

**Shall We Call It
Global Warming,
Climate Variability or
Human Climate Disruption?**

**The Social Construction of
Global Warming**

Mike Page

Submitted to the 2005 Berlin Conference on
The Human Dimensions of Global Environmental Change

Shall We Call It Global Warming, Climate Variability or Human Climate Disruption?

Abstract

The social construction of global warming is different from both the scientific and policy aspects of global warming. It relates to the attitudes and behaviors of individuals and society at large that science cites as some of the root causes of global warming. It can be tracked through the content analysis of prominent media streams from the mid-80s and can be shown to follow Downs' issue attention cycle.

After reviewing these considerations, a social reconstruction of global warming is proposed that incorporates aspects of social psychology and catastrophe theory that can be evaluated in an agent-based simulation.

Introduction

This paper explores the ways in which the social construction of global warming as a societal issue is developed and how the relative presence and makeup of this social construction in the public's worldview can be inferred through content analysis. Global warming, as most would know if its social construction has had the intended personal cognitive impact, is the scientifically predicted phenomena of a gradual rise in global mean temperatures due to an increasing concentration of greenhouse gases such as CO₂ in the earth's atmosphere. Content analysis, when applied to any or all modes of media

communication, can be used as an indirect measure of the level of awareness that a social construction of societal issues such as global warming has been able to achieve.

Content analytic methods have been applied to the analysis of the social construction of global warming as public and scientific understanding has evolved over the past two decades. The results of these studies suggest that, even though this social construction has evolved and grown more grave over time, the human behaviors behind global warming have not changed sufficiently to move this issue towards resolution. This indefinite state of affairs warrants a closer look at the social construction of global warming to see if there are changes that might renew the possibility that social constructionism can have a significant and positive impact on collectively altering human behaviors towards preserving and restoring the global atmospheric environment. If some or all of the myriad factors of the social construction of environmental issues can be isolated and quantified then experimental investigations of human environmental behaviors by means of agent-based simulation might point towards new approaches for informing society of the issues that exist in a way that results in stronger action than exists today.

Overview

This paper has five parts. Part I covers general aspects of the social constructionist perspective and how it applies to global warming. Part II will discuss content analysis and how media communications reflect the social construction of global warming. Part III will revisit the general description of social construction and examine how the integration of certain key concepts from social psychology might be able to shift the

focus of social constructionism from society at large to the individual actor in society and individual behavior. Part IV draws in a small number of analytical tools and discusses ways in which they might be used to model the substance of Part III. A summary follows in Part IV that includes a proposal for further research, highlighting several of the key assertions made in preceding sections with suggested approaches for exploring new ideas.

I: Social Constructionism

a) A General Summary

Beginning in the 1970s, social constructionism offered sociologists a new paradigm for the analysis of social problems (Hannigan, 1995). Rather than tracing detectable social ills to a root cause (as in the structural functionalism of Merton and Nisbet, 1971), social constructionism accepts the expression of concerns over social conditions made by interested ‘claims makers’ to a legitimate institution or organization as sufficient to establish the existence of a social problem. In the social constructionist paradigm, society speaks for itself with regard to issues of concern and the sociologist analyzes the claims that have been made. This stands in contrast to the structural functionalist perspective in which it is the sociologist who frames social problems and their causes by identifying moral violations that might exist in society. Some of these problems might be obvious but others might possibly be mistaken, obscured or disguised.

The social constructionist perspective involves several levels of analysis. At the highest level, the sociologist investigates the claims being made, the constituency of the claims-making group and the activities that have been utilized to present their claims. According

to Hannigan, citing Best (1987), the content of claims must be analyzed along with the methods by which they are presented. The substance of the claims can be evaluated for their validity by examining the facts, examples or predictions incorporated into the claims.

The presentation of claims generally relies on the use of rhetoric to emphasize the substance of the claim and to persuade an audience to adopt a position of like thinking. The choice of the most effective form of rhetoric to utilize in the claims making process will depend on the audience and the desired response that will best promote the claim.

Hannigan outlines a number of identifiable types of rhetoric. The rhetoric of rationality appeals to cognitive processes for judicious action: “The scientific community has arrived at a consensus opinion on the causes of global warming”. The rhetoric of rectitude appeals to outrage or indignation and inspires judgment and action based on values or morals: “We are slowly killing the planet that our children will inherit”. Archetypes can be effectively coupled with the rhetoric of rectitude as examples of eventual results if wrongs are not righted: “Gas-hungry, pollution-spewing SUVs”. Rhetorical idioms are words or phrases designed to become colloquialisms that conjure up mental images or emotions when used: “Urban sprawl”. Rhetorical motifs work much the same way, by equating the character or identity of an unfamiliar social issue to a commonplace idea: “Environmental regulation is ‘crippling’ the economy”. The rhetoric of endangerment implies impending misfortune or disaster: “Water crisis looms as Himalayan glaciers melt”.

The use of rhetoric is a common practice in the development of persuasive arguments. Advertising and marketing are excellent examples. The Young & Rubicon advertising agency integrates rhetorical content dealing with a small group of abstract characteristics in their approach to product presentation. They have found that if their campaign (utilizing rhetoric in claims-making) follows a strategy that emphasizes these characteristics then they can enhance product appeal to consumers beyond what they might normally expect. This approach, known as 'Brand Asset Valuation', focuses on uniqueness, relevance, stature and familiarity. Brand Asset Valuation, viewed as social constructionism, suggests that there is a small set of abstract qualities that, when wrapped in rhetoric, can facilitate the success of a claims-making effort. Social construction does not necessarily have to address the particular qualities given above as examples but it should be clear that claims-making for social construction, even for large issues such as global warming, might be a simple and possibly indirect process utilizing the correct rhetoric at the correct time to trigger specific collective responses in the social worldview.

b) The Social Constructionism of Global Warming

Stehr and von Storch (1995) discuss the social construction of climate change, starting with the simple observation that "society depends on climate" followed by the question "... what is the effect of climate anomaly on society?" Their answer is that the degree to which society is impacted by a climate anomaly such as global warming is largely dependent on the time scale over which the anomaly occurs. Global warming, evincing

itself over a time scale that stretches over decades¹, has not yet gained a consistent level of urgency in the societal worldview. This is a major challenge, in their view, to the establishment of a social construction of global warming that is correct and effective. They see considerable confusion in the public mind about what global warming really is and what it is not.

