PUBLIC ATTENTION, POLITICAL ACTION: THE EXAMPLE OF ENVIRONMENTAL REGULATION

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ABSTRACT

In this paper, a rational choice model of the dynamics of public attention to politically relevant issues is proposed, responding to the following research questions: When and why does public attention arise in the first place? Do 'issue attention cycles' really exist? What issues are likely to attain which degree of public attention? How can public attention be measured soundly? In which way does public attention influence regulatory action, and how, in turn, is public attention affected by political action? To this end, the paper sets off with a discussion of the concepts of 'public', 'issue', 'attention' and 'cycle'. Key variables of the causal model include the acuteness/severity and accessibility/visibility of the issue at stake, as well as the ability to 'solve' the underlying problem. In an empirical study, several environmental issues and their corresponding regulation in Germany are examined in order to test the theoretical conjectures which could, for the most part, be empirically supported.

KEY WORDS • issue-attention • media coverage • political action • public attention • rational choice

1. Introduction

One of the most intriguing chapters in media and political science has been the rise and fall of public attention and its impact on – or relationship to – the actions governments and parliaments take in the areas of public concern. Much research – albeit rather selective – has been conducted and many a theory has been put forward. A unifying approach based on a coherent theoretical framework that is empirically operable and able to calculate scenarios is still missing, however.

Rationality and Society Copyright © 2004 Sage Publications. Vol. 16(2): 149–190.
www.sagepublications.com DOI: 10.1177/1043463104043713

To get a picture of the challenges in this field of research and what a theory of public issue attention in modern societies should be able to explain, let us first take a quick glance at the historical and conceptual development in this field.

Public attention and public opinion[1] are, historically, a relatively new phenomenon. A 'public sphere' appeared in the course of the emancipation of the bourgeoisie from aristocracy in England and France in the 18th century involving the rising idea of free citizens – and not merely subjects – having the right to build their own opinion of public affairs and to participate in the public process of opinion formation (see Baumert 1969: 750). In those days, the 'public' largely consisted of personal communication. Reaction times were quite long, and only certain groups could participate in it. It was not until the development of mass media – press, radio, television and later the Internet – that a broader kind of 'public' came into being by enabling virtually everyone to receive and disseminate politically relevant information (McQuail 1994: 4). In this way, mass media constitute an essential element of today's public sphere (Neidhardt 1994: 10–11) and have thus become one central focus of research regarding public attention. In sum, we may state that both a minimum of *individual freedom* as well as a *free press* constitute essential prerequisites to a public sphere in which opinion and attention may be formed. This need not necessarily be a democracy, but most present-day totalitarian regimes certainly do not match these criteria and cannot therefore be the subject of our analysis.

Research developed from two different initial points. Social, political and media scientists have been seeking to explain the relationship between public attention and political action from a public policy perspective (see the literature cited in section 2). On the other hand, as business enterprises from around the 1970s started seeing themselves confronted by public movements especially concerned with issues of pollution, a new research field termed 'strategic issues management' evolved (see Ansoff 1980; Mahon and Waddock 1992; Liebl 1996). By better understanding the dynamics of public attention towards public issues that could directly or indirectly affect firms it is hoped to anticipate the rise of public attention early enough to suitably respond to movements of public attention, e.g. by altering management policy.

The underlying conjecture in these types of research is that public attention often follows clearly discernible, almost predictable,

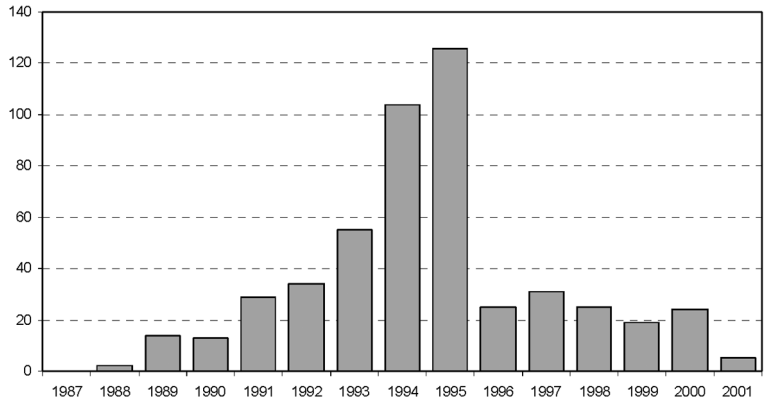

Figure 1. The intensity of public attention towards the issue of summer smog (tropospherical ozone) measured by the annual number of related articles in the German newspaper *die tageszeitung*

patterns. A paradigmatic example is the rise and fall of public attention concerning the issue of summer smog (tropospherical ozone) as portrayed in Figure 1, which we will discuss below in more detail (section 4).

The most popular approach to conceptualizing issue-attention appears to have been the cyclical approach first developed independently by Luhmann (1971) and Downs (1972) identifying 'theme careers' and 'issue-attention cycles' in and of public opinion and attention, respectively.[2] Both authors stress that public attention towards an issue may rise and fall more or less independently of the factual development of the publicly perceived problem or whether it is politically 'solved' or not (Luhmann 1971: 19; Downs 1972: 37). According to Downs, who takes the 'issue' of ecology as an example, public issues often pass through a characteristic issue-attention cycle. Within it, five distinct phases can be distinguished which may vary in duration according to each issue, but which habitually occur in the same order (Downs 1972: 39–41):[3] (1) In the 'pre-problem stage', a highly unwelcome environmental condition exists as such, but is perceived by some experts only, not by the broad public. (2) In the course of an ecological catastrophe or subsequent to other, now clearly visible ecological damage, the public suddenly becomes aware of the problem ('alarmed discovery'). The public discussion focuses on measures believed to

thoroughly solve the problem without realizing the necessary costs ('euphoric enthusiasm'). (3) At the zenith of public attention the difficulties as well as the social and economic costs of the proposed measures gradually become apparent ('realizing the cost of significant progress'). (4) Discouragement, the tendency to avoid cognitive dissonance or simply weariness of an issue may all lead to a 'gradual decline of intense public interest'. Thus, the scarce good of public attention increasingly turns towards other issues of interest.[4] (5) In the final 'post-problem stage', the issue no longer resides within the centre of public attention but may easily be reactivated once new aspects of the problem appear.[5] Starting from this attention cycle heuristic[6] as a frame of reference, we will further explore both its theoretical and empirical content as well as possible links to the way in which governments respond to cycles of public attention. In particular, we seek

- to show why a coherent conceptual framework including clear and operable definitions is essential for an improved understanding of the origins of public attention dynamics and its impact on political action;
- to propose an innovative and integrated theoretical approach to understanding issue-attention, and thereby
- to establish a link between agenda-setting and public choice theory;
- to test the proposed theory by means of a variety of empirical studies; case studies are conducted in the field of environmental politics and legislation, thus ensuring the applicability of Downs' model.

Our general hypothesis concerning 'issue-attention cycles' is: they do exist, there is empirical evidence to substantiate it, they affect political action, and this can be explained within a coherent theoretical framework.

Based on empirical studies, some authors doubt that public attention follows any clearly discernible pattern (Howlett 1997: 25–7; Guber 2001). As we shall see in the following section, however, many of these findings do not conflict with our propositions but may be accounted for by investigating the underlying concepts of 'attention', 'public', 'issue' and 'cycle'. Although an analytical distinction is possible, it should be noted that in the present context the first three concepts are closely related, each presupposing the

other two. Public attention, then, is always directed towards issues, and issue-attention is always public.

2. Some Basic Concepts

'Attention' – Public Attention versus Public Opinion

When aiming to undertake empirical measurements we need to have a precise notion of the sociological construct of public attention. Often in the literature, public attention and public opinion are used as synonyms, or in a similar manner, thus confusing two markedly different concepts. Depending on which of the two is subject to empirical investigation, different authors draw fundamentally different conclusions. For instance, Guber (2001), although drawing on Downs' concept of issue-*attention,* analyses the *opinion* or *attitude* of American citizens towards environmental protection and reports very moderate changes over the course of about 25 years and no clear cycle as portrayed above. To take this as empirical evidence against the existence of issue-attention cycles, however, would mean failing to differentiate between *attention* and *opinion* (or *attitude*). Let us therefore briefly review the basic notions of attention, opinion and attitude (Table 1).

The key term 'public attention' denotes the resources (time and other) that people, special-interest groups and the media dedicate towards a publicly debated issue. Regarded over time, attention can be conceived and measured as an intensity (resource employment per time unit). Since many issues, matters and subjects are

Table 1. Summarizing the concepts of attention, attitude and opinion. In rows 2 and 3, a '+' sign indicates that the properties listed in the first column apply to the respective concept named in row 1; in rows 4 and 5, the number of '+' signs indicates the extent to which the respective property applies to either of the concepts

	Attention	*Attitude/opinion*
Scarce resource	+	
Predisposition		+
Value judgement	+	+++
Temporal stability	+	+++

competing for it, public attention is a scarce resource (see Hilgartner and Bosk 1988). Although a high intensity of public attention often signifies considerable political pressure, this need not always be the case.[7] In contrast to public opinion, public attention does not indicate what people think, but what they think *about*[8] (qualitative aspect), and it expresses the extent to which they dedicate their resources towards a given subject (quantitative aspect). In contrast, 'attitude' is commonly defined as 'a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given subject' (Fishbein and Ajzen 1975: 5), 'opinion' denoting a verbalized attitude (Fishbein and Ajzen 1975: 61; Zimbardo et al. 1977: 20). Having an opinion does not necessarily involve resources: One may be strongly for or against nuclear power, but after having once formed this attitude one need not spend any time or other resources on this issue, although this attitude may continuously guide one's actions, and when asked, the opinion can always be articulated.

