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Public Controversy and Partisan Deliberation

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Abstract

Public scientific controversies are often the enemy of deliberation, because debating and winning take precedence over an open-minded examination of options. Nevertheless, forms of deliberation do occur throughout controversies, including what can be called "partisan deliberation" in which campaigners on each side of an issue refine and coordinate their respective positions. As well, there are other opportunities for deliberation created by controversies, though the conditions are far from ideal.

Keywords: scientific controversy, deliberation, vaccination, fluoridation

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Controversia Pública y Deliberación Partidista

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Abstract

Las controversias científicas públicas son a menudo el enemigo de la deliberación, porque el debate y gane toma prioridad con respecto a la examinación de opciones de una mentalidad muy abierta. Sin embargo, las formas de deliberación se producen a lo largo de controversias, incluyendo lo que se puede llamar "la deliberación partidista" en las cuales los activistas en cada lado del asunto clasifican y coordina su respectiva posición. Además, hay otras oportunidades de deliberación creadas por controversias, aunque las condiciones están lejos de ser ideal.

Palabras clave: controversia científica, deliberación, vacunación, fluoración

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Scientific controversies with a public dimension, for example over climate change, fluoridation, genetic engineering, or nuclear power, seem almost the antithesis of deliberation. In an ideal process in which a group of individuals deliberates on an issue, there is exposure to a range of information, respectful airing of viewpoints, examination of commonalities and differences, and a genuine search for consensus. However, campaigners in public scientific controversies, rather than seeking to resolve their differences through thoughtful engagement, instead seek most of all to win the debate, often less through evidence and logic and more through winning support and using power to influence policy.

Public controversies typically involve a mixture of issues, including science, politics, and ethics (Kleinman et al., 2005, 2008, 2010; Martin, 2014; Nelkin, 1979). For example, the debate over fluoridation of public water supplies involves claims about benefits (prevention of tooth decay) and risks (adverse health effects), about ethics (compulsion), and about politics (how decisions should be made). Although such debates are sometimes characterized as a coalescence of a scientific controversy and a social controversy (Engelhardt & Caplan, 1987), in practice it is often difficult to separate these elements. For example, in the debate over nuclear power, assessments of the evidence about the effects of low-level ionizing radiation are themselves affected by views about nuclear power (Diesendorf, 1982).

Public controversies often generate a polarization of viewpoints, typically with two opposing views being at loggerheads in several different areas. In the fluoridation debate (Freeze & Lehr, 2009; Martin, 1991), proponents assert that the benefits are large, the risks small or non-existent, the benefits greatest for disadvantaged segments of the population (an ethical argument), and that decisions should be made by experts, whereas opponents question the scale of the benefits, emphasize evidence for health risks, oppose compulsory medication at an uncontrolled dose, and argue for public participation in decision-making. It is rare to find prominent figures who take an intermediate stance, for example that fluoridation is completely safe but should be opposed because it is mandatory medication. What happens in polarized debates is that each side adopts positions that attack the opponent's claims and defend

against the opponent's counter-attacks. Adopting an intermediate position means surrendering an argument: the opponent will exploit any concession made. The result is that those with complex positions or with reservations about claims receive little support from either side, and usually drop out of the debate.

For these and other reasons, public controversies seem at first sight to offer poor prospects for careful deliberation involving open-minded and respectful examination and testing of evidence and arguments. Yet there are some surprising opportunities that can be pursued. In the next section, the obstacles to deliberation posed by the dynamics of public controversies are outlined. In the following sections, several openings for deliberation are described: deliberation within each side's campaign networks, called partisan deliberation; individual assessments; public debates; citizens juries; and government bodies. This examination shows that there can be deliberative elements even in inhospitable terrains. Furthermore, examining the obstacles to deliberation, and ways around them, can point to insights applicable to deliberation in seemingly less constrained circumstances.

Public Controversy as the Enemy of Deliberation

In public controversies, the aim of many campaigners is to win, which includes winning arguments and, more importantly, ensuring that desired outcomes are achieved. Campaigners against nuclear power, for example, would like to win arguments about the seriousness of the hazards of reactor accidents and long-lived radioactive waste, and the meta-argument that these hazards warrant more weight than the putative benefits of nuclear power, but more important is that nuclear developments are thwarted and that existing nuclear facilities are closed down. Pro-nuclear campaigners have an analogous set of contrary arguments and goals. When the aim is to win, interactions with opponents become not an opportunity to find common ground but simply another arena to continue the struggle. The result is that wide-ranging deliberation becomes elusive, at least for ardent campaigners.

Due to the dynamics of public debate, there are pressures on each side to make their arguments coherent, so that each element supports their preferred position (Martin, 1991, pp. 37–55). As noted above, fluoridation campaigners consistently take either a pro or anti position on each of the facets of the

debate: benefits, risks, ethics and politics. Adopting a non-standard position is to open your side to attack. For example, pro-fluoridation campaigners are unwise to admit that any health risks are significant, or even exist. If a single credible figure — a health official or a researcher — makes such an admission, it will be taken up by opponents and repeated forever after. The side with less epistemological credibility is especially likely to trumpet concessions by authority figures within the orthodoxy. As a result, debaters are reluctant to reveal any weaknesses in their arguments. If imported into a deliberative forum, this reluctance undermines the prospects for open discussion of viewpoints: partisans will remain guarded.

Within many public controversies, one or both sides seek to win over authorities and to use the exercise of power to resolve the debate. For example, fluoridation proponents have sought to convince governments to implement the measure. In some instances, when local governments refuse, proponents seek mandates from state governments in order to override local resistance. Some US anti-fluoridation campaigners have gone to courts seeking a halt to fluoridation on various grounds. Though they have hardly ever been successful, this illustrates their willingness to draw on the power of authorities to resolve the policy debate in their favor.

Activists — even those sympathetic to public participation in decision-making — may have reservations about deliberative mechanisms, for example being worried that they are an elitist discourse, that radical claims may be submerged in "reasonableness," and that deliberation cannot adequately address a clash of interests (Levine & Nierras, 2007). In polarized controversies, these reservations are likely to be accentuated.

Seeking to use the power of the state, sometimes via the state's regulation of the market, to decide the outcome is to override processes of deliberation. The aim with these sorts of administrative or legal interventions is to achieve goals directly, without the necessity of convincing opponents or shifting public opinion.

Another factor hindering deliberation is verbal attacks on opponents. Critics of vaccination have been described in various derogatory ways, for example as crazies or baby-killers. Some opponents have returned fire with uncomplimentary labels for proponents. Such hostile labeling is contrary to the mutual respect that is an important basis for many deliberative processes.

Public debates have one more important limitation so far as deliberation is concerned: they can distract attention from potential solutions and from areas of agreement. Fluoridation is just one of many ways to get fluoride to people's teeth. Others include fluoridated toothpaste, fluoride mouthwashes, and fluoride applied by dentists, none of which arouse much debate, because they are voluntary. On a wider canvas, there are other ways to address tooth decay, including dental hygiene (brushing and flossing teeth), eating fewer sugary foods, and improving nutrition. However, these sorts of options are sidelined by the vociferous debate over fluoridation.

In summary, public controversies have several features that reduce the prospects for deliberation, including polarization of views, coherence of arguments, a focus on exercising power to impose favored policies, and distraction from alternative solutions to agreed concerns. These features help to explain why some controversies are so long-lived. The fluoridation controversy emerged in the 1950s and has continued in much the same form ever since. Despite the obstacles, though, there are a few openings within controversies that can enable elements or pockets of deliberation. These include deliberation within each side's groups or networks, individual assessments, citizens juries, and formal processes. These are addressed in the following sections.

Partisan Deliberation

In public controversies, deliberation involving partisans from opposite sides may be difficult, but within each side's groups and networks, there are various opportunities for assessing evidence, rehearsing arguments, choosing rhetoric, and deciding strategy. This can be called partisan deliberation: it is deliberation within a set of constraints, most commonly the goal of winning the debate and achieving preferred outcomes. This might also be called constrained deliberation because it occurs within constraints imposed by the debate itself, as well as by other factors.

Within thinking about deliberative democracy, partisan groups in public controversies are one type of enclave. In the continuum of inclusiveness, the highest level is the entire public sphere. Below this are mini-publics, for example a group of individuals randomly drawn from the entire population. Then there are sector mini-publics, for example individuals randomly drawn

from a sector of the population such as youth or people with disabilities. Below sector mini-publics are enclaves, which are homogeneous groups of individuals (Raisio & Carson, 2014). The type of enclave most frequently encountered in public scientific controversies is a group or network of individuals who share the same viewpoint (Karpowitz et al., 2009, p.582). The composition of deliberative bodies, and the likely domains of discussion, are illustrated in Table 1 in relation to the vaccination debate.