Stehr and von Storch explain that while weather (precipitation, temperature, clear skies, storms) influences decisions and actions on a daily basis and natural climate variability (flood, drought) can cause societal impacts that persist for weeks or months, concern over global warming does not influence society with anything close to the same immediacy. Stehr and von Storch assert that society is biased in its sensitivity to normal weather events and extremes and is confusing these extreme events with the character of global warming. Thus the prevailing social construction of global warming, though it is characterized as a serious long-range issue, is focused on and stimulated by the wrong phenomena.

While an increased frequency of extreme weather events is one of the predictions of global warming, weather events can be extreme even within normal climate variation. A good example of this is the series of damaging storms that struck northern Europe in 1991 and 1993. Some of the media coverage of the storms offered the conclusion that

¹ In 1863 John Tyndall first posited the possibility that small changes in the atmospheric concentration of CO₂ due to industrial activities could cause global temperatures to increase.

global warming had caused these extreme events even though Schmidt and von Storch (1993) in *Nature* were later able to show that the storm events were completely consistent with normal statistical variability. But media coverage by the popular press (in which *Nature* is not included) is a primary source for the public's understanding of global warming and hence, its social construction.

The social construction of global warming therefore faces the challenge of distinguishing itself from the experience and understanding of the normal, though sometimes extreme, variation of weather and climate. This is a conflicted situation. The public *has* absorbed a social construction of global warming but it is sometimes created by false claims reported in the media. The very basis of the social construction of global warming held by the public is at risk when extreme but statistically explainable weather events are taken to be evidence of global warming. The public might then conclude that there is little that can be done to prevent these extreme events of rapid onset and, when normalcy resumes, the mistaken social construct loses its power to induce changes in environmental behavior. No human behavior can prevent the next wave of extreme events so a resignation to the eventuality sets in.

There is also evidence that the public has equated ozone depletion with global warming, believing that larger holes in the layer of stratospheric ozone over the South Pole are allowing the observed increase in the level of solar warming (Henry, 2000). This confusion might again be confusion over the complex science involved and the way they rely on media translation and communication of the science. This transliteration may

simply be because chlorinated fluorocarbons (CFCs) are responsible for the thinning ozone layer but they are also a greenhouse gas. They are heat-trapping gases in the atmosphere much like CO₂ but much less impacting. CFCs play a role in both phenomena and, knowing that, the public, via the media, may have merged social constructs that really should remain separate.

Framed in the analysis of claims making discussed above, Stehr and von Storch would claim that the rhetoric of rationality employed by the scientific community to introduce global warming as a social issue has been replaced or overshadowed by the more powerful rhetoric of endangerment conveyed by the media. This evolution, that the scientific community and the media seem to be working at crossed purposes, was an implicit part of Hannigan's description of rhetoric in the claims making process and its dependence for success in affecting social construction on type, timeliness and desired response. Hannigan explains that the claims making process in social constructionism is more effective if it first employs the rhetoric of rectitude or, similarly, the rhetoric of endangerment, a practice with which science seems to be incompatible. According to Hannigan, the rhetoric of rationality is most effective and is usually employed in the development of policy. The popular media has simply more successful at establishing a social construct of global warming in the public's worldview than has the scientific community due to accessibility both intellectually and on the basis of exposure frequency.

A further consideration of the claims making process in social constructionism of global warming is the way in which rhetorical idioms have been or can be used. Some have criticized the term 'global warming' itself as having positive connotations (warm is good). The same is true of 'the greenhouse effect' or 'climate change' (greenhouses grow beautiful plants and change is good). Opponents of action taken to address the factors causing global warming have introduced the term 'climate variability' and play upon the qualified uncertainty of scientific predictions of global warming. Perhaps a new rhetorical idiom such as 'human climate disruption'² would be more effective in immediately communicating the true nature of the phenomena. This term includes an allusion to human cause and implies the undesirability of disruption (more harsh than 'change'). It also conveys an element of the rhetoric of endangerment and should be comfortable terminology for the scientific community. This kind of simple rhetorical idiom is common and necessary in the battle of persuasion over the social construction of global warming. 'Human climate disruption' is the term that this paper will adopt following the next section discussing content analysis when a synthesis of concepts will be pursued.

II: Content Analysis

a) A General Description

Content analysis, in its simplest form, can be used as a tool for measurement of the level of presence of a social construction in the public worldview. It is a straightforward concept (Vining and Tyler, 1999). A tally is made of the number of occurrences of a selected keyword in the body of text or language drawn from elements of some stream of

² It is possible that this is new and unexplored terminology. It does not show up as a unique phrase on Google.

media communication. Newspapers, magazines and television are common sources for this treatment. If a count is collected for the same media source over a period of time, the variation can be viewed as indicating the changing strength of a social construction in the social worldview. This longitudinal approach has been used many times to illustrate Downs' issue attention cycle (Krosnick, et. al., 2000).

A slightly more sophisticated approach to content analysis is concept mapping (Miller and Reichert, 1994). In this application a number of keywords are grouped into phrases that can indicate the subjectivity of the media item.

Content analysis is greatly facilitated by the use of computers and software that can draw from a wide range of sources very quickly and in large volumes. Internet accessibility of the National Newspaper Index is invaluable for this purpose.

b) Content Analysis Applied to Global Warming

Global warming came to widespread public attention in the late 1980s (Williams, 2000). The existence of the Antarctic ozone hole had been verified in 1985. CFCs had been slated for phase out as part of the Montreal Protocol of 1990. In this same timeframe, NASA scientists in the USA declared that three of the years between 1979 and 1988 had been the warmest on record.