Attitudes and opinions are by definition (relatively) consistent. In fact, much empirical evidence suggests that people tend not to change their views very quickly, thus avoiding cognitive dissonance (see Festinger 1957). Public opinion, then, usually changes slowly – unless some major event (e.g. a political scandal) abruptly gives rise to a more radical turn. Attention, on the other hand, may always change rather quickly, because redirecting one's attention does not involve changing one's beliefs. Indeed, any particular public issue can almost immediately be replaced by another, newly arising, one. Even in the case of a political scandal, public attention is likely to rise more sharply than public opinion changes; both the amplitude and the slope of change are generally much higher in public attention than in public opinion. With respect to its temporal dynamics, opinions or attitudes regarding public issues, then, are much less likely to pass through distinctive cycles than is public attention.

'Public' – the Public versus the Political Sphere

We have already distinguished attention from opinion. But what about 'public'? Let us first recall that we conceive *public* attention as a social phenomenon that influences *political* action and that is also affected by it. Depending on our viewpoint, public attention

is an independent or dependent variable with respect to political action. In either case, however, both variables are distinctly different from each other, each involving different actors and mechanisms – as will be elaborated in more detail in section 3. We must, therefore, clearly distinguish the public from the political sphere, as delineated in Figure 4 on p. 165. In our concept, 'public' refers to citizens (as potential voters), special-interest groups and the mass media, whereas 'political' chiefly refers to politicians, parties and governmental officers, in particular those in executive positions. This is by no means a trivial distinction. Some authors, for example, draw on parliamentary debating time and budgets (see Baumgartner 2002), or on the change of governmental organizations (see Peters and Hogwood 1985) as indicators of public attention. By contrast, we would like to stress that the latter should rather be used as indicators of political action. To be sure, public attention as a sociological construct certainly involves an element of communication. If a multitude of private individuals devoted their attention towards an issue but there was no communication about it, this would not be public attention. We will come back to this aspect in more detail in section 2.

'Issues' – Finding the Right Analytical Scale

In today's democracies, both public attention and political action, as we conjecture, tend to form around issues. They focus on relatively small-scale problems like summer smog, BSE, ozone depletion, waste incineration and so forth that are sufficiently distinct still to be publicly perceived as units.[9] This is no longer the case with extensive problem areas such as air pollution or waste management, which merely serve as *categories* comprising and thereby classifying the multitude of different issues.[10] For example, the problem area of air pollution encompasses the issues of summer smog, acid rain, ozone depletion, lead emissions, etc.; waste management covers prevention, recycling, deposits, incineration of waste, etc.

It is thus not surprising that the broad policy areas analysed in different empirical (longitudinal) studies – such as 'the environment' or 'education' – do not exhibit clearly perceptible attention cycles but merely show rather slow changes in differently shaped curves.[11] However, as Figure 2 illustrates, it may well be the case that multiple single issues belonging to the broad field of 'environment' appear

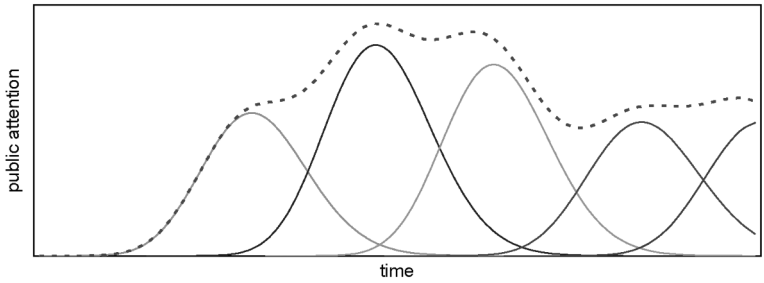

Figure 2. The dynamics of public attention towards a broad problem area (e.g. 'the environment') being composed as the sum of a multitude of single issue-attention cycles (e.g. forest damages, ozone hole, greenhouse effect, etc.)

one after the other, 'recharging' public attention to environmental matters in general over and over again (Guber 2001: 15). Accordingly, Downs' original thesis, put forward in 1972, that the 'issue' of ecology (which in our terminology is rather a broad policy area) would soon wane in public attention (Downs 1972: 50), has obviously proved untrue – not because of basic theoretical deficiencies, but resulting from an inadequately broad notion of 'issue'.

In this context, a scale hypothesis can be put forward as follows: The broader a theme, issue, problem area, etc., is, the larger the time-scale of its dynamics in public attention. The empirical studies presented below may serve as examples (BSE: restricted issue – 8 months 'cycle'; 'waldsterben', acid rain and sulphur emissions: issue of medium thematic scope – time-scale of 10 years; summer smog: issue of medium thematic scope – time-scale of about 7 years). In empirical studies it is thus crucial to cover a sufficiently large time range to detect possible attention cycles.[12]

Another point, which has so far been an underlying assumption, should also be made explicit: In line with Downs' conjectures, the 'issues' we focus on are *problematic* ones.[13] That is, we confine our analysis to those issues publicly regarded as problematic (see Liebl 1996: 8). Summer smog, unemployment or terrorist attacks are all examples of such issues. The reason why we prefer the term 'issue' to that of 'problem' is that we do not focus on the *solving* of the problem but on the *attention* that it receives by the public. In other words, what counts is the property of issues to serve as 'guidelines' for public communication (Luhmann 1971) and, most importantly, to express political pressure. However, this focus does not imply that

issues are per definition problematic, as, for instance, in the notion of Dearing and Rogers, who define 'issue' as 'a social problem, often conflictual, that has received mass media coverage' (1996: 4). Unfortunately, this notion excludes the comparison of problematic with non-problematic issues such as the death of Lady Diana Spencer in August 1997. At the time, this event certainly attracted a considerable amount of public attention (Figure 3) and became a public issue. However, public issues of this type do not create political pressure and the attention cycle is therefore not expected to have an effect on political action. But then again, precisely this property of 'Lady Di' type issues enables them to serve as a reference in order to show how public attention rises and falls *without* any link to political pressure or action, thus providing a basis for determining an 'attention capacity'. Notably, public attention towards Lady Diana Spencer, the mean 'base level' in the 12 months before her fatal accident being at a low but noisy rate, jumped up in the month after her death and then declined, first rapidly, then very gradually until it again reached the 'base level' after another 24 months. We shall later see in the empirical case studies how the dynamics of problematic issues differ from this.

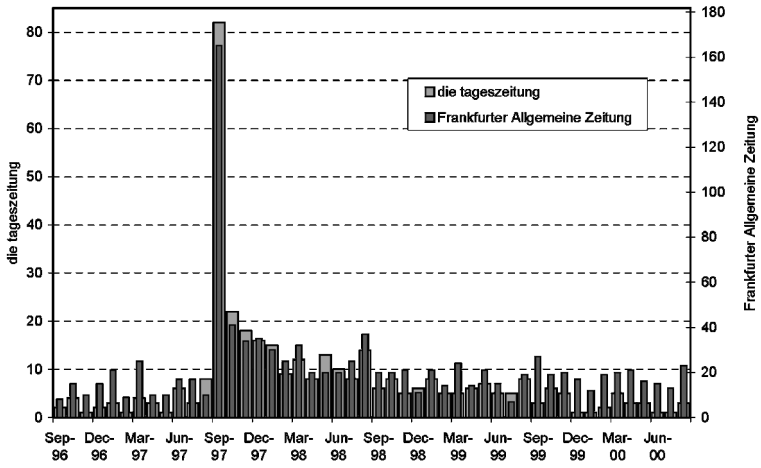

Figure 3. The intensity of public attention towards Lady Diana Spencer, who died on 31 August 1997, measured by the monthly number of related articles in two German newspapers. (For reasons of simplicity and comparability, all articles containing the word 'Diana' have been counted. Original time series are depicted)

'Cycle' – the Cyclical Behaviour of Issue-Attention

When discussing issue-attention cycles, what exactly do we mean by 'cycle'? Two fundamentally different concepts can – implicitly or explicitly – be found in the pertinent literature, each involving rather different theoretical assumptions about the nature of public attention. Downs (1972: 38), Luhmann (1971: 18–19) and many others who have taken up this approach[14] conceive attention cycles as a characteristic succession of phases of public attention, involving its rise, peak and eventual decline. Although in this concept public attention need not inevitably fizzle out to zero – and may even rise again once new facts concerning the issue become accessible – this does *not* imply a *periodic* recurrence of a similar pattern concerning the same issue. Some authors (e.g. Howlett 1997: 4), by contrast, do apparently assume a cyclical, i.e. periodically repeated pattern: public attention towards an issue rises, decreases, rises again and so forth. To begin with, our approach merely assumes that issue-attention, due to effects of self-amplification, often forms a 'one-period' Downsian cycle well documented by our empirical analyses. Whether or not periodic cycles exist, too – and which possible driving forces could be determined – is left for later discussion.

Measuring Public Attention

One possibility of conceiving public attention could be to equate it with the sum of all citizens' individual attentions. Adequate ways to measure this would be to take random samples of polls (see Guber 2001) or interviews (cf. Henry and Gordon 2001). Irrespective of the methodological difficulties involved – especially the low comparability of various empirical studies conducted – there is a more fundamental reason why we do not opt for this method of conceiving public attention: This is their inability to reflect the element of communication in public attention. Public attention is a socially and politically relevant factor. People may be concerned by and turn their attention to all kinds of different issues with a whole range of intensities (and this we can measure with polls and interviews), but this does not have any sociological relevance unless there is communication about it. One reason is that the notion of public attention implies at least a minimum degree of *shared* attention – otherwise it would simply mean indi-

viduals' attention. And second, and more importantly, public attention cannot become politically relevant unless politicians have the opportunity to learn about it.