Table 1. *Deliberative bodies and typical vaccination issues addressed at different levels of inclusiveness*

Level of inclusiveness	Composition of deliberative forum	Typical issues addressed
Public sphere	All citizens	Vaccination in the context of initiatives for child health
Mini-public	Representative sample of citizens	Vaccination policy
Sector mini-public	Representative sample of people involved with the vaccination issue	Vaccination policy
Enclave	Group members supporting or critical of vaccination	Campaigning priorities and strategies

Partisan deliberation can occur in various ways and locations, including within key campaigning organizations, in networks of committed professionals, among politicians, and in government departments. In each of these circumstances, most or all participants agree about their goals but find a need to discuss how best to achieve them. In some situations, it is possible that deliberation may take a wider ambit, including some open-minded discussion of the other side's position. The focus here is on the discussions that are more highly circumscribed by the polarization common in bitter public controversies.

Partisan deliberation in scientific controversies can be hard to study because most of it occurs in arenas closed to outside scrutiny. Campaigners seldom want to make their planning discussions open to the public, or indeed to anyone they do not trust, because comments indicating uncertainty or

weakness might be taken up by the opposition. For example, in 1951 Francis Bull, a prominent proponent of fluoridation, gave a candid talk at a dental conference on how to sell the measure. Unbeknownst to Bull, his talk was transcribed; opponents obtained a copy and used quotes from it to condemn fluoridation advocacy (Martin, 1991, pp. 64–67). The best insights into partisan deliberation in practice are by participants, but candid accounts are seldom publicly available.

To illustrate some of the features of partisan deliberation and the difficulties in studying it, I will use the example of the Australian vaccination debate, in which some discussions are publicly accessible. In Australia, as in most countries, vaccination is supported by most researchers, doctors, and policy-makers; it is endorsed and promoted by government health departments. In the face of this dominant orthodoxy there are some citizen groups critical of vaccination, supported by a small number of doctors and researchers. One of the vaccine-critical groups, set up in the 1990s, was the Australian Vaccination Network (AVN);[1] it became the largest and most prominent in the area. In 2009, a pro-vaccination group, called Stop the Australian Vaccination Network (SAVN),[2] was set up with the explicit goal of shutting down the AVN (Martin, 2011, 2012). Both the AVN and SAVN have presences on the Internet, so it is possible to gain a fair bit of insight into their treatment of the issues.

The AVN, like other vaccine-critical groups, highlights the adverse effects of vaccination, the decline in most infectious diseases prior to mass vaccination, and the importance of informed parental choice in children's vaccination. Sympathetic contributors to the AVN discussion sites seldom review the evidence in support of vaccination. Instead, the primary emphasis is on presenting information to question or complement the government's official endorsement of vaccination. In so much as AVN online discussions have a deliberative element, they operate within a set of assumptions, including that individual choice is crucial, adverse effects of vaccination are important, and that the evidence for the benefits of vaccination is not conclusive. Within these assumptions, various evidence and arguments are canvassed. A key constraint is that evidence and arguments are likely to be challenged by supporters of vaccination, including government officials, pro-vaccination campaigners (including SAVN), and doctors that AVN members consult. Because the AVN has come under such sustained attack by SAVN,

what appears online on the AVN's website is bound to be a limited reflection of the sorts of discussions AVN members might have privately. Not only are SAVN contributors blocked, but many AVN supporters are reluctant to post comments because they might be targeted by SAVN.

More revealing by far are SAVN discussions. SAVN, a network of concerned citizens not formally connected to any professional organization, operates largely through a Facebook page, supplemented by the blogs of many individual SAVNers. There are hundreds of comments on the Facebook page every day, from a wide range of contributors. It is apparent that positions on various issues are negotiated through these discussions. Endorsement of the government's vaccination policy is taken for granted. Research findings are often cited but, in the face of critical queries, SAVNers seldom claim expertise themselves, instead saying people should consult with their doctors.

A primary focus on SAVN discussions is on shutting down the AVN and any other critics of vaccination who have a public profile. Quite a few SAVNers make nasty comments about the AVN. Meryl Dorey, the founder and for many years the most prominent AVN figure, was a special target for hostile comment (Martin & Peña, 2014). SAVNers have made numerous complaints to government departments about the AVN. When journalists quote Dorey, SAVNers complain to the media organization. When Dorey was scheduled to give a public talk, SAVNers organized to try to have her invitation withdrawn (Martin, 2015). SAVNers are quite open about their efforts to censor vaccine critics. However, there are limits. When actions against the AVN become too strong, SAVN Facebook page administrators draw the line. For example, they condemned the sending of pornography to Dorey and others in the AVN.

In the SAVN online discussions, the Facebook page administrators play an important role. They initiate, through posts, most of the extensive discussions, thus performing a role within SAVN analogous to the agenda-setting role of the mass media in wider society. Other SAVNers can introduce topics in the section "Visitor posts." Some of these generate considerable comment; others attract likes but little comment; quite a few fail to stimulate any response.

There are several ways to characterize SAVN discussions; the focus here is on deliberative elements. The most salient facets that involve deliberation address the appropriate goals and methods for SAVN. The primary focus of SAVN has been the AVN, including highlighting shortcomings of AVN

claims, making fun of comments by AVN members, and taking action to discredit and hinder the AVN. However, many SAVNers see this project as part of a wider campaign against alternative medicine. In 2015, after the influence of the AVN had dramatically declined, SAVN administrators turned more of their attention to attacking chiropractic and other modalities such as naturopathy and homeopathy.

Then there is the question of what to think about various issues. If there is a new claim or initiative by vaccine critics, or some new event such as a policy announcement or statistics published about a particular infectious disease, SAVNers will discuss its significance and how to respond. In many discussions, SAVNers offer information or perspectives or viewpoints. These may be supported, qualified, opposed, or ignored. The ongoing interactions thus provide a sort of running de facto deliberation about information, activities, attitudes, methods, and goals. This is constrained by the overall aim of SAVN to discredit and censor anyone who publicly challenges orthodox views about vaccination.

The following thread, from July 2015, illustrates some of the typical elements of SAVN discussions, showing responses to a post critical of vaccination.[3] I chose this thread — a post followed by a dozen or so comments — because it is a self-contained topic rather than part of an ongoing discussion.

> **Sumner Raphael Berg**
> For the older ones who got the polio vaccine back in the 50-60s we got with it SV40 which comes from a Rhesus monkey and is a carcinogen. Aren't we lucky?
>
> **Mike Both (yawn)**...
> http://scienceblogs.com/.../a-zombie-meme-rises-from-the.../
> A zombie meme rises from the grave: Maurice Hilleman, the polio vaccine, SV40, and cancer
> The Internet has produced a revolution with respect to information. Now, people anywhere, any time, can find almost any information that they want, as long as they have a connection to the global network and aren't unfortunate enough to live in a country that heavily censors the Internet connections…SCIENCEBLOGS.COM
> July 13 at 8:39pm; 15 likes

Ray Sarah Elliott And not only did you not have a carcinogenic vaccine, but you never suffered the nastiness of polio and have lived in good health to tell the tale. Yes you are very lucky indeed.
July 13 at 9:18pm; 17 likes

Anne Blake Not only gullible enough to swallow such arrant nonsense but foolish enough to post it here and expose his trolling ignorance to the ridicule it richly deserves.
July 13 at 11:09pm; 9 likes

Peter Tierney Quick. Everyone grab their calipers. Oh, no wait.
July 13 at 11:11pm; 11 likes

Annie Taylor I'm glad I got the vaccine!!! Unlike my Neighbour. She got the Polio instead. Wake up Pal. You are obviously NOT in my age group. Those who are saw first hand Polio will never buy your Bullshit Lies.
July 13 at 11:12pm · Edited; 7 likes

Annie Taylor Oh you ARE my age .then you should know better. For the sake of your grandchildren may the likes of you soon all begone.
July 13 at 11:15pm · Edited; 3 likes

Maddy Jones Clean up to aisle 6, mop and bucket to isle 6, we have a drive by mess to clean up
July 13 at 11:20pm; 4 likes

Annette Bannon I didn't know a rhesus monkey was a carcinogen!.....oh wait!
July 13 at 11:55pm; 4 likes

Paul Jones Vroooooooommm!!!
July 14 at 12:06am

Meleese Pollock Yes we are lucky. Polio crippled my grandmother when she was 2 and my parents had a polio scare with my brother.
July 14 at 6:24am · Edited; 4 likes