June 23, 1988 was the first anniversary of the hottest day ever recorded in Washington, D.C. On this day, which set another high temperature record for D.C., Dr. James Hansen,

a NASA climate scientist, was scheduled for the third time to testify before the U.S. Senate on global warming. This time he testified that he could state with statistical certainty the global warming was causing the recent record temperatures (Mazur and Lee, 1993; Trumbo, 1995). The nation's 'prestige press' (the New York Times, the Washington Post, the Los Angeles Times, the Christian Science Monitor and the Wall Street Journal), of course, recorded these events.

Trumbo (1996) conducted a content analysis of the reports as compiled in the National Newspaper Index. The impacts of the testimony of James Hansen in 1988, along with other factors, are clearly reflected in the level of news coverage in these publications illustrated in Figure 1.

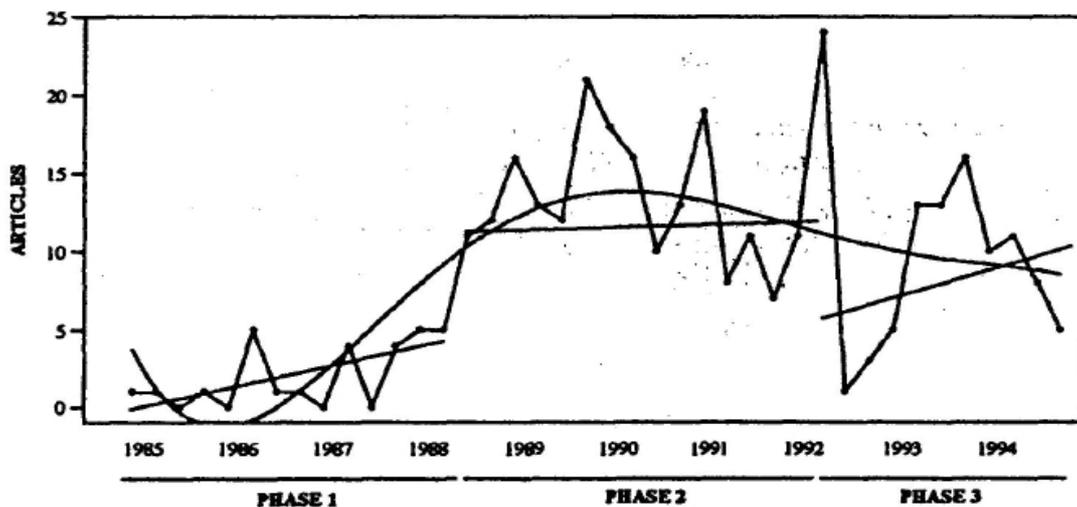


Figure 1. Number of articles on global warming in five national newspapers (Trumbo, 1996)

Trumbo's content analysis of news reporting covering this period is very rich, evidentiary and much more exhaustive than most other research conducted on this subject. His 1996

paper, cited above, dealt only with news articles published by the prestige press. A monograph, published in the preceding year analyzed the science press, news magazines, opinion polls, television and the Congressional Record as well. This more complete treatment will be examined shortly.

Trumbo's analysis of newspaper reporting identifies three of the five phases in the issue-attention cycle predicated by Downs (1972). The "pre-problem" phase corresponds with the first linear segment (1985-1988) imposed on the plot of article count in Figure 1. News coverage during this period was low since the activity here was primarily scientific and had not yet entered the political realm (Wilkins and Patterson, 1991). The fact that there is any popular coverage at all at this point is probably due to the preceding revelations about the ozone hole: concerns over the human impacts on the atmosphere were mounting and there was relief that actions had been taken to address ozone depletion. Environmental issues dealing with the atmosphere were a continuing background during this period but also prepared sensitivities for the second of Downs' five phases, "alarmed discovery".

Hansen's 1988 testimony is a clear marker for the initiation of the second phase of the issue-attention cycle (1989-1992). Impetus was added to this event by the severe drought experienced by much of the nation during that summer and the intense fires that threatened to consume Yellowstone National Park. Newsweek devoted a full issue to global warming and Time magazine named Earth the Planet of the Year. In 1989 President Bush promised action on the greenhouse effect, pledging to counter it with 'the

White House effect'³, completing the shift of notable events from the scientific community to the political in the eyes of the media that Wilkins and Patterson describe.

Downs' third phase (1992-1994) in the issue-attention cycle is 'the realization of economic cost'. The fossil fuel industry battled hard to counter alarm over the specter of global warming. Aided by low fuel prices and an exploding demand for energy (China showing the largest increase), they factored economic costs into the debate. White House Chief of Staff John Sununu was a key proponent of a 'go slow' approach to action on global warming. His recommendations were included in President Bush's remarks to the Rio Earth Summit in 1992 that effectively established the U.S.'s minority stance in the world as more concerned with economic growth than with global warming. Despite the lukewarm stance taken by the Bush administration, there was a general sense of relief that action had been taken. National news coverage of global warming subsequently declined and the issue subsided from the American public's awareness.

Trumbo's analysis would seem to indicate that the issue-attention cycle is currently in its fourth phase. But Downs predicts a fifth phase in which interest remains low but may exhibit short periods of recurrence of interest. This may be the situation reported by Shanahan and Good (2000) in which warmer than normal temperatures, regardless of season, in New York and Washington, D.C. seem to spur renewed media interest in the topic of global warming, reinforcing the incorrect social construction of global warming.

³ Note the rhetorical idiom in use here.

In the same study, Trumbo also illustrates the changing frame of the global warming discussion in the media, what Gurevitch and Levy (1985) refer to as ‘a site on which various social groups, institutions, and ideologies struggle over the definition and construction of social reality.’ By frame, Trumbo has in mind a ‘tone’ or summary message derived from a content analysis that involves more than keyword scoring. Frame analysis is even more powerful than concept mapping since it requires a complete analysis of each individual report. The tones come in four flavors: problem statement, analysis of cause, calls for action and proposed remedies. In the global warming debate Trumbo sees three types of claims makers: scientists, politicians and (special) interests (both pro and con). Within the media coverage analyzed, the relative amount of framing credited to each of the claims making groups changes notably with the phases of Downs’ issue-attention cycle. As might be deduced from the previous discussion, there is a marked shift in the claims making within any frame among scientific, political and interest sources. Scientific sources were cited twice as often as the other two groups combined during phase one and half of these claims from the scientific community addressed the causes of global warming. In phase two, the scientific community still holds sway in the claims making process but the other two groups make significant gains during a period when newspaper coverage nearly quadrupled. Moral judgement, made collectively by all three groups, dominated the dialog during this phase. In phase three the three parties are on an even par as far as their service as sources for newspaper reporting. The volume of coverage in this third phase fell by more than half. Discussion of cause diminished, claims based on moral judgement declined slightly but discussion of

remedies became a significant part of the dialog, likely as part of the coverage of the Rio Summit.