As mentioned in the introduction, ways of communication are diverse, ranging from (direct) interpersonal communication to (indirect) mass communication via press, radio, television and the Internet. Assuming that in today's democracies the mass media constitute by far the most important vehicle for shared attention and political communication, media coverage, then, should best reflect public attention. Therefore, we will use the latter as principal indicator of public issue-attention, drawing in particular on the number of newspaper articles on certain issues per time unit. Compared with other possible indicators (polls, interviews, etc.), this approach has several major advantages: Whereas polls and interviews, costly as they are, can only cover selective issues at limited points or periods in time,[15] newspaper analysis permits investigation of an enormously broad range of issues or other thematic aggregations at virtually any time-scale of interest. Long-range time series may thus be constructed, tracking issue dynamics over the whole span of their life cycle(s). Polls, by contrast, most often only cover issues already 'established', thereby excluding the most sensitive first stages of attention cycles. Furthermore, the body of published newspapers constitutes a huge archive allowing for ex-post analyses of any issue that in the case of the polls and interviews are restricted to those issues that have actually been covered at the time these polls and interviews were conducted. Perhaps most importantly, media analysis yields less biased results, because the coverage of issues is taken as it is, whereas in polls and interviews the interviewees are either given a list of issues to which they are asked to name which issue they pay the most attention to, thus limiting the scope of possible answers, or they may freely name the issues they pay most attention to, but then they risk forgetting the important ones. Finally, the advantage of polls and interviews, that these measure attention more directly and thus more correctly, may well turn into the contrary when people are not responding 'correctly' to questions, e.g. when asked for their attention to certain socially badly accepted issues. Newspapers, however, are bought, and when we assume the 'voting at the kiosk' hypothesis (see below) to be true, then newspaper coverage indirectly reveals the actions of citizens following their 'real' preferences for devoting their attention.

Last but not least, the media-based approach is much cheaper and faster to carry out than are polls and interviews. Articles from many newspapers have now been electronically available for several years, which has greatly improved the accessibility of these data.

Still, it is often argued that 'media agenda' and 'public agenda' are not at all identical and should therefore be kept analytically separate. Two main lines of theory have evolved: Whereas in the *agenda-setting approach,* mass media are considered to influence citizens' attention (in that they bring forward certain issues onto the public agenda in the first place),[16] the *uses and gratifications approach* places the emphasis on the needs of the citizens (the 'audience') which they seek to gratify via their selective use of the media.[17] As much research as has been done for decades to clarify whether the media influence the citizens or vice versa, it seems now that both are too closely intertwined to be able to decide on this: 'In sum, there is considerable evidence that the direction of causality in the media-public relationship cannot be assumed' (Soroka 2002: 10). It thus seems plausible that the relationship between mass media and citizens has rather been co-evolutionary to the extent that the media cover those issues that are 'relevant' to the citizens, while the latter focus their attention on the issues covered by the media. The causal mechanism, then, is the following. Considering free media enterprises being rational actors who seek to maximize print runs or viewer levels, they presumably have a strong tendency to cover the issues they believe the 'audience' is interested in or concerned with. The publisher will discover whether or not a newspaper, for example, meets the expectations of its readers by monitoring print runs ('voting at the kiosk')[18] and letters to the editor – acknowledging that even 'negative' letters disagreeing with the representation of an issue in the newspaper indicate resonance by the readers and thus, too, generally indicate high public interest in the issue. Hence, it seems very likely that all publicly relevant issues will be covered by the news media, whereas those issues not covered are not publicly relevant because of the mechanisms involving self-interest on the part of the media enterprises. In the light of these reflections, and given the mentioned drawbacks of other methods, media coverage possibly best reflects public attention.

3. An Actor-based Model

Based on the above considerations regarding the nature of issue-attention cycles, we construct a theoretical actor-based model[19] to tackle the following main research questions:

- When and why does public attention rise and fall?
- By what causal mechanism (model) – deterministic or stochastic – can the dynamics of public attention be modelled?
- How does political action – regarded as a dependent variable – relate to public attention (independent variable)? Under which circumstances is merely symbolic action taken (regarded as acts that – politically motivated – only claim to solve a problem while remaining factually ineffective), and under which circumstances is substantial action taken?
- How, in turn, is public attention affected by political action (as well as other changes in 'boundary conditions')?

These topics shall be addressed with respect to a coherent theoretical causal model elucidating the *mechanisms* and *influencing factors* that lead to observable attention cycles.

Theoretical Assumptions

The theoretical framework of rational choice is particularly apt to explain collective behaviour like the observed issue-attention dynamics by the actions of individuals. Rationality – or rational choice – in this context refers to the assumption that single actors undertake purposeful actions (choices) in order to reach their value-shaped or preference-shaped goals (see Coleman 1990: 13–18). Within this framework, we can specify causal mechanisms of how a social macro-level phenomenon appears as a result of micro-level change, taking into account, in turn, the effects of other macro-level structural variables ('boundary conditions'). *Our goal is to understand and model the dynamics of public attention and political action regarding a certain issue on the basis of structural variables concerning the issue itself.*

We base our theory on the following general assumptions:[20]

1. Methodological individualism, i.e. *actors* – individual or collective – are the basic elements of analysis (not social systems).[21]

2. Generic rules of behaviour implying utility/interest-maximization under conditions of limited resources and cognitive capacity ('bounded rationality').[22]
3. Hypotheses concerning the perceptions, interests and preferences as well as the resources and restrictions of the relevant actors (resources and restrictions being time, money, information-processing capacity, social capital, institutions such as social and legal norms and values as well as the lack of each of these).
4. Transition rules to explain public attention and political action as social macro-level phenomena by micro-level (individual) action and interaction.
5. Hypotheses linking these macro-level phenomena back to the micro-level in that they affect the framework of resources and restrictions mentioned under (3).

Whereas the first two assumptions hold generally, in the following paragraphs we will further specify the relevant actors and their specific properties. The transition rules will then be elucidated within the framework of the actual model that we propose (section 3).

In order to keep our theory as simple as possible (and thus attain a high degree of generality, applicability and relevance), we distinguish only four different types of relevant actors whose interests and preferences, resources and restrictions will be portrayed in the following. To this end, we draw mainly on the concept of public choice theory or 'economic theory of democracy' first developed independently by Downs (1957) and Herder-Dorneich (1959), which applies the idea of rationality – previously used to characterize *economic* decisions[23] – to *political* decision processes.

- *Citizens* (type of individual actors) are generally interested in maintaining or improving the environmental conditions which affect them. In a representative democracy, they may realize this goal indirectly by voting for those parties and/or politicians that promise to take the necessary measures.[24] At the same time, however, citizens try to minimize the costs – monetary as well as cognitive – involved in finding out about how different political actors will deal with a specific environmental issue, which often requires understanding the environmental problem and the effect of proposed measures. The more citizens are concerned

with an issue, the more attention they will rationally devote to it.[25]

- The *mass media* (type of collective actors) seek to maximize print runs in order to maximize profits, and consequently cover those issues which they believe their readers are interested in (see above, section 2). Following this economic rationale, the mass media in our theory do not pursue any genuine political interests.[26]
- *Politicians* (type of individual actors),[27] according to public choice theory, also strive to maximize personal benefits (e.g. money, power, prestige). A growth of the common welfare only appears as a means to realizing these goals.[28] Politicians therefore seek to maximize electors' votes in order to maintain or improve their current position as deputy, official, prime minister, etc. They, too, do not pursue any genuine political interests. It is also assumed that politicians constantly monitor their popularity, which is regularly measured in opinion polls. Political success is thus not only indicated by successful elections but also by high popularity.
- *Special-interest groups* (type of collective actors) profit in different ways by pushing forward certain issues. Scientists, for example, who publicly reproach certain hazardous substances may seek to attain a public reputation outside the scientific community (see Peters 1994: 166); industrial organizations may seek to minimize costly environmental standards and therefore try to get the broad public on their side; and environmental groups may wish to achieve the opposite.

Two Existing Approaches to a Causal Explanation of Public Attention

The issue-attention models put forward by Downs and Luhmann both paint a demonstrative and graphic picture of the characteristic behaviour of public attention. Yet they merely *describe* what can be seen, while failing to *explain* the causal mechanism. Based on the assumptions of rational choice theory, we attempt to put forward a more fundamental causal process-model, integrating insights from political science, social psychology, media science and diffusion theory.

Let us first briefly review the two principal approaches to explain public attention as a function of

- the severity of the environmental problem at stake, and
- the capacity to solve this problem.

Possibly the most simple (and naive) approach to issue-attention regarding environmental problems is the *problem-reaction model* employed in political science (see v. Prittwitz 1990: 103). According to this, public attention and political action directly depend on the severity of the environmental condition: The higher the costs caused by the environmental problem (in terms of shortcomings in health or quality of life, or of the costs required to rectify these), the greater the stakeholders' discontent with the situation (see Opp 1996: 361–3, 368) and their interest in embarking on measures to improve the deficient situation and thus the greater the attention of all stakeholders towards the issue. This approach may be particularly applicable for threatening catastrophic events that are directly perceptible by the broad public and consequently lead to an immediate response in public attention. It particularly applies to any environmental problems that have a direct effect on human health. The SEVERITY OF THE EVIRONMENTAL CONDITION may therefore be held as one independent variable explaining public attention. We contend, however, that there are other, equally or more important, factors influencing public attention.

Alternatively, the *capacity model* derived from social psychology tries to ascribe public attention to existing capacities for action, i.e. to resources for solving the problem at stake. The basic proposition is that deteriorations in environmental conditions remain unperceived unless they are or become technically solvable at economically viable costs. This is explained by the theory of cognitive dissonance (Festinger 1957). Accordingly, people generally strive to even out discrepancies between different perceptions – i.e. cognitive dissonances – or do not permit them to enter conscious reasoning in the first place (v. Prittwitz 1990). Environmental conditions that are significantly worse than the level of aspiration may constitute such discrepancies. Depending on the available resources, they can be resolved in different manners: When adequate resources to deal effectively with the problem are lacking, the aspirational level may be adjusted, or information regarding the actual state of the problem may be ignored or believed to be untrue in order to avoid cognitive dissonance and psychological stress. If, on the other hand, sufficient options for action are perceived, then actors will seek to implement measures to improve environmental quality,

thus contributing to a rising public attention (see Opp 1996: 363). A prominent example of this is the occurrence of smog alerts in the former West Germany, the frequency of which rose as air pollution in the 1970s and 1980s became less severe due to available desulphurization and other purification techniques (see v. Prittwitz 1990). In sum, we may assume AVAILABILITY OF PROBLEM-SOLVING RESOURCES to be the second major independent variable influencing public attention.