> **Allison Hagood** A list of studies finding no link between SV40 and cancer rates:
> http://europepmc.org/.../reload=0;jsessionid..... [4 other links omitted]
> Potential exposure to SV40 in polio vaccines used in Sweden during 1957: no impact on cancer.....
> Abstract: U.S. polio vaccines produced during the 1950s were potentially contaminated by simian virus 40 (SV40). Recently DNA from SV40 has been detected...EUROPEPMC.ORG|BY EUROPE PUBMED CENTRAL (EUROPE PMC)
> July 14 at 6:27am; 8 likes
>
> **Judi Wood** We are tremendously lucky. I remember watching a newly graduated doctor on his first third world posting anxiously feeling his own face and limbs. 24 hours later he was on his way back to Australia. I next saw him several years later in a wheelchair at his own wedding. It was during the time I was getting my childhood polio vaccines, a course of injections. Some of my peers who didn't get the vaccine in time died or were massively crippled. So yes, I think I'm lucky.
> July 14 at 7:42am; 3 likes
>
> **Peter Bowditch** Me in Australasian Science magazine.
> http://ratbags.com/rsoles/comment/ausscience1304_polio.htm
> The girl in the iron lung RATBAGS.COM
> July 14 at 8:10am; 3 likes
>
> **John Andrews** You gotta hand it to Big Pharma. In the 50s and 60s he had already forward planned the cashcow cancers of the 90s and 2000s.
> July 15 at 9:22pm; 1 like

The initial post refers to the well-documented contamination of early polio vaccines, given to millions of people in the 1960s, by the monkey virus SV40, which has subsequently been linked by some scientists to particular cancers, but contested by others (Bookchin & Schumacher, 2004). SAVNer comments span a range of approaches. Some make fun of the post and poster, reflecting

a typical SAVNer attitude involving humor, superiority, contempt, and dismissal. Other comments introduce information to counter the alleged SV40-cancer link; as in many other threads, SAVNers provide pro-vaccination information. Yet other comments assert or imply that the benefits of polio vaccines outweigh any possible risk. A recurring theme in SAVN discussions is that the benefits of vaccination greatly outweigh any risks — a popular SAVN slogan is "Vaccination saves lives" — and indeed SAVNers frequently question or criticize claims about risks.

The shortcomings of this short interaction from the point of view of deliberation are apparent: a contemptuous attitude towards a contrary view, one-sided provision of information, and an assumption that the benefits of vaccination outweigh any harms. Nevertheless, it is also possible to see deliberative aspects, including the introduction of information (including via links) relevant to understanding a contentious claim, and assertion of a relevant comparison of risks.

Another qualification is that it is not apparent whether all posts are displayed. SAVN, to its credit, allows some critics of its position to post on its Facebook page, but also blocks some of them. The person who made the original post in this thread, Sumner Raphael Berg, either did not reply or had replies blocked or removed. His post received no likes.

It is even questionable whether an online, asynchronous exchange can be deliberative in any sense. Engagement in such exchanges is disjointed and seldom is part of a search for common ground, and so might better be characterized as discussion than deliberation.

Partisan deliberation can also occur within government health departments, advisory groups, and meetings of health professionals. These discussions are not public, but it seems reasonable to believe that these discussions have deliberative elements, again within constraints of overall support for vaccination. Indeed, the ambit of discussions is bound to be a bit broader. For example, decisions need to be made about proposed new vaccines and about the recall of vaccine batches in the light of reports of adverse events. Judging by official statements, there usually seems to be consensus within the pro-vaccination groups in health departments and the medical profession. Only insiders could comment about the level of disagreement about any fundamentals. It is plausible that deliberation within government and professional circles is constrained in two ways, by the need

to justify official policy and counter vaccine critics and by the need to present a united front. These two constraints are mutually reinforcing.

Individual Assessments

Controversies bring issues to professional and public attention, and this attention can stimulate some individuals to investigate further and try to make sense of apparently contradictory claims. In principle, anyone who wants to can undertake their own assessments, by reading scientific and other articles, by talking to partisans, and by publishing their ideas and obtaining feedback. This could occur for any contentious issue; the visibility of public controversies means that it is more likely to occur with them. If everyone is talking about climate change, then individuals are more likely to want to investigate it further than to study some less salient controversy, for example over the safety and benefits of raw milk. The size of the human or environmental impact of a contentious practice does not automatically translate into corresponding interest. In developed countries, vastly more people die from pharmaceutical drugs than illegal drugs, but most of the public controversy is about the illegal ones.

Consider someone who becomes interested in an issue that is publicly contentious and investigates by reading articles and thinks about the evidence and arguments. This is an internal, reflective form of deliberation (Goodin, 2000). Such an individual's initiative is analogous to the role of a judge as contrasted to the role of a jury: most of the deliberation is by one person. However, to the extent that such individuals interact with others, for example through conversations or writing blogs, there is a wider deliberative dynamic.

Journalists regularly report on public controversies; this is part of what makes them public. Many journalists focus on events and try not to pass judgment on the arguments; others are themselves partisans. There are also some who seek to understand the issues, interview experts and campaigners on both sides of the debate, and present a balanced account of the arguments. Among those who make individual assessments about controversies, journalists have a prominent place because their credibility depends in part on being seen to be fair-minded.

Whether such deliberation is recognized depends in part on whether the individual comes up with a non-standard position. Examples include

supporting the use of some vaccines but not others and supporting fluoridation but at a reduced level. On the other hand, if the individual ends up supporting one side or the other, then they will be seen as partisans. So even if the individual used a personalized deliberative process, this will be treated as simply following one of the standard lines.

One indication of such individual deliberation is an exposition of arguments on both sides of the debate. For example, two non-scientists attempted to make sense of the climate-change debate and wrote a book about it (Morgan & McCrystal, 2009). This may not seem to be anything special, but in many debates it is difficult to find anyone on either side who presents both the strong points on both sides and the weaknesses on both sides. (Some websites specialize in countering the arguments of opponents, but seldom highlight the weaknesses of their own side.)

To the extent that controversies trigger individuals to undertake their own assessments of the evidence and arguments, they can stimulate a form of deliberation. Although this might be just one person investigating in isolation, often such individuals interact with others, spreading their interest in independent evaluation.

Initiatives for Deliberation

In the literature on deliberative democracy (Carson & Martin, 1999; Gastil & Levine, 2005), attention is placed on a variety of mechanisms such as citizens juries, citizens parliaments, and deliberative polls, which are types of mini-publics. For example, in a typical citizens jury, twelve or more citizens, randomly selected from the community, are brought together to address an issue. They might be provided written information, hear from experts and partisans, discuss facets of the issue, and seek to explore common ground and move toward consensus. Independent facilitators are used to ensure the process is run smoothly, fairly, courteously, and expeditiously.

When a controversial issue has a high public profile, advocates of deliberative processes are likely to have greater interest in initiating such juries or other deliberative mechanisms. It is precisely when an issue is unresolved and the source of disagreement that deliberation is important. So it is not surprising that many citizens juries have been set up to address contentious topics such as energy policy and genetic engineering.

Although public controversies can stimulate this sort of interest in fostering deliberation, it is not often that formal deliberative forums have a major impact on the debate. Sometimes, when one side in the debate has the preponderance of power and/or epistemological authority, partisans may be reluctant to engage with a citizens jury, because it might give undue credibility to opponents. More seriously, dominant groups, most commonly governments, are often reluctant to share decision-making power, so while controversies can stimulate deliberative initiatives, they also act to restrict the impact of those initiatives.

As well as formal deliberative processes, there are other sorts of actions, typically taken by governments, with deliberative elements. These occur only in some controversies, typically those in which governments are caught in the crossfire of competing partisans. Seeking to avoid offending voters and lobby groups on one side or the other, governments may try to offload responsibility. In the fluoridation debate in the US, hundreds of local governments have called referendums (Crain et al., 1969), a participatory process that, while not formally deliberative, can encourage some individuals and groups to undertake their own investigations. In other instances, governments call for submissions to a formal inquiry; the submission process encourages a certain level of moderation in arguments put forward, because obviously biased submissions are more likely to be discounted. In Denmark, the Board of Technology ran consensus conferences and used other mechanisms on contentious issues such as food irradiation.

On the other hand, in some controversies governments are partisans. Nearly all governments promote vaccination and thus are unlikely to encourage participatory processes, because they might open the door to greater criticism of predetermined policy goals. On the other hand, when opposing partisans have roughly equal strength and when governments have no direct stake in decisions taken, governments may be more likely to initiate or facilitate deliberative measures.

Conclusion

Public controversies are often characterized by highly polarized and entrenched positions, with competing partisans seeking most of all to win the debate and, more importantly, for their preferred outcomes to be implemented

in policy or practice. These features make many controversies inhospitable to deliberation. Indeed, attempts at deliberation can be subverted, with partisans seeking to use them for their own ends.