The shift from the scientific perspectives on global warming to those of politicians and interests is easily understood as part of the transitions between Downs' phase one and phase two. But what might cause this shift? Scientific research and discovery revolving around global warming continues but less voice is given to these perspectives in the media beginning with Down's third phase. Boykoff and Boykoff (2004) attribute this change, at least in the 'prestige media', to the desire for 'balanced coverage', compressing the scientific voice to make room for the viewpoints of politicians and interests. Boykoff and Boykoff actually see this balanced reporting as a bias; not an ideological bias but one that follows from 'journalistic norms and values'.

A 1995 monograph written by Trumbo seems to be (paradoxically because it was produced a year earlier) an expansion of his research in 1996. Reviewing a much wider variety of media sources than just the prestige press in his content analysis, he included television news (NBC, ABC and CBS), news magazines (Time, Newsweek and U.S. News & World Report), twenty different scientific publications, poll results registering global warming in the Extreme Concern Index (ECI) and The Congressional Record registering policy activity (Figure 2). Each of these additional sources approximates newspaper reporting but the much wider data sampling allows for a very interesting extra dimension of analysis.

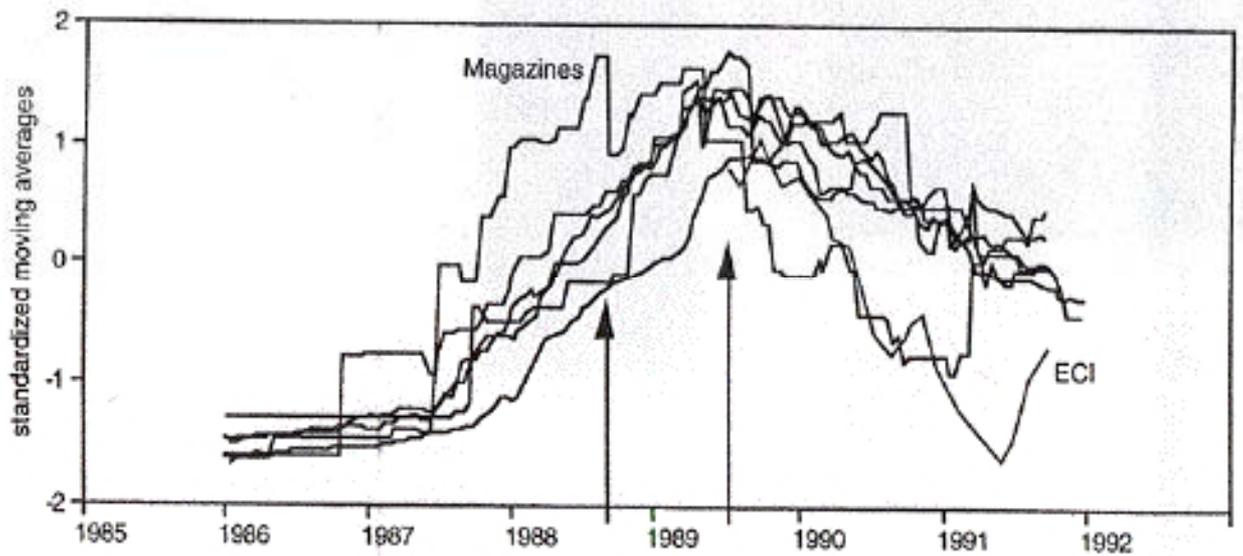


Figure 2. Reporting of multiple media sources on global warming (Trumbo, 1995)

From this dataset, Trumbo was able to deduce the relationships between the different media types in terms of which might influence reporting of the other in terms of how quickly a report in one media stream appears in a report presented by another media stream. Trumbo conducted not only a longitudinal tracking of content but also evaluated influence between media types. There is, however, no attempt to assess the accuracy of reporting in this analysis (or in the 1996 report). The global warming-focused reporting in these media streams might still be the inaccurate representations which concerned Stehr and von Storch so greatly.

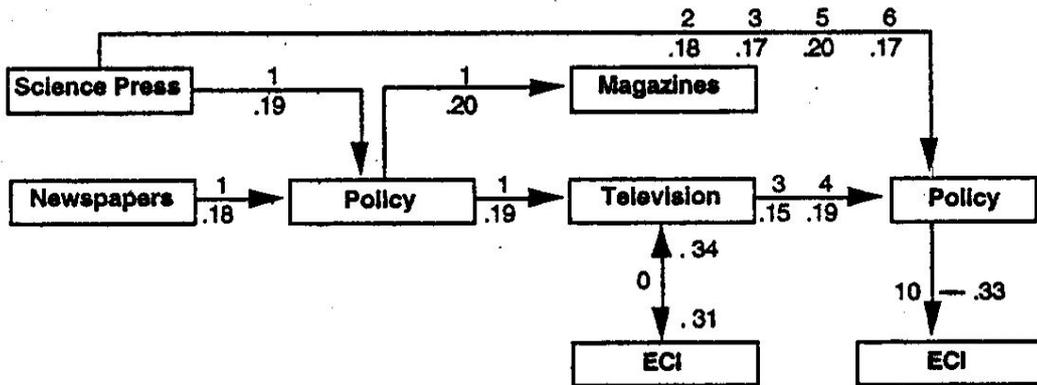


Figure 3. Influence between media types showing time lags and strength of influence (Trumbo, 1995)

Figure 3 shows the results of a cross correlation analysis between media types to determine which influences exist between the media streams and how strong the influences are. The integer labels between the boxes representing different media types represent a time lag of two weeks per unit, i.e. a lag of 1 unit between the science press and policy and newspapers and policy represent a delay in the reporting of the same events of two weeks. The relationship between television and polls is the strongest of all of the links (largest decimal value), has a 0 lag and is bidirectional, indicating that television news content is driven by the immediate concerns of its viewers and viewers are concerned by what television reports to them. Of special note is the extremely large lag between policy (Congressional Record) and its negative correlation with the ECI (opinion survey). This would seem to imply apathy bordering on opposition in the public response to policy.