Self-Organization Model

Both models hold independently of the temporal, historical development and can hence be characterized as linear and static. Yet the ups and downs of public attention towards a certain issue often cannot be explained by these 'external' conditions alone (see Downs 1972: 38) but involve processes of self-organization as well. Our proposed model consists of five mechanisms that may in part be attributed to different stages of public concern similar to Downs' conception.

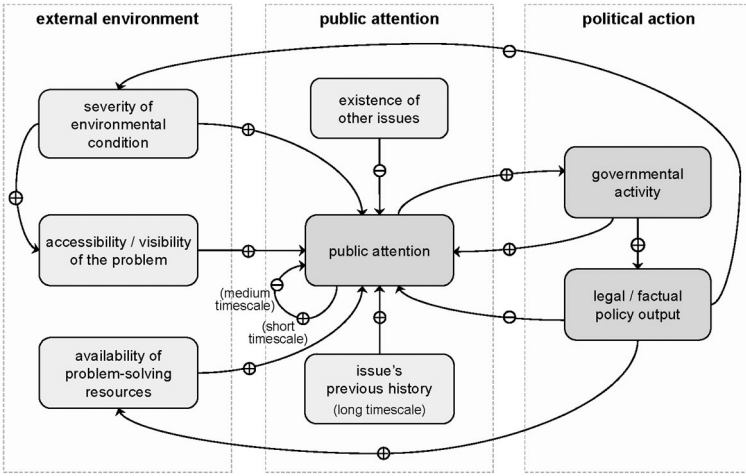

Figure 4. Schematic feedback diagram of key factors influencing public attention and political action towards environmental problem issues. Reinforcing effects are depicted by '+', weakening effects by a '−'. Note that the impacts represented by the various warrows may be of very different strength. The lighter shaded boxes denote variables which, in our analysis, serve as independent variables only (despite them possibly being subject to other influences, too)

(1) Public attention is scarce. Every individual (or collective) actor can only receive a limited amount of information per time unit. Regarding environmental politics, this is particularly true for the vast majority of citizens who are not professionally concerned with issues of this field. Attention towards an issue involves both information reception as well as – often – a readiness to alter a cognitive 'frame' (see Coleman 1990; Esser 1993). Both are *costly* and tend to be avoided: citizens are 'rationally ignorant' (Downs 1957).[29] Therefore, so long as the environmental conditions are perfectly consistent with the aspiration level of the citizens,[30] the possible benefits from turning one's attention towards them will remain low. Public concern and attention will not develop in the first place.

(2) Only when the ENVIRONMENTAL CONDITION falls behind a given level of aspiration, or when the aspiration level rises as the AVAILABILITY OF PROBLEM-SOLVING RESOURCES improves, could a rise in public attention be indicated. These two variables form the prerequisite that an issue may enter the public sphere and thus initiate an attention cycle.

(3) In order to receive public attention, an environmental problem issue must be publicly perceptible and/or sufficiently simple to comprehend (variable: ACCESSIBILITY OF THE PROBLEM).[31] Some problems, such as the dying of fish in a eutrophic lake, are directly visible to the non-expert eye; many others, such as those involving creeping contamination or very distant phenomena like the destruction of tropical rainforests, are only accessible via public communication of scientific research; yet others are of highly complex nature and thus virtually incomprehensible to the non-expert. Those aware of the problem (e.g. dedicated scientists, experts, journalists, politicians, environmental agencies or organizations) must both be willing and able to spread their knowledge and insight about the subject. They must expect personal benefits from calling attention to a problem, potentially against the majority opinion.[32] In modelling issue-attention, this 'stage' is the most sensitive. It is difficult to predict if and when the 'critical mass' of theme-promoters is reached; 'random' factors may be essential in determining whether or not and when an issue-attention cycle is triggered. In such a non-linear dynamic system,[33] small changes in initial conditions may lead to great changes in the resulting trend.

(4) Once a critical mass is reached, the issue becomes a 'fast-selling item' and attention towards it grows in an exponential manner,

involving both interpersonal and mass media communication: The more individuals dedicate their attention to the issue and talk about it to other individuals, the more other individuals (and potentially affected stakeholders) will be informed and possibly feel concerned about it.[34] Thus, information costs decrease as more and more information becomes readily available, so it is rational for individuals to devote their attention to this issue rather than to others. (Even though the issue at stake has already been on top of the public agenda for some time, few people will have remembered all important aspects, so the information cost aspect still holds in these cases.) As has been stressed above, an important factor in amplifying public attention is the mass media, who – as rational agents – take up those issues they anticipate people to be interested in and in turn facilitate communication and information about them. The media thus act as *catalysts:* they increase the speed of news dissemination, but do not lead the discussion down a particular road. Mathematically, this mechanism of self-amplification can be modelled in terms of diffusion theory (see Krampe 1989; Rogers 1995; Dearing and Rogers 1996) and models of social learning (see Weiß 2000). This self-reinforcing mechanism is indicated by the short-term positive feedback loop (see Figure 4).

(5) Regarding the further 'fate' of the issue-attention cycle – i.e. the point of time and the speed of decrease in attention – two alternative scenarios exist.

When public attention remains below a certain threshold and the issue is not suited to enable politicians to gain popularity, no political measures will be taken. Unless other reasons exist, the environmental problem will persist as it is. Having already spent much attention on an unresolved issue, citizens will gradually turn away from it because of decreasing (marginal) benefits. This process is accelerated once new issues arise, capturing increasingly more public attention. Thus, the public interest regarding the issue at stake will gradually fade (see also Opp 1996: 365). Depending mainly on the SEVERITY OF THE ENVIRONMENTAL CONDITION, but also on whether new and unspent issues of interest arise, this can happen fairly rapidly. This mechanism introduces a negative feedback effect (also referred to in Figure 4) on a medium time-scale. The model thus becomes path-dependent, because whether it will continue to rise or start to decline depends on the amount of time an issue has already received high public attention.

When, on the other hand, public attention poses such political pressure that politicians see themselves forced to act, unless they wish to risk a severe loss of popularity, then political action will be taken. Depending on the circumstances, regulatory measures may remain *merely symbolic:* In the case of an 'unsolvable' problem, i.e. the costs of a significant improvement in the state of the environment exceed its benefits, or powerful (industrial) interest groups[35] whose support is of greater value to the politicians than the public attention to an otherwise intended regulation, politicians tend to pass regulatory acts that only seem to solve the problem at stake or merely express the intention to improve the situation.[36] In other cases, *substantial* regulatory measures are decided upon which will effectively improve the environmental situation. In both cases, a sharp decline in public attention is expected, because it is no longer rational for stakeholders to dedicate much attention to the issue (other than perhaps to follow the implementation of measures). The ineffectiveness of purely symbolic regulation may only become apparent after some time. The unresolved issue then recaptures public attention and the attention cycle begins anew.

(6) After an issue has gone through a cycle of public attention it may re-enter the public sphere once the conditions mentioned above are met again. Indeed, this is even more likely than in the case of an issue still at the 'pre-problem stage' (Downs 1972: 41), because the reception of something that is already perceived is easier than that of something unknown. Accordingly, another variable influencing the dynamics of issue-attention must be considered: an ISSUE'S PREVIOUS HISTORY on a rather long-term time-scale. Public attention thus being perceived as path-dependent, our suggested model, in contrast to both the problem-reaction and the capacity model, is *not* an *equilibrium model*.

To summarize, we propose the following system of hypotheses, which takes into account the path-dependence of public attention dynamics.

H-1: For a problem issue to gain PUBLIC ATTENTION it is necessary that citizens' aspiration levels of environmental quality are no longer met, i.e. either the objective ENVIRONMENTAL CONDITION worsens (H-1a), or the aspiration level itself rises with an increased AVAILABILITY OF PROBLEM-SOLVING RESOURCES (H-1b).

If at least one of the conditions in H-1 are met, then consider the following hypotheses:

H-2: PUBLIC ATTENTION is more likely to turn to a problem issue in the first place if the ACCESSIBILITY OF THE PROBLEM is high.
H-3: The intensity and magnitude of public attention is positively influenced by the severity of the environmental condition (H-3a), the availability of problem-solving resources (H-3b), the accessibility of the problem (H-3c).

If PUBLIC ATTENTION is high, then consider the following hypotheses:

H-4: The higher the SEVERITY OF THE ENVIRONMENTAL CONDITION, the longer the issue will receive a high level of PUBLIC ATTENTION.
H-5: The higher the intensity of the PUBLIC ATTENTION, the more politicians will engage in political activity (variable: GOVERNMENTAL ACTIVITY = H-5a) concerning the issue at stake and eventually pass regulatory acts (POLICY OUTPUT = H-5b) so as to 'solve' the problem.
H-6: Any visible POLICY OUTPUT – whether it be symbolic or substantial – accelerates the decline of public attention.
H-7: In time, PUBLIC ATTENTION will sooner or later gradually turn away from an issue, the more so as OTHER ISSUES appear and displace the old one.

When an issue that receives high public attention has finally decreased, then consider the following hypotheses:

H-8: Generally, those issues that have once received high public attention (variable: ISSUE'S PREVIOUS HISTORY) will remain at a higher level in PUBLIC ATTENTION than before they entered the cycle (H-8a) and will also be more easily reactivated than completely new issues (H-8b).
H-9: In the long run, an issue will regain high PUBLIC ATTENTION if it remains substantially unresolved (no or merely symbolic POLICY OUTPUT only) and the conditions in hypotheses H-2 and H-3 are met.