Nevertheless, public controversies offer several opportunities and encouragements for deliberation. Consider first an issue that is seldom in the public eye, for example age discrimination or bee colony collapse disorder. There is not much deliberation about these issues — compared to racism or genetic engineering, for example — because there is comparatively little organized action to pursue particular goals. In contrast, when issues come to public attention and are debated vigorously, and in many cases rancorously, opportunities for deliberation are created, though within the interstices of the main confrontation.

When issues become prominent, some individuals may be stimulated to study the issues for themselves, engaging in internal-reflective deliberation. Governments, to address the competing claims, in some cases initiate inquiries and referendums, which have deliberative elements. Political parties may try to develop policies, in the process engaging members and others in searching discussions. Because of the interest generated by public debates, advocates of deliberative methods such as citizens juries are more likely to choose these controversial issues as the focus for examination.

As well, there is an important type of deliberation that is especially prominent in controversies, called here partisan deliberation or constrained deliberation. It is a type of enclave deliberation, with enclave members sharing a viewpoint. Campaigners, in order to forge the most effective sets of arguments, engage in discussions about science, politics, and ethics, seeking an agreed position to use to advance their cause, both to present a convincing case to supporters and neutrals and to counter claims and attacks from the other side. This sort of deliberation seldom involves significant interaction with those on the other side, because an open acknowledgment of the strengths of the opponent's position or the weaknesses of one's own can be exploited by opponents in the debate. Because of the emphasis on winning the debate, partisans are guarded in open engagements and often in private discussions too, except with others who are trusted.

The dynamics of partisan deliberation, which usually occur in private interactions between campaigners, including phone conversations and group meetings, are seldom open for public viewing. The online discussions of Stop

the Australian Vaccination Network are an exception, giving some sense of how views can be negotiated. But even these discussions give only a limited insight, because private actions and interactions are not visible.

The key shortcoming of partisan deliberation in controversies is obvious enough: the scope of the issues addressed is limited by the goals of the campaigners, and cannot encompass the perspectives and goals of opponents. But there is something to learn from controversies in this regard: every form of deliberation is constrained in various ways, and thus could be considered partisan deliberation. The question is not whether deliberation is constrained, but how. For example, deliberation within mini-publics (Raisio & Carson, 2014) and social movements (della Porta, 2009) is typically constrained by common assumptions about goals and methods.

Consider, for example, a citizens jury about container deposit legislation in Australia (Carson et al., 2002). The two main alternatives posed to the jury were either to recommend introducing container deposits — an extra payment of say ten cents for every drink can or bottle sold, refundable when the container is returned — or not to introduce such deposits. At the last moment, the packaging and beverage industries boycotted the jury, refusing to send expert representatives. Industry figures met with the state premier and reached a deal not to introduce container deposits. This is an example of how a mini-public was sabotaged: citizen deliberation was threatening to groups with vested interests.

The unedifying aftermath of this citizens jury points to the radical potential of deliberation: it promises to go beyond the partisan stands of environmental and consumer advocates favoring container deposits and of beverage manufacturers opposing them. Setting this aside, it is worth noting that the focus on container deposits meant that some wider issues were not addressed, for example changing manufacturing, sales, and/or consumer behavior so that containers are reused (rather than recycled) or that not so many are produced in the first place. Reusable bottles and cans are totally off the policy agenda, and so is reduced packaging or consumption.

This example illustrates a wider point: every topic being deliberated necessarily involves some degree of focus and hence sidelining or ignoring of various wider issues. Another way to think of this is that there is quite a bit of deliberation about any manner of issues, but not nearly so much about what should be deliberated. There seems to be little point in setting up a deliberative

process about a possibility that is currently remote, such as alternatives to well-entrenched market mechanisms and consumer behaviors, as the case of container deposit legislation illustrates. It can be argued that it is precisely such "utopian" alternatives that deserve greater attention.

To return to controversies: the polarization of views and commitment to winning make cross-position deliberation difficult, and for campaigners on each side the existence of an organized opposition means that partisan deliberation is shaped by the debate itself. Rather than being resigned to the limited and distorted forms of deliberation in such circumstances, an alternative is to think more broadly, including about commonalities between the two sides and about ignored alternatives that sidestep the debate altogether. Controversies can be so absorbing that it is easy to forget that more important issues may lie somewhere else.

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Notes

[1] In 2014, the AVN changed its name to the Australian Vaccination-skeptics Network.
[2] As of 2015, SAVN gave its name as Stop the Australian (Anti)Vaccination Network.
[3] The format of the thread has been slightly altered for ease of reading.

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Science Communication in India: An Assessment

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Science Communication in India: An Assesment

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Abstract

The paper explores science communication through diverse cultures in pre and post independent India. India is known for her early scientific wisdom and scientific heritage. Several sages and scholars have worked on medicinal, mathematical, agricultural, and other sciences, in Indian subcontinent during ancient and medieval periods. They had composed volumes based on self-earned experiences, using various means of communication, like oral communication, Guru-Shishya-Parampara (teacher-pupil tradition) of learning and dissemination of information through interaction. The tradition of oral communication continued through generations, in addition to knowledge creation. Then the modern science communication emerged. Publication of scientific books started in 1800 AD at Shreerampur in English, Bengali and Hindi. The historical perspective of science communication has remained almost untouched by researchers, except an attempt on scientific terminologies by Sharma (1964) and agricultural journalism by Parasar (1980), besides a few more research articles. The author of this paper worked thoroughly on *The Origin and Evolution of Science Communication in India* with comparative account in other parts of the world and published a book *Hindi Vigyan Patrakarita* (*Hindi Science Journalism)* in 1990, the first book on science communication in India, translated in different Indian languages, paving the way for other academics. The paper emphasizes on pioneering developments in various aspects of early and modern science communication and discusses the relevance and need of science communication by pointing out policy measures taken by the state. Finally, the paper summarizes the role of various individuals India.

Keywords: science communication, India, modes, networks, scientific temper, science popularization

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Comunicación Científica en la India: Una Evaluación

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Abstract

Este artículo explora la comunicación científica a través de diversas culturas en la India antes y después de su independencia. La India es conocida por su sabiduría y legado científico. Diversas sagas han trabajado en medicina, matemáticas, y agricultura, entre otras ciencias, durante periodos de medievales y antiguos. Diversos volúmenes se han producido basados en experiencias y usnado diversas formas de comunicación, como la oral, o la Guru-Shishya-Parampara (tradición maestro-alumno) sobre aprendizaje y diseminación de información a través de la interacción. La tradición oral se ha desarrollado durante generaciones en paralelo con la creación de conocimiento en la India. Sobre 1800 la comunicación de conocimiento en su forma moderna en la India surgió en Shreerampur, tanto en inglés, como bengalí e hindi. La perspectiva histórica de la comunicación científica ha quedado casi intacta, excepto, por ejemplo, en obras de Sharma (1964) y el periodismo sobre agricultura de Parasar (1980), entre algún otro trabajo. Yo mismo trabajé en el *Origen y la Evolución de la Communicación Científica en la India* con un estudio comparativo con el resto del mundo y publiqué el libro *Periodismo Científico Hindi* en 1990. Este fue el primer libro específicamente de comunicación científica en la India, traducido a varios idiomas del país, y supuso un camino a seguir para otros autores después. Este artículo muestra estos desarrollos pioneros en comunicación científica en la India y analiza la relevancia y necesidad de esta disciplina mirando a las medidas adoptadas por el estado en este sentido. Finalmente, se analizan el papel jugado por varios otros autores trabajando en este tema en la India.

Palabras clave: comunicación científica, la India, modos, redes, temperamento científico, popularización científica

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India has a rich tradition of communication, especially when it comes to communicating to masses. Folk plays, like *Nautanki*, and religious plays like *Ramlila*, folk songs and folk dances are immensely effective as the means of mass communication. *Ramlila* is one of the oldest of folk arts, possibly, which has communicated to millions of people over generations, the code of conduct and ideals of social life. More recently, Mahatma Gandhi was possibly the greatest communicator of all times, who aroused people of India to participate in the freedom struggle with their might against the mightiest empire the world had ever seen, and all this was through his extraordinary communication skills, which was so natural to him.

> Every cultural pattern and every single act of social behaviors involve communication, in either an explicit or implicit sense. (Sappier)

The might of mass communication, can be underlined as the root cause of any social change, let alone development. This speaks volumes on the impact of sustained science communication, in changing the way a society thinks and behaves; a change, which we want our country to undergo, sooner the better; to be transformed to a nation of scientifically thinking and scientifically aware people. Therefore, why not to think of internalizing science communication activities in our socio-cultural system like, *Ramlila* and other such rituals are. Arousal of people for developing scientific temper and scientific awareness is necessary for national regeneration through mass action, as was the case in freedom movement; unmistakably the only perceivable panacea for innumerous miseries of our people.