The level of influence which one media stream is able to exert over another, combined with the shift of coverage from one group of claims-makers to another within frames, all

illustrated by Trumbo in his 1995 and 1996 reports, sheds an intriguing light on the social construction of global warming. From a social psychological viewpoint, the presence of these actors in the claims-making process and their relative statures, i.e. the strength of influence that this type of network analysis would point out, is an indicator of the social power that they hold. The next part of this paper explores the concept of social power as an explanatory tool for these shifts and differences in stature. With this insight it is suggested that there are deeper ways to view and accomplish social construction than were presented by Hannigan.

III: Social Power in Social Constructionism

In his discussion of the social construction of environmental issues, Hannigan explains that claims makers need 'both to command attention and to legitimate their claim'. Claims are legitimated through rhetoric that is properly formed, directed and timed. But how does a claims maker 'command attention'? The command of attention is accomplished, social psychologists would say, through the exercise of social power.

French and Raven (1959) define social power as change in a person's cognition, attitude or behavior which has its origin in another agent (person or group). In this classic work they delineate five types of social power:

- 1) An agent with coercive power forces a choice of action to avoid adverse consequences.
- 2) An agent with reward power can transfer positive or remove negative consequences.

- 3) An agent with legitimate power exercises influence by virtue of acknowledged authority.
- 4) An agent with referent power exercise influence through charisma or perceived benefits of association.
- 5) An agent with expert power exercise influence through the possession of superior content knowledge, intelligence or training.

Hannigan's description of Brand Asset Valuation can be viewed within the context of social power because the example of four key product attributes exerts social power over a consumer. Uniqueness corresponds to expert power: this product is smarter and better than any other product. Stature corresponds to legitimate power: Purchase of this product is an acknowledgement of its superiority. Relevance and familiarity correspond to referent power: this product is important and comfortable.

Social constructionism, framed in the language of social power, can be conducted in much the same way that product marketing utilizes Brand Asset Valuation. The three phases outlined by Hannigan might be developed in this way:

- 1) Claims – Experience or knowledge (expert power) explains the factual basis of social ills.
- 2) Claims maker – A recognized spokesperson (legitimate power) has the duty to inform society of the existence of a social ill and urge a course of action.
- 3) Claims making – The spokesperson, by persuasive arguments (rhetoric), draws others into like thinking and action (referent power).

An example of the use of social power to influence environmental behavior can be found in the Nordlicht⁴ Campaign (Prose, 1996). To supplement the usual application of technical solutions to solve environmental problems, Prose and his team developed a plan they termed Participative Social Marketing (PSM). Their goal was to reduce the generation of CO₂ by stimulating a reduction in the consumption of fossil fuel resources in the German state of Schleswig-Holstein.

Hoping to capitalize on the spread of behaviors through social networks, they prepared leaflets for distribution that described ‘relatively easy opportunities’ (low cost threshold, Diekmann and Preisendorfer (2003)) for reducing dependence on automobiles for individual transportation and other energy-saving actions. The leaflets included coupons to be signed and returned to the Nordlicht Campaign office as a symbol of personal commitment to incorporate the recommended changes in consumptive behavior. Local and regional sponsors such as businesses, clubs and banks printed and distributed the leaflets and were allowed to include their logos on the leaflets, exploiting referent power. Sponsorship was designed to appeal to social and regional identities and create a spiral of positive behavior. Over the first three years of the campaign, 12% of regional households had signed on. In the state capital of Kiel electricity consumption was reduced by 3%. In the first month 100,000 km were traveled by alternative means of transportation.

⁴ Nordlicht in German means ‘northern lights’. The name is supposed to convey the leadership of industrial Northern countries to do what it takes to slow human climate disruption, cutting back on CO₂ emissions in this case.

Participation in the campaign over and beyond the reporting period was a source of pride among residents and enrollment continued to increase.

In addition to the referent power used to foster interest in individual participation, expert power was undoubtedly used to develop the information content of the leaflets and the leaflet sponsors provided legitimate power.

As a grander example of the effectiveness of social power, consider the oldest social construction of the environment that there is:

Genesis 1:28 - God said unto them (Adam and Eve) “Be fruitful and multiply and replenish the earth and subdue it and have dominion over the fish of the sea and over the fowl of the air and over every living thing that moveth on the earth.”

In this verse God:

- 1) is the claims-maker possessing the ultimate in expert power as the Creator of heaven and earth.
- 2) uses the legitimate power of ultimate authority as Creator to entitle Adam and Eve to complete control over the environment that they live in and to create more life in the image of God.
- 3) uses referent power to encourage them to hold dominion over all things, much as God does.

In the Old Testament, there is no more of a legitimate power than God's and, since God created the universe, God is absolutely the ultimate and unquestioned expert on all matters.

The Quoran (31:20) contains a similar passage. Eastern religions tend to have no environmental prescription either (McNeil, 2000). A belief in the word of God or Allah or Buddha is not required to see the lasting impact of this social construction or doubt its effectiveness. It is a construction that still permeates thinking, millennia after its development.

This scale of this social construction may not be achievable today but the direction for the task of socially re-constructing human climate disruption should be clear. Scientists need to enhance their expert power by eliminating uncertainty in their claims or, at least, reduce concern over it. Someone or some group with sufficient legitimate power must be the communicator of this social construction and referent power must be enhanced to attract and encourage others to exhibit and advocate behaviors that are environmentally friendly. And, most of all, understanding of the phenomena in the media must improve.