Apart from the variable of PUBLIC ATTENTION, five independent and two dependent variables have been introduced in the model, which

shall now be briefly discussed with respect to how they can be empirically measured.

Whereas the SEVERITY OF THE ENVIRONMENTAL CONDITION can in absolute terms be estimated by the costs caused by the unwelcome situation, or by the expected benefits of a potential regulation, the AVAILABILITY OF PROBLEM-SOLVING RESOURCES expresses the opposite, i.e. the costs of a potential regulation, or the benefits of not regulating the matter. In explaining public attention, a change in these variables is more important than their absolute values. Therefore, we mostly draw on observed changes in environmental condition (e.g. indicators of summer smog intensity) or in technology (for more detail, see Newig 2003: 118 ff.). ACCESSIBILITY OF THE PROBLEM is indicated by its visibility and comprehensibility as defined above on p. 166. An ISSUE'S PREVIOUS HISTORY denotes whether the issue has already gone through a full attention cycle. The variable on the EXISTENCE OF OTHER ISSUES could not be tested systematically in the present study, but the literature suggests the need of further research on this aspect (see Hilgartner and Bosk 1988; Zhu 1992). GOVERNMENTAL ACTIVITY may be measured by the number of parliamentary operations per time unit (this has systematically been done for the BSE issue), and POLICY OUTPUT by the number and type of regulatory acts.

4. Case Studies

We shall now see how these propositions match with empirical reality. Three examples from our own studies have been chosen that exhibit very different dynamics of public attention and regulatory practice.

'Waldsterben', Acid Rain and Sulphur Emissions

The 'waldsterben' issue received enormous public attention in West Germany in the early 1980s[37] (see Figure 5) and led to a number of highly efficient regulatory acts.

As early as the late 1960s, it became known that industrial emissions of acid gases, especially of sulphur dioxide, made a considerable impact on the pH value of rain, and also that some highly sensitive ecosystems, e.g. in Scandinavia and Canada, suffered serious damage (see Odén 1968). Yet the industrial countries

mainly responsible for these emissions (such as Germany and the United States) lacked an awareness of this problem and refused to take efficient countermeasures, ultimately because citizens within these countries did not see themselves affected by this distant ecosystem damage (see Roqueplo 1986: 406). In Germany, this situation changed abruptly when a number of news magazines and papers took up foresters' reports of a new kind of rising tree damage and of scientific research (both journalists and scientists serving as THEME-PROMOTERS) which established the plausible causal link between acid emissions (mainly sulphurous) stemming for the most part from exhaust gases of large combustion plants, acid rain and the new forest damage publicly called 'waldsterben'.

Whether or not a significant increase in forest damage occurred or if the observed phenomenon must be accounted to a shift in perception can hardly be reconstructed from today's perspective, because regular and comparable time series regarding forest damage are only available from 1984 onwards (see Figure 5). Since then, the overall situation has hardly changed at all, with the exception of a slight improvement in the eastern part of Germany since reunification, which entailed exceptionally drastic reductions of exhaust gases and thus of acid precipitation. All in all, it can reasonably be assumed that the ENVIRONMENTAL CONDITION regarding the state of German forests had probably not suffered very dramatic aggravation when the issue came to the focus of public attention. However, the ENVIRONMENTAL CONDITION in terms of industrial pollutant emissions (and immissions) was, in the early 1980s, still at an unsatisfactory level – although, very gradually, improving. All things considered, the dramatic and sudden public awareness of the 'waldsterben' issue can hardly be explained by an actual increase in the SEVERITY OF THE ENVIRONMENTAL CONDITION. As to the ACCESSIBILITY of the problem issue, many effects of acid rain (like soil acidification, for example) are not visible to the human eye. Damage to trees, however, can easily be noticed and was at the time remarked on by many citizens – yet again it cannot be said whether this indicates an aggravation of actual forest damage or rather a shift in public perception. On the other hand, the causal link between industrial sulphur emissions, acid rain and forest damage was plausible and easy to follow, thus contributing to a high ACCESSIBILITY of the issue.

In particular, the rapid increase of an AVAILABILITY OF PROBLEM-SOLVING RESOURCES at the turn of the decade can account for the

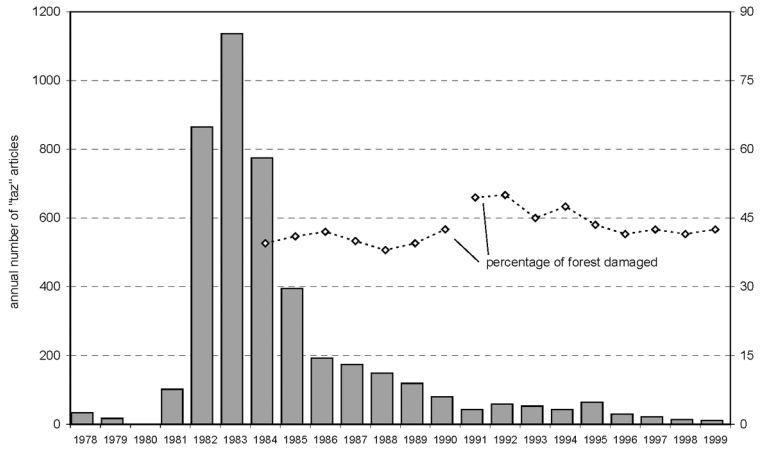

Figure 5. Annual numbers of *taz* articles regarding the issue of 'waldsterben'.[i] For comparison, the percentage of damaged forest is also shown, starting with the first year of regular monitoring (right ordinate).[ii]

[i] '*Taz*' data are only electronically available from 1987 onwards. All articles that contained the word trunk *Walkdsterben** were counted. Data for the missing time period were taken from the German newspaper *Handelsblatt* (keyword: *Waldsterben**) as well as from the HWWA (Hamburgisches Weltwirtschaftsarchiv) press archive, section 'air pollution and air pollution control', which comprises articles from various different daily and weekly newspapers and magazines (articles dealing with 'waldsterben'). Linear regression of the time series in overlapping intervals ($r^2 = .71$ and .74, respectively) yielded the depicted time series, scaled to 'taz' values. Owing to the stochastical uncertainties involved, the first values of the time series are less valid than the later ones.

[ii] The percentages of damaged forest are derived from the annual percentage of 'highly damaged trees' plus half the value of the yearly percentage of 'slightly damaged trees'. Thus, a value of 100 signifies that all trees are highly damaged, a value of 0 means: no trees are damaged at all. A value of 45 typically denotes 30% highly damaged plus another 30% slightly damaged trees. Until 1990: former West Germany, from 1991 on: entire Germany

sudden rise in public attention. Since the late 1970s, flue gas cleaning and especially desulphurization techniques have undergone great improvements. The German government was therefore able in 1983 to pass a regulatory act (the Ordinance on Large Combustion Plants) requiring the energy utilities to retrofit their large combustion plants (mainly coal) with flue gas desulphurization techniques. This ordinance, which had already been in preparation for some years but had politically only been made possible by the immense public attention towards the issue since 1981 (cf. Kuhnt 1983: 568),

led to a dramatic decrease in acid emissions (minus 80%) in the following decade and a corresponding improvement of rain acidity. This legislation has therefore widely been regarded as an exceptionally successful environmental regulation (Mez 1995). The overall costs of the retrofitting amounted to as much as 30 billion DM (equalling 15 billion US dollars), but they could be passed on to the electricity consumers, who paid increasing electricity hikes of about 10%. Although the great majority of citizens thus paid the largest part of the bill for this regulation, this fact remained publicly almost unnoticed, because an increase in the electricity bill – usually withdrawn regularly from the client's bank account – represents a virtually invisible cost (as opposed to, for example, an increase in fuel gas prices, which is very clearly visible at each stop at a petrol station and thus recurrently leads to an uproar by car drivers).

The decrease in public attention regarding the 'waldsterben' issue, clearly depicted in Figure 5, may in part be attributed to the immense success of SUBSTANTIAL POLICY OUTPUT, namely the Ordinance on Large Combustion Plants (but perhaps also on the subsidized introduction of catalytic devices – starting in 1985 – which has gradually but significantly been reducing nitrous oxide emissions of cars, which also account for the acidification of rain). Although the SEVERITY OF THE ENVIRONMENTAL CONDITION indicated by the state of German forests has not significantly improved since the mid-1980s, the supposed causes have been dealt with in an effective manner so that today the remaining AVAILABILITY OF PROBLEM-SOLVING RESOURCES has become very small. Both factors, but also a certain weariness of the issue, can explain the fact that today the 'waldsterben' issue no longer receives any considerable public attention.

Summer Smog

On a smaller scale than the 'waldsterben', the issue of summer smog in the 1990s in Germany also received great public attention, causing the government to pass a purely symbolic regulation, the so-called Ozone Act.[38]

Some time later than for example in the United States, it also became a public issue in Germany that high values of tropospherical ozone could cause temporary and chronic lung damage, especially in children, who have a higher rate of respiration. Tropospherical ozone is formed in a photochemical reaction requiring high solar

radiation out of certain precursors, for the most part volatile organic compounds and nitrous oxides stemming mainly from traffic emissions and from the production and usage of solvents and varnish.

As Figure 1 and Figure 6 clearly illustrate, public attention rapidly grew from the late 1980s – showing a clear seasonal pattern in that public attention in the annual cycle is highest in summer when the chances of suffering from high ozone concentrations is greatest and practically no public attention in winter when there is no danger of summer smog at all. Thus, on a yearly scale, the problem reaction model holds, because PUBLIC ATTENTION rises with the SEVERITY OF THE ENVIRONMENTAL CONDITION. On a larger temporal scale, however, almost the opposite is true: As public attention rose to its peak in 1995, the SEVERITY OF THE ENVIRONMENTAL CONDITION, expressed by an annual summer smog index (see Figure 6), from 1990 onwards continually declined, owing to substantial emission reductions due to the introduction and progressive spreading of catalytic devices as well as the emission reductions following the Ordinance on Large Combustion Plants (section 4).