India had a tradition of acquiring knowledge, discovering the secrets of the nature; by examining and thorough observations and by applying certain procedure; what we call today, the method of science. The then Indian intellectuals transmitted this knowledge through oral communication and unique compositions, for generations after generations; that is precisely why we do not have enough documentary evidences for such a great treasure of earlier knowledge of science and technology. However, much later, they had written down such information on different surfaces, rocks, like palm leaf,

Bhojpatra, bark of various trees, copper and bronze plates, and eventually on paper. These communication materials have now become the potential sources of the information on early science and technology in India.

According to Toynbee (1976), in Asia, people were so intelligent to make boats and found their way to Australia crossing Timor Sea around 3,200 BC. Undoubtedly, the knowledge of production, use and control of fire was a great discovery of mankind, but it is uncertain that when it was made. However, according to various archaeological evidences, it appears that man first developed the primitive stone tools, followed by the knowledge of use and control of fire, and the development of the civilized society was the next step. According to Satyaprakash (1967), the fire churning technology was first invented by sage Atharvan, sometime around 4000 BC or earlier, as described in a number of hymns in Rigveda (6.16.17), and Yajurveda (11.32):

> The priests churn thee, Agni, as was done by Atharvan and bring him from the glooms of night, wandering deviously, but not bewildered. (Rigveda)

> O fire, thee the source of survival for living beings. Thee the energy for the universe. Sage Atharvan first invited thee by churning. O fire, Atharvan derived thee from the head of priest Vishwa by churning lotus. (Yajurveda)

However, there are ample evidences to establish that the use and control of fire was known even to the *Homo erectus*, the immediate ancestor of *Homo sapiens*, 0.3 million years ago ancient man was using simple forms of stone lamps, probably fuelled with animal fat and using grass or moss for a wick around 79000 BC. Possibly, Atharvan might have developed some simple technique for producing fire or disseminated fire-churning technology among the masses around 4000 BC. As mentioned by Satyaprakash (1967), Atharvan belonged to the Angiras clan. The fire churners were in great demand at that time who communicated knowledge of the fire churning techniques.

The Cro-Magnon man lived in Indian subcontinent, who prepared cave sketches, did experiments and prepared records some time before 40000

years (NCSTC Exhibition, 1998). According to Vilanilam (1993), the Neolithic Indians were producing handmade earthen vessels. The Indus valley civilization, which developed from early Harappan Neolithic cultures that are several millennia older, flourished around 2600-1800 BC, in northwestern parts of India during the Bronze Age. One of the major breakthroughs of this civilization was its original pictographic Indus script, visual representation of people, things, events, tools, processes, methods, and actions, etc., which represents the earliest type of real writing, which still awaits decipherment. However, it is believed that there may be some information on herbal medicines and astronomical calculations, in the Indus script, as far as the science communication is concerned (The International Encyclopaedia of Communications, 1989). Toynbee (1976), has written:

> The scriptures of Hinduism cannot be dated. They were composed and transmitted orally for an unascertainable length of time before they were committed to writing, but the oral transmission of them is likely to have been accurate, since the efficacy of a liturgy was believed to depend on its words being recited correctly.

According to Satyaprakash (1967), the Charaka Samhita, appears to be the proceedings of first ever symposium on the subjects related to medical sciences (Ayurveda). The world's first symposium held on the medicinal plants in relation to diseases was presided over by Sage Bharadvaja somewhere in Himalayas during 700 BC. The whole account appears in Charaka Samhita. Names of different participants are also given. Charaka Samhita also lays the rules for debates and discussions – a prominent form of intellectual discourse and creative communication!

Methodology and Observations

Science and communication in ancient, Vedic, classical and medieval India are well established as per the studies made by several scholars, and it can be taken as the precursor to the foundation of the emergence of modern science communication in Indian subcontinent. The present study involved survey of relevant literature, visits to scientific and literature and archival institutions,

and discussions with the experts and concerned people for gathering data by the author. The data was analyzed and observations made as follows:

i. Notable events in science media e.g., the first publication of a popular magazine, the first airing of a popular radio show: (a) 1818: Publication of monthly "Digdarshan", an educational magazine carries popular science articles, in Hindi, Bengali, and English languages begins; (b) 1821: The first popular magazine "*Pashwavali*" in Bengali language starts; (c) 1924: Radio broadcast begins (Agriculture and Health programmes in 1966); (d) 1959: Doordarshan telecast begins (School TV in 1961, Agriculture programme in 1967).

ii. Science in media, resources for journalists, like the establishment of Science Media Centres or other places where journalists can access expert advice on science issues: (a) 1956: Science feature service for press starts from the Council of Scientific & Industrial Research (CSIR).

iii. The First interactive science centre, like the Exploratorium, when did it open its doors for the first time: (a) 1959: The Birla Industrial and Technological Museum (BITM), Kolkata opens under CSIR.

iv. Science writing awards, where journalists, science communicators and scientists can gain recognition for their work: (a) 1951: On initiative of Mr. Biju Patnaik, former Chief Minister of Odisha, Kaling Foundation Trust, Bhuvneshwar, in association with UNESCO, establishes international "Kaling Prize for Public Interpretation of Science".

v. The first Science festival: (a) 1987: "Bharat Jan Vigyan Jatha" (BJVJ), nationwide public assemblage and march for science, organized by the National Council for Science & Technology Communication (NCSTC).

vi. The first significant national government programme to support science communication activities: (a) 1982: "National Council for Science & Technology Communication" (NCSTC) establishes. The first Council meeting takes place in 1984.

vii. The formation of a National association for science communicators: (a) 1985: "The Indian Science Writers' Association" (ISWA) establishes (involving all forms of science communicators - scientists, writers, journalists, broadcasters, performers, demonstrators, cartoonists, etc., interested in science communication).

viii. The formation of a National association for science journalists: (a) 1960s: "The Science Writers' Association of India" (SWAI) establishes (mainly science journalists; later reformed as ISWA)

ix. The first masters, research degrees in science communication: (a) 1993: NCSTC initiates setting up Institute of Mass Communication in Science & Technology at Lucknow University, and Centre for Science Communication at Devi Ahilya University, Indore for running M.Sc. courses in S&T Communication with academic and financial support from NCSTC.

x. The founding of research journals in science communication: (a) 2002: "*Indian Journal of Science Communication*" (Founder Editor Dr. Manoj Kumar Patairiya).

xi. The First national conference for science communicators: (a) 1993: The First National Convention of Science Communicators, organized by ISWA (Known as the "Indian Science Communication Congress", ISCC, since 2001).

xii. The First courses to train science communicators (possibly post-graduate diplomas, or even units in an undergraduate degree): (a) 1983: The *Vigyan Pravah*, a popular science monthly in Hindi, and *Ultimate Science*, a science policy quarterly in English (Founder: Dr. O.P. Sharma; Editor: Manoj Kumar Patairiya), New Delhi, commence a course in science journalism; (b) 1989: The NCSTC catalyses and supports a diploma course in science communication, at Jamia Millia Islamia, New Delhi on trial basis; (c) 1990: The NCSTC catalyses and supports a long-term regular course in science communication, at Madurai Kamraj University.

xiii. The date of the founding of National Science Week: (a) 1987: February 28 "The National Science Day" (the week, fortnight, or month either begins or ends on February 28th, i.e. The National Science Day). Indian physicist Sir C.V. Raman announced his discovery of Raman Effect on February 28, 1928, for which he was honoured with the Nobel Prize in Physics in 1930.

xiv. The year of graduation of the first PhD in science communication: (a) 1998: Manoj Kumar Patairiya.

xv. Date of important National initiatives, reports on science communication, events that changed the way the area was regarded: (a) 1958: "Science Policy Resolution" presented in the Parliament by the then Prime Minister Jawahar Lal Nehru, which emphasizes scientific temper; (b) 2002: “Report of the Review Group of the NCSTC” submitted to the Govt. of India with a number of workable recommendations for science communication. The Group was chaired by Dr. S.K. Joshi, Former Director General, CSIR, and the author has served as the Member Secretary of the Group and put together the report.

xvi. Other important milestones: (a) 1784: The first learned body “The Asiatick Society” was formed on January 15, 1784, in Calcutta. Later this name was changed to The Asiatic Society of Bengal and again in 1936 the name was changed to The Royal Asiatic Society of Bengal. As per original resolution, the society was to hold weekly meetings every Thursday evening. The need for meeting together was felt with a view to exchange notes, promote learned discussions and communicate their own findings (Bose et al (1971); (b) 1785: In April 1785, a paper in Persian, titled “The Care of the Elephantiasis and other Disorders of the Blood”, written by a Mohammadan medical man, and translated into English by William Jones, was the first scientific paper presented; (c) 1788: The Asiatick Society started the Transactions of the Asiatick Society as the first research journal under the title, *Asiatick Researches*, in