All of these things and more need to happen if a social construction of human climate disruption will be able to replace the social construction of global warming that exists today. The current social construct is having little real impact due to its historical development. The original claims makers were matched by their opponents who made a more persuasive argument out of uncertainty and economics. But the experience does not

have to go waste. Much more is known now about how the debate over global warming transpired and why. Perhaps the process could be restarted with the hope for a different result. But this must be done in a timely fashion because the planet is already, according to climate scientists, committed to serious climate disruption for the next for the next 400 years (Meehl, 2005; Wigley, 2005).

Scientists, politicians, special interests and the media developed the current social construction of global warming over a period of decades. If development of a more proper and correct social construction is to be undertaken, as a renewed initiative, it must be sensitive to the fact that the health of the planet has already been compromised. Developing a new social construction in real society will likely take the same length of time as it has in the past. Fortunately there are experimental methods that can be applied to social systems. Sociology has been drawn into the computer age with the development of computational sociology and agent-based modeling. With these methods, societies and possible societal outcomes can be experimentally studied over a multitude of scenarios and within a much more appropriate timeframe. The next section discusses the basic approach to these methods.

IV: Social Modeling

Reflecting on the social construction of global warming, it was suggested above that the term 'human climate disruption' be used instead of 'global warming'. Switching to this new term is an exercise in social construction in itself because this rhetorical idiom conveys the anthropic source of objectionable conditions. It instills a sense of alarm by

employing the rhetoric of endangerment and. It creates a discomfort with personal actions and spawns a consideration of what conclusions certain behaviors can have. A psychologist would say that it creates a 'cognitive dissonance' (a confusion over what's right and what's wrong) within an individual. A sociologist would probably describe the situation on a societal scale as a 'social dilemma' (Staats, 1996). It is the salient factor in the 'low cost hypothesis'.

Individuals, with consideration of their own social construction of human climate disruption, develop a framework in conformance with their values and use it to rationalize their behaviors and resolve any cognitive dissonance they might experience. Essentially they develop their own Brand Asset Valuation based on the referent power they hold over themselves.

A model of the processing of cognitive dissonance that takes place within an individual is shown in Figure 4 (Mosler, 2002). He describes the function of the model this way:

“If individuals experience a dissonance between attitude and behavior, they will attempt to reduce the dissonance; there will be a change of cognition (cognised attitude or cognised behavior). That cognition will change that shows the least resistance to change. A comparison of attitudes and behavior with held values yields a resistance to change. Personal values make up a person's general, basic orientation. The greater the resistance to change is, the smaller the difference between values and

attitude or behavior. This means that the more that an attitude or behavior “fits,” or is consistent with, the importance, or value, the person places on things, the greater the resistance to change. The extent of attitude or behavioral change is determined by the difference between these two variables, or in other words, by the magnitude of the actual dissonance.”

“This change in attitude or behavior is then weighted in terms of self-responsibility, in such a way that if a person has no feeling of self-responsibility, there will be no change, as no dissonance exists.”

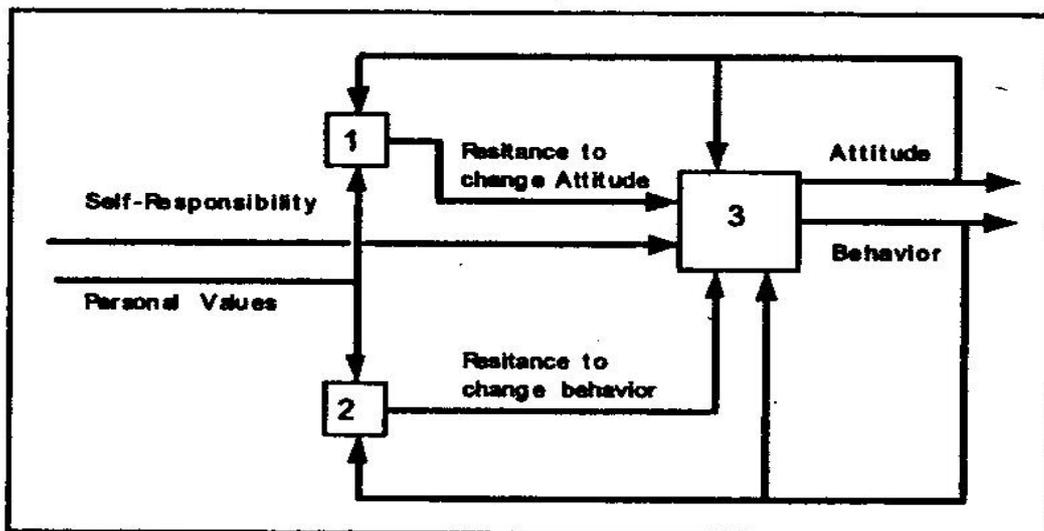


Figure 4. Model of how an ‘agent’ might process cognitive dissonance (Mosler, 2002)

Simple models such as this form the basis of a fairly new discipline called computational sociology. Agent-based social simulation utilizes very large numbers of individual agents, initialized with a range of characteristics simulating personal values to model response to a simulated social environment. To model response to a construction, agents would be initialized with the same information about their social and environmental

surroundings and are then allowed to interact with those conditions and with each other. Outcomes of emergent behavior can then be analyzed against hypothetical predictions.

To show the efficacy of his model, Mosler (2002) tested predictions of agent-based modeling against the results of a real-world campaign to reduce driving speeds in Munsingen, Switzerland. The campaign enlisted the participation of one fourth of Munsingen's 4,000 car owners. All participants were given pre- and post-campaign questionnaires to register changes in behavior and attitude. An environmental and safety value for slower driving was among the attitudes surveyed. During the campaign, feedback mechanisms such as signage and speed monitoring devices were put in place and were intended to drive the dissonance comparison in the participants, much like the central comparator function of the agent model.

Results of the agent simulation were very close to those reported by the participants of the campaign regarding attitudes but less so for behaviors. Nonetheless, the principle was acceptable that success of a campaign to modify behavior could be closely modeled by this method.