Resulting from increasing political pressure, the German government passed the so-called Ozone Act in 1995. It included a temporal traffic ban coming into effect once a certain limit value of ozone was reached and certain meteorological conditions were met. Owing to the high limit value of ozone and the numerous exceptions from the traffic ban the Ozone Act remained substantially without any measurable effect (see FAZ, 13 August 1998) until the designated expiration of its validity at the end of 1999. Nevertheless, it immediately succeeded in calming down public attention, as the sudden drop after 1995 indicates.

The fact that public attention still did not diminish to zero but remained at a moderate level of attention is in accordance with H-7.

The problem of summer smog has largely vanished because of the substantial, but not immediately effective, regulation brought into effect in the 1980s, so that today the SEVERITY OF THE ENVIRONMENTAL CONDITION has reached such a low level that a reappearance of the summer smog issue seems quite improbable.

BSE

The issue of BSE has internationally received particularly intense public attention. In Germany, its dynamics formed a remarkable

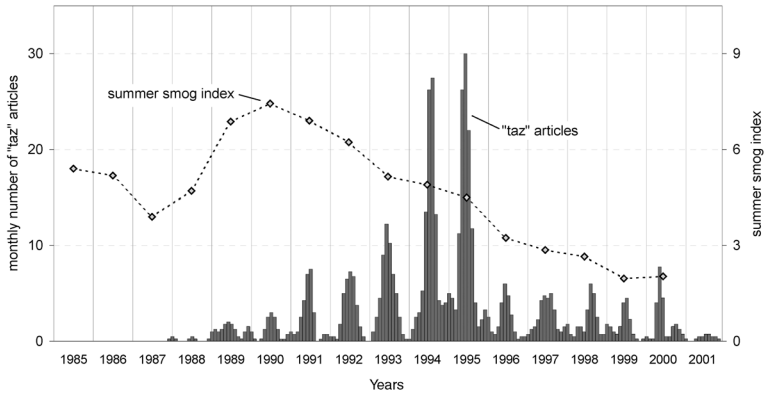

Figure 6. Summer smog – monthly numbers of articles in the German daily newspaper *taz* regarding the issue of summer smog (tropospherical ozone)[i] as well as an annual index of the actual intensity of summer smog. To even out random fluctuations, both time series have been filtered using a three-period moving average.[ii]

[i] In the German public discussion, the terms *Ozon* (ozone) and *Sommersmog* (summer smog) were and are equally in use. In order to avoid falsely counting those newspaper articles regarding the depletion of the stratospherical ozone layer (an issue which is not related to photochemical tropospherical ozone), too, only those articles have been counted that contained either of the word trunks *Sommersmog**, *Ozonsmog**, or all of the words *Sommer**, *Ozon** and *Smog**.

[ii] The index integrates five different ozone values published annually by the German Environmental Protection Agency (*Umweltbundesamt*), i.e. the number of days the ozone concentrations of at least one gauging station exceed 180 µg per cubic metre (µg/m^3) of air and 240 µg/m^3, the average number of hours the ozone concentrations exceed 180 and 240 µg/m^3 as well as the annual maximum of all gauging stations. The index, arbitrarily scaled, has no physical value but yields an overall measure of the severity of the yearly ozone situation in the whole of Germany (before 1990: West Germany only).

curve (see Figure 7), and it entailed a whole series of regulatory and other political acts.

It took the German public about four years to notice the issue after the cattle disease BSE (bovine spongiform encephalopathy) had been discovered in Britain in 1986. Even as it became known that thousands of British cattle had died and the European Commission had banned the export of British beef, the issue still remained in the 'latent phase'. Possible reasons for the rapid spread of the disease are the transmission and proliferation of the BSE pathogen by way of feeding meat and bone meal, produced from cattle, to other cattle. Only in 1990, when first indications were published that humans, too, might be affected by the disease, did the issue draw some

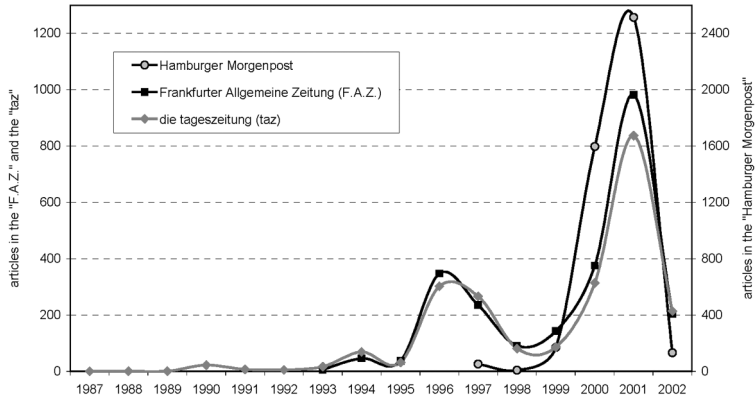

Figure 7. BSE – Media coverage in three different German daily newspapers. Depicted are annual numbers of articles in the tabloid *Hamburger Morgenpost* (data available since 1997), the conservative *FAZ* (data available since 1993) and the left-oriented *taz*

public attention, which quickly fell again towards zero for another two years.

The subsequent dynamics of public attention regarding the BSE issue may be attributed quite clearly to external stimuli, each triggering a somewhat separate issue-attention cycle. The relevant external events comprised not so much changes in the 'objective' SEVERITY OF THE ENVIRONMENTAL CONDITION. It was rather the stepwise accumulation of (scientific) knowledge regarding both the nature and hence the danger of the disease and its infectious agent as well as the actual extent of the epidemic (for example, the number and origin of infected cattle), in short: the rising visibility (ACCESSIBILITY OF THE PROBLEM), that led to multiple waves of public attention. After a first small wave in 1994, possibly due to new hypotheses concerning BSE, a remarkable peak in 1996 followed the clear statement by the British government that BSE did pose a health hazard to humans and the subsequent import ban of British beef by the German government. After a – relatively – calm period, when the issue-attention cycle simply seemed to pass into its 'post-problem stage', new facts and information – e.g. an inquiry by a commission appointed by the British government in October 2000 (Phillips 2000) – became publicly available. The discovery of the first German BSE-infected cattle in November 2000, for the most part, triggered an unprecedented rise in public attention towards the BSE issue. However, the

extent to which the German public was alarmed in this period did not follow any corresponding increase in health risk – the problem had only become more visible and hence more threatening. On the other hand, the relatively low actual SEVERITY OF THE ENVIRONMENTAL CONDITION accounts for the sharp decrease in PUBLIC ATTENTION after only a few months. Of the many political measures taken, two that may have contributed to a rapid decline in public attention are particularly noteworthy. At the end of November 2000, within five days the German parliament (Bundestag) passed a law banning the feeding of meat and bone meal to all farm animals. Given that such feeding to cattle had already been prohibited years previously, one could not expect this merely symbolic act to reduce the risk posed by BSE. But it showed the immense political pressure politicians saw themselves exposed to.[39] At the height of the 'crisis', i.e. the peak of public attention, in January 2001, two members of the German government resigned from office, opening up the possibility of restructuring the former Ministry of Agriculture into a Ministry of Consumer Protection.

The total POLITICAL ACTION concerning the BSE issue became so great that it is worthwhile counting all parliamentary operations

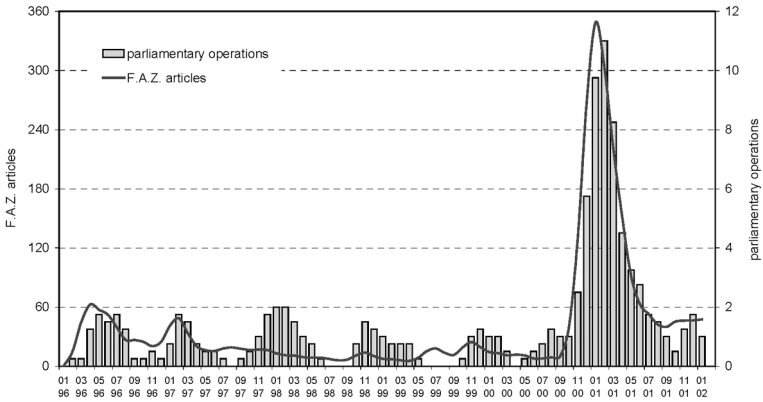

Figure 8. BSE – Media coverage and parliamentary operations. Depicted are the numbers of monthly articles in the German daily newspaper *Frankfurter Allgemeine Zeitung* (FAZ) containing 'BSE' and monthly operations of the German parliament (Bundestag)[i] on the issue of BSE, from January 1996 to January 2002. Random fluctuations in both time series have been filtered using a three-period moving average.

[i] The number of articles comprises all Bundestag operations (legislation, speeches, enquiries, etc.) related to BSE. The data are taken from the parliamentary electronic archive, available at http://dip.bundestag.de

(laws, ordinances, parliamentary debates, enquiries, etc.) and comparing this time series to the issue-attention series (Figure 8). As may clearly be seen, POLITICAL ACTION is closely coupled to PUBLIC ATTENTION. Statistically, political action follows public attention with a time-lag of one month (Figure 9). A linear regression between the two variables at a time-lag of one month yields a highly significant regression coefficient r^2 of 0.93.