1788, which was divided into two parts in 1829, one devoted wholly to scientific papers, and the other to popular literary communications; it continued till 1839. The second part is important from the point of public communication of science. In 1832 the title of the journal was changed to *The Journal of the Asiatick Society of Bengal*, which, in the beginning was devoted to the publication of papers of literary and popular character; (d) 1826: A monthly publication under the name *Gleanings in Science* was started, but the purpose was to publish extracts and abstracts from the European scientific publications. It can be considered as the first attempt of publication of Scientific Abstract Service; (e) 1915: A popular science monthly in Hindi *"Vigyan"* was started in April 1915 from Vigyan Parishad, Allahabad (Founded 1913), is continue to exist without interruption and celebrating the year 2014 as its centenary year; (f) 1998: NCSTC/ ISCOS start the first course on science journalism through distance learning; (g) 2000*: Vaigyanik Drishtikon*, the first science newspaper in Hindi, Editor: Tarun Jain, a fortnightly publication from Jaipur (Rajasthan); (h) 2001: Indian Science Communication (ISCC) begins annually; (i) 2002: Indian Journal of Science Communication (IJSC), Founder Editor: Dr. Manoj Kumar Patairiya commences; (j) 2002: NCSTC/ ISCOS start the world's first online course on science journalism; (k) 2004: The Year of Scientific Awareness observed; (l) 2004: Vigyan Rail, science exhibition on wheels showcasing India's achievements in different sectors of S&T since independence; (m) 2004: NCSTC organizes the First Seminar on 'Scientific Temper' with international participation at Rajasthan University, Jaipur; (n) 2010: The 11th International Conference on Public Communication of Science & Technology (11th PCST-2010) held in India, the author serves as the Chair, Organizing Committee.

Historical Perspective

Various classical scientific works were carried out in Indian subcontinent, in the fields of mathematics, astronomy, medicine and material science, etc., during ancient, medieval and modern periods, which still form a huge treasure of our scientific and cultural heritage (Patairiya, 2002). However, a remarkable gap between scientific knowledge and the common man remained during the entire span of time and almost no effort was made to bridge this gap. These scientific texts were generally written in technical and classical forms and not in common man's language. With the passage of time, despite many political and social vicissitudes, scientific knowledge and more precisely custodians of that knowledge mostly remained centered around the corridors of power. This was the time when such knowledgeable gems used to be the *Navratnas* of royal courts.

Medieval age, however, saw a remarkable phenomenon. Classically coded scientific literature was made comparatively simpler and written in the popular forms of commentaries and analyses. One can observe a great tradition of such commentators in the Indian sub-continent, who contributed such secondary scientific literature for generations. Indian history is replete with this tradition. This was indeed an exceptional attempt towards presenting science in comparatively simpler form. Many of India's ancient works, be it '*Aryabhatiya*' of *Aryabhat* or '*Leelavati*' of *Bhaskar*, are available in these forms. This situation is continuing more or less even today and the gap between scientific knowledge and lay persons is still very wide. Scientific knowledge is still confined to the language of the elite and it is very difficult to access such information in common man's language especially in vernaculars.

There have been a few people in various parts of the country, always eager to take science to commoners through their uncommon efforts and with limited resources in more recent times before Independence. The formation of Asiatic Society in Bengal has historical significance. *Vigyan Parishad* was established in United Provinces (now Uttar Pradesh) at Allahabad in 1913, which brings out *Vigyan*, a monthly since 1915 without discontinuity. After independence, in Orissa, the *Orissa Bigyan Samiti* was formed on August, 7, 1949, which began science popularization in Oriya language.

Several other voluntary organizations continued to follow. Apart from organizations, several enthusiastic individuals also joined the movement. Some of them were Sir Syeed Ahmed Khan in Aligarh, Ruchi Ram Sahni in Punjab, Swami Satyaprakash in Uttar Pradesh, Shivram Karanth in the south, Hargoo Lal at Ambala, and several others.

After Independence, a number of government organizations also came forward for science popularization. Publications and Information Directorate, New Delhi (now National Institute of Science Communication and Information Resources) began publication of *Vigyan Pragati,* a Hindi monthly in 1952. *Science Reporter* (English monthly) and *Science Ki Dunia* (Urdu quarterly) followed this. National Research and Development Corporation (NRDC) started *Awishkar,* a Hindi monthly and thereafter *Invention Intelligence,* English monthly. Besides that, institutions like National Council of Educational Research and Training (NCERT), Central Institute of Educational Technology (CIET), Consortium for Educational Communication (CEC), Directorate of Agricultural Information and Publication, Indian Council of Medical Research (ICMR), Developmental Education Communication Unit (SAC), etc., also started spreading scientific knowledge concerning their areas of interest. Thus, science communication was taken up at various levels, institutional as well as individual. Indian editions of *Popular Science* and *Scientific American* also stepped in adding to international perspectives to science communication movement.

In order to integrate, coordinate, catalyze and support the efforts of science communication and science popularization, at micro as well as macro levels in the country, the Government of India established the National Council for Science and Technology Communication (NCSTC) in 1982 as an apex body. NCSTC began its activities in 1984. The prime objectives of NCSTC are - to communicate science and technology amongst all sections of the society, to inculcate scientific and technological temper amongst masses and to promote, catalyze, support and orchestrate such efforts in the country. In the year 1989, the Department of Science and Technology established an autonomous organization *Vigyan Prasar*, which undertook the task of mass scale development and dissemination of software for popularization of science and technology, such as TV programmes, audio cassettes, CD-ROMs, publications, etc. The National Council of Science Museums

(NCSM) under the Ministry of Culture is also contributing in this direction through setting up of science centers, science exhibitions, science fairs, science city and science museums, etc. Ministry of Environment and Forests has planned to create environmental awareness through Ecology Clubs in schools. All India Radio, Doordarshan, and other TV channels broadcast and telecast various science programmes. Many state governments, Birla Group and Jawaharlal Nehru Memorial Fund have established several planetariums at various places in the country. Government, non-government, international sectors are attempting towards science communication and science popularization and some individual efforts are noteworthy.

Emergence of Modern Science Communication

There were some enlightened Indians, with great zeal and devotion, who came forward either to establish scientific institutions or to conduct scientific research and communicate scientific information to the people over the period. Thus, interest in modern science in India assumed a new dimension in the last two decades of the 19th century. Scientists started writing scientific papers in various national and international journals. Prafulla Chandra Ray (1861-1944) conducted systematic chemical analyses of a number of rare minerals found in India to discovering in them some of the missing elements in Mendeleev's Periodic Table. He communicated a preliminary note on this in 1896 to the *Journal of the Royal Asiatick Society*. An extremely inspiring teacher, he was lucid and lively in his exposition. Dr. Mahendra Lal Sircar was a firm believer in the rationality of science. He had realised that science was the most powerful instrument of modern civilization. Mahendra Lal founded the Indian Association for the Cultivation of Science, Calcutta on July 15, 1876. The Association was intended to be a sort of a training school for the diffusion of scientific knowledge in its initial stages. In an eloquent address at the association, he said, “I would emphatically say that the Indian youth have shown as much aptitude for, and love of science, as the youth of any country in the world”.

The common newspapers and magazines now started carrying science items and news. Bengali periodicals took leading dissemination of science in the 19th century. It is interesting, however, that in subsequent years hardly anything was said about Darwinism in the major Indian journals and there

was no controversy similar to the great storm, which broke in Europe. According to Gosling (1973), the *Tatwabodhini Patrika*, a popular monthly founded by Debendranath Tagore in 1843, contained a regular column, Science News. Between 1843 and 1880, there were articles on geology, zoology, physics, chemistry and other branches of science. From 1873 onwards, illustrated articles about anthropology and the evolution of man began to appear. Gosling (1973), further observed that the *Sambad Prabhakar*, popular but somewhat conservative, founded by Iswar Gupta in 1839 was well accepted by the readers. It contained a number of well-informed editorials, often written with a strong orientation towards science and technology. Within a decade of its establishment in 1839, the *Sambad Prabhakar* was thundering the message to its readers:

> No country can progress without the advancement of technology. No useful purpose is served by teaching arts and literature. The work of Kalidas, Shakespeare and others may provide literacy pleasure but there will be no real progress without scientific instruction.