The ability to model individual behaviors en masse presents a very interesting approach to the study of societal behavior. This would be especially true if individual agents could be given varying endowments of the social powers outlined by French and Raven (see above) and allowed to interact. A tangible element of realism should be included in the

‘agent society’ by initializing the agents according to a sampling of existing profiles of real societal constituents and allowing interactions to follow a realistic pattern as well.

The response of a society of agents, each one much more complex than the simple model above and immersed in a simulated but realistic social environment, could be measured for varied agent properties and social factors. Great insight would be needed to design processing within the agents and what factors of the social environment should be included as influences on agent behavior. Mosler’s agent is but one example. Moser and Dilling (2004), in discussing risk communication, list three other social factors which would also make up an interesting set of agent characteristics: perceived self-efficacy in responding to a threat, expected response costs and intention. Social psychology can certainly provide a longer list as well. At issue is agent complexity, which should be kept as simple, as possible but sufficiently robust that meaningful results can be derived.

What is sought in this approach is to determine whether or not influential factors within the social environment can be configured in such a way as to move the collective behavior of agents in one direction or another to a desired outcome, i.e. can the environment of the agent society be ‘socially engineered’? Since this is an experimental system that answer is probably yes since social and environmental conditions are an experimental parameter. Any number or type of factors may be included and varied at will. With sufficient experimentation, the salient factors that exhibit a notable influence can be determined.

In the course of the experiment, agent behaviors can be measured on many different scales. If the experiment is designed to measure environmental behaviors then knowledge will be gained regarding the observed behaviors as a function of variable social and environmental factors. A picture will eventually emerge, possibly like Figure 5.

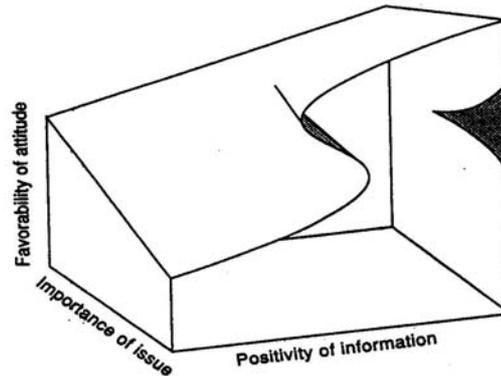


Figure 5. Catastrophic behavior change as a function of information and issue relevance.

(Vallacher and Novak, 1994)

Figure 5 illustrates the nature of a catastrophic (not necessarily bad, just sudden and drastic) change in attitude as a function of two social factors: positivity of information and importance of issue. What's important here is the combined effect of the nature of information *and* relevance on attitude. When importance is low and information is less positive then attitude is low. When importance is high and information is more positive then attitude is high. What the combination of the trends in these factors allows is the possibility that the manifold that represents attitude will overlap itself. The overlap creates the possibility that attitude can 'leap' from one value to another where attitude is significantly different. Variation in importance and positivity trace a continuous path across the attitude manifold until the combination reaches the edge of the overlap and attitude must change drastically as these driving factors continue to vary. Regions of

overlap would not be known a priori but, if they do exist, should be observable and reproducible by experiment.

To tie this concept back to agent-based social modeling: If the proper components of social conditions can be identified that can be varied in order to move a population of agents to a region in the social environment where environmental behavior is multi-valued as in the figure above, then a catastrophic change in environmental behaviors is allowed to occur. The desirable movement of behaviors would be from low to high and towards the region where the change in behaviors would be drastic, sudden and positive. The reverse scenario would be of interest also as a configuration to be avoided.

Moser and Dilling (2004) write about 'inertia in our social systems' to characterize the slow or nonexistent changes in human behaviors related to climate change despite all that we know about it today. 'Inertia' would aptly describe the situation on the behavior manifold in Figure 5 in which behavior is single-valued: changes in social factors yield small, incremental changes in behaviors. But recent events such as the attacks on the World Trade Center, bombings in London and Hurricane Katrina show that changes in attitudes and behaviors can indeed be sudden and drastic.

Development of a simulated society through experiment as outlined above might be able to give clear guidance to a strategy for the social reconstruction of human climate disruption ... in theory, of course.

V: Conclusions

The seed of the view of behavior as a quantity that can undergo drastic and sudden changes came from an article in Scientific American (reference long lost) that I read as a teen. The article used a dog as an example and drew the manifold of behavior in which the dog was friendly at one end and vicious at the other. In between the dog could be either but we're all familiar with the possibility that a dog can change behaviors suddenly and drastically, sometimes with harmful consequences. The sudden change in behavior was couched in the theory of catastrophes that can be used to also describe the failure of structures; stock market crashes and rallies, mob behavior, the political electorate and lasers.

The idea of catastrophic changes in behavior came back to me when reading Trumbo's 1995 paper on content analysis. The smooth curve in Figure 1 is a fifth order polynomial fitted to the article count data. A fifth order polynomial has four inflection points; locations where it changes slope. Trumbo found that the curve's second inflection point coincided closely with Hansen's 1988 testimony and that the third approximated the timing of the Rio Summit. These were social events that caused sudden changes in the social construction of global warming.

There is not enough room or time here to fully explore the implications of catastrophe theory for social construction but it is certainly an intriguing concept. Thus I propose further research in this area.

I have left open the questions of what social factors should be included in an agent-based social simulation to explore environmental behaviors because this is a huge question and will have to be explored diligently. But a few do come to mind. Within the agents, the capacity to develop, exercise and respond to the various types of social power needs to be included along with personal values and self-responsibility. The same is true for all of the aspects of rhetoric. Hopefully the simulation will show that some of the agents rise to the role of claims maker.

One particular factor came to my attention recently, what Staats, et. al. (1996) call 'depersonalized trust'. This is another term from social psychology that represents the belief I have that another person, culture or nation outside my observable range is fulfilling a mutual commitment to action so that I do not feel that I am being cheated. One can certainly see that the interests opposed to curbing energy consumption as a preventative measure against human climate disruption have inflamed depersonalized trust to gain ground in the argument.