All in all, the BSE case shows a complex pattern of different attention cycles regarding the same problem issue. Due to a growth of knowledge concerning the risks of the disease, the PROBLEM SITUATION, but more so the ACCESSIBILITY of the problem greatly increased over the years, bringing about great public attention (H-1a and H-2b, H-3b). Every time, public attention decreased to a very low level some time after new findings had been disseminated (1995, 1998, 2002), which supports H-8. The relatively low SEVERITY OF THE ENVIRONMENTAL CONDITION then led to a rapid decrease in public attention (H-4). As has been shown, politicians responded in an almost predictable manner to the rise and fall of public attention (H-5). Possibly the – largely symbolic – political action may have accelerated the decline in public attention in winter 2000/2001 (H-6). Also, the multiple reappearance of high public attention is in accordance with H-8 and H-9.

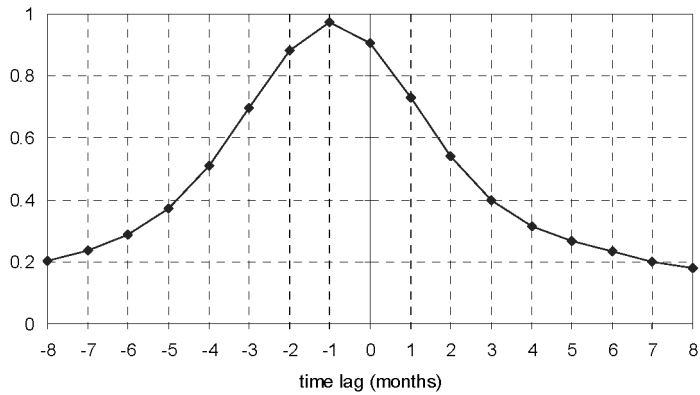

Figure 9. BSE – Cross-correlation function between the two time series '*FAZ* articles' and 'parliamentary operations' from Figure 8 showing an extremely high correlation between the two, POLITICAL ACTION following PUBLIC ATTENTION with a time-lag of one month

5. Testing the Hypotheses

Examining these three case studies against the background of the developed theoretical framework, what have we learned?

First of all, the empirical material presented clearly indicates the existence of readily discernible issue-attention cycles, which supports our general underlying hypothesis that social – in particular, environmentally relevant – issues are processed in a wave-like manner. In contrast to the non-political 'Lady Di' type issues (see Figure 3 above), all of the examined issues gradually increased in public attention, thus supporting the assumption of a self-organization mechanism. Furthermore, this self-amplifying behaviour, albeit triggered by external stimuli, in all cases at times became completely detached from external 'reality', as is indeed assumed in the model of the issue-attention cycle. Political action, on the other hand, in all cases closely followed public attention (H-5), leading to substantial regulation in the case of the 'waldsterben' issue and to – essentially – symbolic regulation in the summer smog and BSE cases.

H-1. In all of the examined cases, a worsening ENVIRONMENTAL CONDITION (H-1a) or a rising aspirational level due to an increased AVAILABILITY OF PROBLEM-SOLVING RESOURCES (H-1b) could be found. Regarding summer smog, it may be assumed that high ozone concentrations measured at the end of the 1980s triggered the long-term attention cycle ranging from 1987 until recent years (H-1a), whose dynamics in the mid-1990s otherwise became completely detached from that of the measured summer smog conditions. In the BSE case, too, the ENVIRONMENTAL CONDITION – as perceived by the public – triggered the multiple waves of high public attention. 'Waldsterben' and acid rain, on the other hand, possibly did not become a public issue because of a considerable aggravation of the

Table 2. Summarizing the testing of hypotheses. Confirmation is indicated by '+', rejection by '−', partial confirmation by '(+)' and evidence that both confirms and rejects a hypothesis by '±'

	H-1		H-2	H-3			H-4	H-5		H-6	H-7	H-8		H-9
	a	b		a	b	c		a	b			a	b	
'Waldsterben'	−	+	+	−	+	+	+	+	+	+	+	+	−	+
Summer smog	+	−	+	±	−	+	+	+	+	+	+	+	(+)	+
BSE	+	−	+	−	−	+	(+)	+	+	+	+	+	+	+

state of German forests, but rather resulting from a shift in public perception as the overall problem-solving resources, mainly industrial desulphurization techniques, became technically and economically available (H-1b).

H-2. As a third influencing factor for an issue to gain high public attention (although no prerequisite), ACCESSIBILITY OF THE PROBLEM played a partial role in the examined cases. Clearly, the 'waldsterben' issue involved a simple and easy-to-comprehend causal attribution and was thus highly accessible to the public. Similarly, in the summer smog issue the link to the traffic policy discussion rendered the issue highly accessible. In Germany, the issue of BSE gained public attention each time new facts became publicly known, rendering the issue more tangible and more visible to the non-expert citizen.

H-3. The extent or magnitude of a whole issue-attention cycle is first indicated by its peak intensity (in terms of maximum press articles per time unit, e.g. per year), and, second, by the total sum of press articles regarding the issue. Thus, in order to delimit an attention cycle and distinguish it from habitual coverage regarding an issue, we shall assume at least weekly press coverage, i.e. a minimum number of 50 press articles per year. In these terms, the 'waldsterben' issue received by far the most public attention with a peak press coverage of roughly 1000 articles in 1983 and a total number of 4000 articles between 1981 and 1990 plus in the years 1992, 1993 and 1995, with an average of daily coverage or more ($>$ 300 articles per year) from 1982 to 1985 (Figure 5). Issue attention in the case of BSE totalled about 2100 up to the year 2002, with a peak intensity of 840 articles in 2001 (Figure 7) and daily coverage in three subsequent years, whereas the summer smog issue received a total attention of 'only' around 290 press articles between 1993 and 1995, which was highest in 1995 with 125 articles (Figure 1). Regarding the latter, however, we need to take into account the distinctive seasonal cycles and thus the high intensities of public attention in the summer months, which are not reflected in the annual aggregated numbers. Considering monthly figures, we discover much higher intensities, in particular daily coverage in two summer months in 1994 and 1995 (Figure 6).

Although possibly the most difficult variable to explain, our empirical analysis allows us to draw a number of precautious conclusions regarding factors influencing the magnitude of issue-

attention cycles. As could be shown, the extraordinarily high and sustained public attention regarding the 'waldsterben' and sulphur emissions issue may ultimately be attributed, first, to a rising AVAILABILITY OF PROBLEM-SOLVING RESOURCES (H-3b) and, second, to good ACCESSIBILITY OF THE PROBLEM, which also played an important role. In the summer smog case, we need to distinguish between the seasonal peaks in public attention, which are obviously due to the seasonally higher SEVERITY OF THE ENVIRONMENTAL CONDITION (H-3a) in summer and the long-term attention cycle. The latter can less evidently be explained by external factors. Possibly, the ACCESSIBILITY OF THE PROBLEM (H-3c) in terms of the causal attribution 'road traffic causes ozone' also accounts for the magnitude of public attention, especially given the ongoing debate on traffic policy. The link of the summer smog issue to the traffic policy debate that allowed the issue to become so popular was thus an important factor. ACCESSIBILITY OF THE PROBLEM proved an important factor regarding the extent of public attention to the BSE issue, too.

H-4. In keeping with the convention set up above, the issue-attention cycle of the 'waldsterben' issue lasted 13 years, with at least weekly press coverage (4 years with at least daily coverage), compared to 8 years (3 years) in the BSE case (until 2002), and 3 years (0 years) in the summer smog case (considering the seasonality of the summer smog issue, it received daily press coverage in two subsequent summers, each for two months, and weekly coverage in ten subsequent summers for two to seven months each). According to H-4, 'waldsterben' and sulphur emissions should have constituted the greatest environmental problem, whereas summer smog should have represented the least severe environmental problem, with BSE lying somewhere in between. This does seem plausible in so far as the industrial sulphur emissions were in fact very high at the time, and if large parts of Germany's forests were in fact severely damaged, this, too, would have contributed to a major SEVERITY OF THE ENVIRONMENTAL CONDITION, possibly greater than the spread of BSE in cattle and the ozone concentrations measured in summer. Although the BSE problem most likely did not pose a significant threat to the health of German citizens (especially compared to other diseases), the huge uncertainties involved and the risk of a lethal disease, combined with the often encountered over-estimation of small risks (see Kahneman and Tversky 1979) may well have led to an extremely high *perceived* SEVERITY OF THE ENVIRONMENTAL

CONDITION. With summer smog, the actual health risks are still contended among experts, but may probably be classified as not overly hazardous.

H-5. In all of the examined cases, the political pressure due to high public attention was strong enough to cause politicians to engage in political activity (H-5a). The extraordinarily high public attention towards the 'waldsterben' issue led to one of Europe's most recognized and most effective (in terms of improvement of environmental quality) regulations, the Ordinance on Large Combustion Plants in 1983, when public attention towards the issue was highest and only two years after the dramatic rise of public attention. In contrast, the much lower but still high attention towards the summer smog issue caused politicians in 1995 to pass a merely symbolic law unable to cope effectively with the environmental problem. This law, too, was passed in the year of highest public attention (H-5b). The BSE case proves the best evidence of the assumed positive relation between public attention and POLITICAL ACTION, high political action following high public attention statistically with a time-lag of one month (cseeFigure 8).

H-6. On the other hand, the examined cases suggest that political action, especially the regulatory acts passed, had a positive impact on the decline of public attention. Empirical evidence is strongest in the summer smog case, public attention showing an abrupt decline after the Ozone Act had been passed, quite in contrast to the non-political issue of Lady Diana Spencer's death (see Figure 3 above). Issue-attention towards the 'waldsterben' and BSE issues, too, dropped quickly after regulatory acts had been passed.

H-7. However, in all three examples the strong reduction of public attention to a very low level – in the 'waldsterben' and summer smog cases to almost zero, whereas the BSE issue still does not seem to be at the end of the attention cycle – may in part also be explained by a certain weariness of the issue, for none of the issues seem to have been fundamentally and substantially resolved by the political measures taken. The question to what extent this is due to the appearance of OTHER ISSUES is not easily answered and would require further systematic empirical analysis (see Zhu 1992 on this aspect). However, regarding the generally declining attention of the German public towards the larger problem area of 'environment', it is plausible to assume that these issues have indeed partly been replaced by those of other fields, particularly economic development and unemployment.