As recorded by Vaidik (1976), *`Buddhi Prakash'* was started from Agra in 1852, which carried articles on science, education, mathematics, geography and history. The government used to purchase it for distribution in schools. Bhartendu Harishchandra started *Harishchandra Magazine* on October 15, 1873, which carried articles on science as well. It was later renamed as *Harishchandra Chandrika*. *Kavi Vachan Sudha* also published science articles. Pandit Bal Krishna Bhatt started *Hindi Pradeep* from Prayag in 1877 carrying popular science and educational articles. Although the credit to be the first Hindi daily goes to *Sudha Varshan* brought out in 1854 from Calcutta, but in real sense the Hindi daily was started in 1885 with the publication of *Dainik Hindosthan* by Raja Rampal Singh of Kalakankar (UP). He had decided a special subject for each day of the week, purely there was no science, but it included some allide forms of rural, educational and physical health. *Sajjan Kirti Sudhakar*, brought out from Mewar in 1879, was containing articles on archaeological subjects. *Almora Akhbar* (1871) contained articles on science subjects such as forest management, child education and liquor prohibition, etc. Babu Totaram from Aligarh started

Bharat Bandhu weekly in 1887. Science was an important subject for this; it is evident from a line, which appeared regularly on the front page of the paper, just below the title, stating "A Weekly Journal of Literature, Science, News and Politics".

The *Kashi Patrika* was started by Pandit Laxmishankar Mishra from Banaras in 1882, and it contributed tremendously to the science writing in Hindi. It also carried a line on front page below the title, stating: "A Weekly Educational Journal of Science, Literature and News in Hindustani". It contained adequate material on science, technology, agriculture and education. Its editor, Pt. Mishra himself was M.A. in physics and Professor of physics in Banaras College. He had been the District Inspector of Schools of Banaras. The *Kashi Patrika* for certain, can be credited to have geared the major effort towards a popular science magazine in Hindi (Patairiya, 1990).

Monthly *Digdarshan* was started by Baptist missionaries of Serampore (West Bengal), in Bengali and English in April 1818, edited by Clark Marshman (1794-1877). Subsequently, its Hindi version was also started; Captain Gower sent two Hindi experts from Delhi for this purpose. But according to the second report of the Institution for the Support and Encouragement of Native Schools, the first three issues of *Digdarshan* were published in Hindi and sent to various schools of the country. Thus *Digdarshan* can be considered to be the first newspaper in Hindi and Bengali with a focus on science; however, some people think that *Udant Martand* (1826) was the first Hindi newspaper, but there are no references of science coverage in *Udant Martand* (Patairiya, 1990). There were two articles in the first issue of *Digdarshan* pertaining to science and technology - one on discovery of America, and another on travel in the sky by the balloons. The second issue also carried two articles on science, one on the trees prevailing in India (and not in England), and another on the steamboat powered by water vapor. During these days, textbooks on science subjects were very limited and as such Calcutta School Books Society purchased several issues of *Digdarshan* and distributed among schools as it carried adequate educational materials including on science and technology (Patairiya, 1990).

The author has discovered an unsung hero and pioneer of science popularization `Shri Hargulal' of mid-19th century (1857), who was a science teacher at Ambala. He had fabricated various scientific models, toys,

designed posters and eventually started lecture-cum-demonstrations/ exhibitions of his low-cost models among the children and common audience for popularizing basic principles of science in different parts of the country. As the demand of science models and posters/ charts increased, he started mass production of different models and was even able to export them. He also fought and won a court case against a Bombay based industrialist, who was trying to sell and export Lal's scientific instruments and models under his own name. Hargulal got compensation for the same (Patairiya, 1997).

According to Sehgal et al. (1994), Professor Ruchi Ram Sahni (born April 5, 1863) was a multi-faceted personality. He was a scientist, an innovator, an enthusiastic educationist, a fierce patriot and a devoted social worker and a science populariser. He started his career as Second Assistant Reporter to the Government of India in the Meteorological Department in 1885. One of his major achievements was the creation of scientific awareness amongst the common people of Punjab. In those days, Punjab also comprised of the present day Punjab, in Pakistan and some parts of Himachal Pradesh and Haryana. Alongside similar efforts in Bengal, his was the first attempt at popularizing science in Punjab. All his science popularization activities were organized under the auspices of the Punjab Science Institute, which he co-founded with Professor J. Campbell Oman. Popular lectures on various aspects of science organized created unprecedented enthusiasm among the people; they did not even mind paying a small fee for his science lecturers to Moffussil places. Probably this was the earliest instance in India of common people actually paying for listening to popular science lectures. He tried hard to improve the quality of science teaching in schools and colleges, since he had realized quite early that no science teaching was possible without facilities for repairs of simple scientific instruments used in schools and colleges. He hence established a workshop as part of the Punjab Science Institute for repairing and manufacturing of scientific apparatus used in schools and colleges, and this he did by spending his own money. The workshop also trained young people enabling them to earn a decent livelihood by engaging them in instrument repair. He was also very much concerned with the industrial development of the country. He established a Sulphuric Acid Factory near Lahore, which flourished for several years. In

this venture, P.C. Ray assisted him a lot. He also actively participated in the freedom movement.

The work of Sir C.V. Raman is attributed to both the dimensions. Besides his research interests, Raman had a deep understanding of science popularization. He was able to mesmerize the public during his popular lectures. He also used to demonstrate his apparatuses while delivering a lecture, which he termed as "performance". Interestingly, his critics were also admirers of his "performance". He had given several radio talks. An anthology of his radio talks was published by the Philosophical Library, New York under the title "The New Physics: Talks on Aspects of Science". The Indian Association for the Cultivation of Science in Kolkata has a plaque that depicts the Raman Effect:

> At this institute, Sir C.V. Raman discovered in 1928 that when a beam of coloured light entered a liquid, a fraction of the light scattered by that liquid was of a different colour. Raman showed that the nature of this scattered light was dependent on the type of sample present. Other scientists quickly understood the significance of this phenomenon as an analytical and research tool and called it the Raman Effect. This method became even more valuable with the advent of modern computers and lasers. Its current uses range from the non-destructive identification of minerals to the early detection of life-threatening diseases. For his discovery Raman was awarded the Nobel Prize in physics in 1930.

Present Scenario

Science communication has drawn the attention of policy makers, planners, scientists, technocrats and media personnel during the past decade world over and so as in India. Currently several activities, approaches and media have been tried and utilized by different agencies, both government and non-government, for S&T popularization. As a result, a lot of infrastructure, software and human resources are available in the country. Various means and modes of communication have been utilized in India by the science communicators to reach out to the masses. Every form has its own significance and utility keeping in mind the vast diversities existing in the

subcontinent. Different communications tools were employed for S&T popularization and inculcation of scientific temper.

Over the years, there has been a remarkable increase in science coverage in different media of mass communication, be it print, electronic, digital, folk or interactive media. Several national/ regional dailies have started weekly science pages and magazines are covering science columns. *Vigyan Prasar* started a unique activity and was providing ready-to-print science page to medium scale newspapers periodically in Hindi and English. Some 21 newspapers were incorporating the same page in their editions.

A variety of programmes are now available on AIR, like Radioscope, Science Today, Science Magazine, Science News, etc.; the interest was triggered by two joint NCSTC-AIR radio serials `Method of Science' and `Human Evolution'. On TV, 'Turning Point' a science based programme was able to catch eyes of viewers, besides the University Grants Commission (UGC), National Council of Educational Research and Training (NCERT), Indira Gandhi Open University (IGNOU), NCSTC science programmes from time to time. Several voluntary agencies like Kerala *Shastra Sahitya Parishad* (KSSP), Karnataka Rajya Vijnana Parishat (KRVP), *Eklavya*, *Puppet* are actively involved in taking science to the people by way of folk forms, street plays, theater, puppetry, folk songs, skits, etc. In fact, print and electronic media have certain limits, but the illiterates or neo-literates can also be enlightened through the use of folk medium, as it has no limitation, and offers two way channel of communication, which was proved to be very effective during Bharat Jan Vigyan Jatha (BJVJ-87), Bharat Gyan Vigyan Jatha (BGVJ-90) and Bharat Jan Gyan Vigyan Jatha (BJGVJ-92).

Other media for science communication, like exhibition, *Vigyan Mela*, slide shows, lectures, demonstration, and planetarium are also part of the ongoing science communication/ popularization movements in the country. A variety of popular science softwares have been produced. A number of potential science communicators are being trained through full time academic courses in science and technology communication and short term science writing/ journalism workshops to bridge the gap, who can in turn take up responsibilities of different science communication programmes/ activities (Patairiya, 2001).

Several government and non-government agencies such as NCSTC, NCSM, Council of Scientific and Industrial Research (CSIR), Indian council of Agricultural Research (ICAR), ICMR, NCERT, All India Radio (AIR), *Doordarshan* (Govt. TV Channel), NBT, CBT, UGC, KSSP, etc., are putting in effort towards dissemination of scientific information and inculcating a scientific temper among people. Although much has been achieved, the picture is not so rosy and there is an urgent need of appropriate leadership to work towards putting in every effort to make science communication activities more effective and sufficient both in terms of quality and quantity and a lot is still to be achieved.