This discussion started with an outline of social construction and drew in the concept of social power as a critique of the existing process. I believe that if individual behaviors are to be motivated then tools that focus on individuals must be employed. Surveys only measure. They do not motivate.

Development of a social construct as described by Hannigan takes a considerable amount of time and currently can only be fully understood in hindsight. This is why I suggest

taking the social construction process into the computer lab. It can be studied there without harmful effects and many variations can be tested until one is found that can be effective. But it does not necessarily take years of computer modeling to predict that if the social construction of human climate disruption is going to be redeveloped to a more effective conclusion then it will have to involve a world leader with tremendous legitimate power within their own governance and significant referent power over other world communities. And they will embrace the expert power of the scientific community. We do not have this now ... anywhere. It will take tremendous effort to overcome the environmental construction that God laid on humankind in the Garden of Eden.

It is curious that Trumbo did not include opinion pieces in his content analysis for any of the media streams he looked at. This left out the perspective of the individual that is not necessarily subject to the constraints for balance, sponsorship, etc. faced by the media. There is also the criticism for the media in that it is too often the case that they misrepresent and misreport (usually unintentionally) the true nature of human climate disruption. This calls the value of Trumbo's content analysis into question. What is truly being analyzed if data relies on the presence of a keyword or key phrase in some media product? Content analysis should be preceded by a careful analysis of factual content but this represents quite a bit more work. Content analysis should also be correlated with behavioral changes if the social construction is one that induces that, i.e. a social construction of human climate disruption should induce reduced energy consumption. This was seen in the Nordlicht campaign. Since this kind of change is easily measured it should be a guide to the quality of the results of content analysis.

Finally, I would like to conclude that if the study of social construction is going to remain in the domain of sociologists then the discipline should open itself up to existing knowledge in other fields. There is much to be gained by collaboration and integration. This is something I hope that I've been able to show.

References:

Best, J. 1987. "Rhetoric in claims-making." *Social Problems* 34(2):101-21.

Boykoff and Boykoff , 2004. Balance as bias: global warming and the US prestige press. *Global Environmental Change* 14, pp. 125-136.

Diekmann, Andreas and Peter Preisendorfer. 2003. "Green and Greenback: The Behavioral Effects of Environmental Attitudes in Low-Cost and High-Cost Situations." *Rationality and Society*. 15(4):441-472.

Downs, A. 1972. Up and down with ecology: the issue-attention cycle. *The Public Interest* 28, pp. 38-50.

French, J. R. P., Jr. and Raven, B., 1959. The bases of socialpower. In D. Cartwright (ed.) *Studies in social power*. Ann Arbor: University of Michigan Press, pp. 150-167.

Gurevitch, M., and Levy, M. R., 1985. *Mass Communications Yearbook*, Vol. 5 (Beverly Hills, CA: Sage). p. 19.

Hannigan, J., 1995. *Environmental Sociology: A Social Constructionist Perspective*. (Routledge, NY) 1995.

Henry, A. D., 2000. Public Perceptions of Global Warming. *Human Ecology Review*, Vol. 7, Number 1, pp. 25-30.

Krosnick, J., Holbrook, A. and Visser, p., 2000. The impact of the fall 1997 debate about global warming on American public opinion. *Public Understanding of Science*. 9, pp. 239-260.

Mazur, A, Lee, J. 1993. Sounding the alarm: environmental issues in the US national press. *Social Studies of Science* 23, 681-720.

Meehl, J. 2005. NCAR/CGD seminar presentation. Boulder, CO. April 21, 2005.

Merton, R.H. and Nisbet R.A. (1971) *Contemporary Social Problems*. 3rd edition. New York: Harcourt, Brace World.

Miller, M., and Reichert, B., 1994. Association for Education in Journalism and Mass Communication Annual Meeting, August 1994.

Moser, Susanne and Dilling, Lisa, 2004. Making Climate Hot. *Environment*, Volume 46, number 10, pp. 32-46.

Mosler,

http://www.iemss.org/iemss2002/proceedings/pdf/volume%20due/407_mosler.pdf

Last visited March, 24, 2005.

Prose, F., 1996. In Facing the Challenge: - Successful Climate Policies in European Cities. Ed.: European Academy of the Urban Environment, Berlin 1996. pp. 55-59.

Shanahan, J. and Good, J., 2000. Heat and hot air: influence of local temperatures on journalists' coverage of global warming. *Public Understanding of Science* 9, pp. 285-295.

Staats, H. J., Wit, A. P. and Midden, C. Y. H., 1996. Communicating the Greenhouse Effect to the Public: Evaluation of a Mass Media Campaign from a Social Dilemma Perspective. *Journal of Environmental Management* 45, pp. 189-203.

Stehr, N. and von Storch, H., 1995. *Climate Research* 5, pp. 99-105.

Schmidt, H., von Storch, H. 1993. German Bight storms analyzed. *Nature* pg. 365.

Trumbo, C. 1995. Longitudinal modeling of public issues: an application of the agenda-setting process to the issue of global warming. *Journalism and Communications Monographs*, 152.

Trumbo, C. 1996. Constructing climate change: claims and frames in US news coverage of an environmental issue. *Public Understanding of Science* 5, pp. 269-283.

Vallacher, R., Novak, A., 1994. *Dynamical Systems in social psychology*. (Academic Press, CA.)

Vining, J., Tyler, E., 1999. Values, Emotions and Desired Outcomes reflected in Public Response to Forest Management Plans. *Human Ecology Review*, Vol. 6 Number 1, pp. 21-34.

(Wigley, 2005) March 17 *Science*, "The Climate Change Commitment," by NCAR scientist Tom Wigley, calculates a continued rise in temperatures and sea level out to the year 2400, using a different computer model.

Wilkins, L. and Patterson, P., 1991. Science as a symbol: the media chills the greenhouse effect. *Risky business: Communicating Issues of Science, Risk and Public Policy* (Westport, CT: Greenwood) pp. 159-176.

Williams, J., 2000. The Phenomenology of Global Warming: The Role of proposed Solutions as Competitive Factors in the Public Arenas of Discourse. *Human Ecology Review*, Vol. 7, Number 2, pp. 63-72.