H-8. Time dependence of an issue's career was also of importance regarding the issue's fate after it had gone through an attention cycle. In both the 'waldsterben' and the summer smog cases the issue remained on the public agenda for several years on a low but fairly constant level, considerably higher than that before the issue entered the cycle (H-8a). The BSE case, then, paradigmatically shows how an issue may be more easily activated once it has already been on the public agenda: The enormous wave of public attention at the turn of the years 2000/2001 would most probably not have been possible without its having been in public discussion earlier (H-8b). The same applies for the multiple seasonal cycles of public attention to the summer smog issue.

H-9. Both the summer smog and the BSE issues have regained public attention multiple times, since the issue at stake had each time remained (largely) unresolved. Since its peak in the early 1980s, however, the 'waldsterben' and sulphur emissions issue has never regained a similar level of public attention. Though the state of German forests has not greatly changed in the past 20 years, industrial pollutant emissions have been reduced enormously due to the legislatory acts taken, such that there has been little incentive for public attention since then.

6. Concluding Remarks and Suggestions for Further Research

With the conceptual framework and the system of testable hypotheses presented here, a first attempt has been made to apply rational choice theory to this challenging field of social and political science. The empirical evidence clearly shows the existence of discernible issue-attention cycles and sustains most of the propositions put forward. However, the suggested model of public attention and political action still bears more potential than could be realized in this short study. A good way to test and further refine it would be to build an agent-based computer model allowing the reconstruction of observed dynamics of public attention and its relation to political action, to quantify possible weights of different influencing factors, and to explore possible scenarios of issues still in the 'latent phase'. Furthermore, additional systematic empirical research is needed regarding in particular the replacement of issues by newly arising ones.

Acknowledgements

I thank Professor Dr Claudia Pahl-Wostl, Dr Steffen Wesche, the members of the Resource Flow Management group and three anonymous reviewers for helpful discussions of the ideas presented here. Parts of the empirical research that this article draws on were funded by the Volkswagen Foundation, Hannover.

NOTES

Original time series data may be obtained from the author (e-mail: jens.newig@usf.uni-osnabrueck.de).

1. We shall later see what distinguishes the two.
2. Many recent publications draw on Downs' approach (see Peters and Hogwood 1985; Hilgartner and Bosk 1988; Dyllick 1989; Steger and Winter 1996; Howlett 1997; Guber 2001; Henry and Gordon 2001; Baumgartner 2002). Note that Luhmann's notion of 'public opinion' is fairly close to that of public attention in this paper.
3. Luhmann (1971: 18–19) describes a similar pattern, distinguishing different stages of an issue's 'career': latent phase – breakthrough – element of public opinion – culmination – turning away. However, Luhmann's theoretical framework of social systems theory seems less compatible with the one we put forward here.
4. For a more detailed discussion of scarcity of public attention, see Hilgartner and Bosk (1988) and the zero-sum model of Zhu (1992).
5. Downs' model neither explicates what type of political measures are taken nor, more generally, how governments and parliaments respond to the political pressure posed by intense public attention towards an issue.
6. The attention cycle heuristic bears similarities to the heuristic 'models' of the policy process (e.g. the stages heuristic). See the discussion in Héritier (1993) and the more recent overview in Sabatier (1999).
7. Note the 'Lady Di' type issues discussed below.
8. We draw here on a phrase by Cohen (1963: 13): '[. . .] the press is significantly more than a purveyor of information. It may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think *about*.'
9. Dunlap and Jones (2002: 485–6).
10. A question that remains open is *how* issues are delimited in social discussion, i.e. how an issue's borders are socially constructed. To my knowledge, there has not been much research on this point. See Dunlap and Jones (2002: 485).
11. Howlett (1997), for instance, analyses acid rain issues and nuclear issues in Canadian parliamentary debates (somewhat discernible attention cycle in acid rain, no clear trend for nuclear issues); Guber (2001) detects a weak attention cycle in the broad field of environmental protection (see also above); Baumgartner (2002) studies American federal budget and congressional hearings in

such broad fields as 'the environment', 'education', 'health', 'transportation' and many others over a range of 45 years and finds all sorts of different timely patterns.

12. In their study on 'personal importance of air quality', ranging from May to September 1998, Henry and Gordon (1999) found only weak evidence of an attention cycle – presumably not only because of the largeness of the 'issue', but also as a result of the small time-scale.
13. Downs (1972: 41). However, Downs remains rather ambiguous about what kinds of issue are likely to pass through distinct cycles. Whereas at the outset of his article he claims that 'most key domestic problems' will go through the cycle (p. 38), he later specifies the characteristics of such issues as (1) affecting only a minority of citizens, (2) a majority benefiting from the causes of the problem a minority suffer from, and (3) having intrinsically exciting qualities (p. 41).
14. Peters and Hogwood (1985: 240–1), Mahon and Waddock (1992).
15. Often in measuring issue salience by polling, only the issue the respondent thinks is the 'most important' is measured (see Soroka 2002: 46), thus excluding less important ones that may still receive high degrees of public attention, particularly those that are more likely to pass through distinct cycles.
16. The central hypothesis was formulated as early as 1972 by McCombs and Shaw (p. 177): '[I]t is hypothesized that the mass media set the agenda for each political campaign, influencing the salience of attitudes towards the political issues'. A detailed account of the development in this field is given by Dearing and Rogers (1996). Today, the term 'agenda-setting' is often used in a more general manner, encompassing different causal relations between 'media agenda', 'public agenda' and 'political agenda' (see the recent volume by Soroka 2002).
17. See, for instance, Katz and Foulkes (1962: 377); Lowery and DeFleur (1985: 93); Palmgreen et al. (1985: 13).
18. Zippelius (1999: 276).
19. The terms 'model' and 'modelling' are used broadly in this paper and refer to generalizations of observations and/or causal relations – not just to their formal or mathematical representations. See Esser (1993: 119–40).
20. For a detailed account of the general assumptions, see in particular Coleman (1990), Esser (1993) and Williamson (1985).
21. Social systems theory draws on communications rather than actors as basic elements, and focuses on the emergent structures of social (sub-)systems (and their functions for society as a whole), but not on the mechanisms as to how these structures develop (see Luhmann 1995: 607–9). We are interested in investigating the 'emergence' of system level phenomena from the interactions of individual (or collective) actors.
22. Simon (1972). This notion differs from that recently put forward by Gigerenzer and Selten (2001), who abandon the concept of individuals seeking to maximize utility or achieve optimal solutions in favour of an 'ecological', 'adaptive' rationality.
23. Coleman (1990: 14–18).
24. In 'classical' rational choice theory, the fact that people vote despite the theoretical proposition of the individual costs of voting exceeding the individual benefits from it and it thus being 'irrational' to vote, is treated as the 'paradox of voting' (Coleman 1990: 289–90). Recent works by Schuessler (2000) have shown, however, that this behaviour is consistent with rationality assumptions.

25. One might object that peaks of public attention are not so much due to 'rational' considerations but based on pure 'irrational' emotions, as in the case of Lady Diana Spencer. In our theoretical framework, this is no discrepancy: The emotional element lies on the level of an individual's preference structure which determines his or her goals and concerns. Emotionally driven preferences are by no means irrational (see Gigerenzer 2001). Rather, turning one's attention to a preferred issue is profoundly rational!
26. The fact that different newspapers do indeed exhibit different political 'orientations' can also be attributed to economic considerations, namely dividing the total market of possible readers according to the distribution of political orientation, thus forming diverse 'ecological niches' for the multitude of newspapers quite analogous to the formation of different political parties in public choice theory (see Downs 1957).
27. Often in public choice theory, political parties rather than politicians are regarded. Here, we will not opt for this generalization, which aims mainly to explain the spectrum of political parties. Rather, we consider existing political parties as a constant boundary condition.
28. Herder-Dorneich (1959: 58) calls this the 'ruse of democracy': that the goal of common welfare is augmented by means of politicians pursuing personal ambitions.
29. This only holds true for the problematic issues we are dealing with. News (or rather 'non-news') concerning many issues such as the 'Lady Di' type are largely consumed as a form of entertainment and thus constitute direct benefits rather than costs for the recipient (Downs 1972: 42). But even then the question remains: Which issue will one turn to? Possibly those that are already in public debate and thus receive high levels of attention.
30. It would be a challenging task to empirically determine such aspirational levels and their effect on public attention.
31. For other factors increasing the probability that an issue shapes the political agenda, see Liebl (1996: 92).
32. For a more detailed account of the possible motives of scientific experts actively engaging in public discussion and thus promoting certain issues, see Peters (1994: 166).
33. The literature on the theory of non-linear dynamic systems ('chaos theory') is vast. A demonstrative introduction is given by Briggs and Peat (1989).
34. In terms of institutional economics: The issue becomes an institution, reducing the transaction costs of accessing it. Interestingly, Luhmann (1971: 15, 27), not yet having performed his 'autopoietic turn', regards issues as institutions governing the devotion of – scarce – attention towards possible subjects. For a detailed account of institutional economics, cf. the pertinent literature, e.g. Williamson (1985).
35. This is stressed in the 'interest group theory of government' developed by exponents of the Chicago Political Economy. Cf. in particular Stigler (1971) and Peltzman (1976).
36. For a detailed portrayal of a rational choice theory of symbolic legislation, cf. Newig (2003). Also, see Dwyer (1990); Mahon and Waddock (1992: 27).
37. In Switzerland, a practically analogous dynamics of media attention regarding 'waldsterben' occurred, although with a one-year delay. Zierhofer (1998: 200).

38. A detailed account of the development and effects of the Federal Ozone Act is given by Newig (2003: 149–206).
39. For a detailed account of German BSE legislation following the first German BSE case, see Schulte (2002).

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