It is, however, disappointing that Indian science magazines, like *Science Today, Bulletin of Sciences, Times of Science & Technology* have been closed and Indian editions of some foreign magazines, like *La Recherche* and *Scientific American* have ceased their publication, after bringing out a few issues. Whatever may be the reason, it is clear that science has no territorial boundaries, and so is true for the science communication activities. As far as coverage of science and technology in mass media is concerned, in developing countries, like India, it will increase in near future significantly, as very fast and rapid developments are taking place. On an average, the science coverage in India is around 3.4 %, which we intend to enhance up to 10-15 %, as per a resolution of the Indian Science Writers' Association (ISWA). So far, 5 Indian science communicators have won UNESCO's Kalinga Prize for outstanding contribution in the area of science communication/ popularization. In terms of international comparison, in India the efforts put in by NCSTC, KSSP, and other organizations/ individuals, like *Vigyan Jatha,* Children's Science Congress, explanation of so called miracles, etc., are widely acclaimed and have no match and are unique and first ever in the world. There is a wide scope of a broad spectrum of science communication activities in future to better serve the mankind.

Modes of Science Communication

The process of science communication can be interwoven into five principles. Generally, when we talk about science communication, it obviously incorporates science popularization, scientific temper,

technological temper and technology communication. Let us go into the details of these five mediums of science communication:

i. Print Media: Such as newspapers, magazines, wallpaper, books, posters, folders, booklets, etc.
ii. Audio-Visual Media: Mainly radio and TV, besides, films, slide shows, bioscope, etc.
iii. Folk Media: It has been a common observation, that through folk media, it is possible to achieve penetration to the segments where other media have limitations. Puppet shows, street plays skits, stage performances, folk songs and folk dances, *nautanki* and other traditional means of communication belong to this category. This media is cost effective, entertaining and offers two-way communication.
iv. Interactive Media: Science exhibitions, science fairs, seminars, workshops, lectures, scientific tours, conferences, *vigyan jathas*, etc. The advantage here is being man-to-man and two-way communication.
v. Digital Media: information technology has given birth to comparatively a new media, known as digital media. It includes Internet, CD-ROM, multimedia, simulations, etc. This is proving to be an effective medium and it can illustrate difficult concepts through text, audio, graphics, video, animation and simulation. It has also made science communication simpler to handicapped segments of the society. This new media has given birth to a more instant and global mode of communication in the form of 'Social Media', involving social and individual networking sites.

That apart, we are popularizing science through our 22 regional languages, to penetrate into local populace effectively. Selection of target audience has greatest significance. Our science communication efforts are aimed at various target groups, such as, common man, children, students, farmers, women, workers or specialists, etc. Various forms for presentation are being used to make science communication more interesting and enjoyable, such as science news, report, article, feature, story, play, poem, interview,

discussion, lecture, documentary, docu-drama, scientoon (science + cartoon), satire, etc. Following are some of the important modes and means of science communication in India:

i. Popular S&T literature (articles/ features in daily newspapers, periodicals; newsletters and specialized S&T magazines: comic strips, picture-cum-story books, wall charts etc.).
ii. Exhibitions of S&T themes (temporary, permanent and mobile).
iii. Science Train- Science Exhibition on Wheels.
iv. S&T and Natural History Museums (with permanent galleries on basic topics, on country's heritage and on famous discoveries and inventions, among others).
v. Science Centres and Parks (participatory and interactive activities and demonstrations to learn about S&T principles, applications and to encourage development of a spirit of enquiry among children and adults).
vi. Contests (quizzes, essays, scientific models, toy and kit making, public speaking, debates, seminars etc.).
vii. Popular lectures on S&T subjects (for general public, for children and students at schools, colleges, universities and other institutions).
viii. Tours (guided tours around botanical, zoological gardens, museums, planetariums, bird sanctuaries, industries, factories, etc.).
ix. Planetariums (including mobile ones; sky watching with naked eyes or telescope to learn about planets, stars and other celestial objects).
x. Radio broadcasts (for general as well as specific audiences).
xi. Television telecasts (for general as well as specific audiences).
xii. Audio-Video Programmes (on tapes and cassettes for special or general audiences; slide shows, bioscopes.
xiii. Digital software, CD-ROMs, etc. (for special or general audiences).
xiv. Science Films (for general and specific audiences).
xv. Folk forms (song and drama, street plays, puppet shows, march, festival, fairs, Jathas, etc.)
xvi. Science Club activities, etc.
xvii. Community Radio, Community TV

xviii. Webcasts, Podcasts, and Social Media
xix. Workshops, symposiums, seminars, roundtables, discussions, etc.
xx. Low cost kit/toys and other hands-on-activities (with specific training modules).
xxi. Non-formal Science & Technology Education.

Role of Various Organizations

Various Government, non-Government, voluntary organization are playing significant role in science communication. Some of them are described here:

i. National Council for Science and Technology Communication: The NCSTC is an apex body of the Government of India for promotion, coordination and orchestration of science and technology communication and popularization programmes in the country, with two major objectives of popularization of science and technology and stimulation of scientific and technological temper among people. Programmes began in right earnest with the finalization of the VII Five Year Plan and the first meeting was held in early 1984. It has ten major elements, viz., (i) training in science and technology communication, (ii) software development, (iii) information networks/ databases, (iv) field projects, (v) incentive schemes, (vi) research in science and technology communication, (vii) international cooperation, (viii) women component plan, (ix) environmental awareness, and (x) policy advices. A number of training programmes have already been organized and supported to train people/ resource persons in various tasks of science communication as well as in different media. A number of science communication software items for electronic as well as for non-electronic media have been developed and disseminated to the users. Information networks developed and a number of research projects have been undertaken. Besides a number of projects/ programmes, a mega project on science and technology for promoting voluntary blood donation has been formulated by NCSTC. Preparation of an annotated bibliography of popular science publications in all major Indian languages was undertaken. A project to develop self-

sustaining science communicators, who can generate income by selling software, produced by and with support of NCSTC was formulated, besides a Software Jatha.

ii. Vigyan Prasar (VP): It was set up by the Department of Science and Technology, Government of India, as an autonomous registered society in 1989 for taking up large scale science popularization tasks. Its broad objectives may be summarized as follows. (i) To undertake, aid, promote, guide and coordinate efforts in popularization of science and inculcation of scientific temper among the people and to increase the knowledge, awareness and interest about science and technology among all segments of the society. (ii) To provide and promote effective linkages on a continuous basis among various scientific institutions, agencies, educational and academic bodies, laboratories, museums, industry, trade and other organizations for effective exchange and dissemination of scientific information. (iii) To undertake the development of software materials for different media, so as to enable the masses to better understand, appreciate and comprehend abstract scientific principles and practices. (iv) To organize research projects, courses, workshops, seminars, symposia, training programmes, fairs, exhibitions, film shows, popular discussions, street plays, quizzes, song-dance-dramas, etc., in furtherance of the objectives of the organization. It also organizes an annual Science Film Festival involving short films and TV documentaries, etc.

iii. National Council of Science Museums (NCSM): Having its headquarters in Kolkata, NCSM is an apex body of science museums and science centers in the country. It has a National Science Centre in New Delhi, and some 30 regional science centers, including Lucknow, Bhopal and Bhubaneswar, etc. A Science City has been set up in Calcutta by NCSM. Several states have also setup science cities under collaboration with NCSM, i. e. Gujarat Science City, Ahmedabad; Pushpa Gujral Science City, Kapurthala, Punjab; and Science City, Chennai, etc., and a few more are coming up.

iv. National Institute of Science Communication and Information Resources (NISCAIR): Formerly it was known as the Publications

and Information Directorate (PID). It was renamed as National Institute of Science Communication (NISCOM) on September 26, 1996 and further transformed into NISCAIR, incorporating INSDOC. It brings out eleven professional scientific journals, besides three popular science journals, *Vigyan Pragati* (Hindi monthly), *Science Reporter* (English monthly) and *Science Ki Dunia* (Urdu Quarterly). It has also brought out an encyclopedic series, titled, The Wealth of India, a compendium of knowledge on the economic products and industrial resources of the country. The institute also undertakes the publication of popular science books in Indian languages. Monographs on different scientific subjects are also published from time to time.

v. Science Communication Networks: An All India People's Science Network (AIPSN) was catalyzed in 1987-1988, with 27 constituent voluntary organizations, which organizes All India People's Science Congresses and is also known as All India People's Science Movement. The NCSTC Network was brought into existence in 1991 with the objective of taking popularization of science activities to all nooks and corners of the country. Presently it has over 70 organizations, including government, NGOs and voluntary organizations. It is now known as National Science and Technology Communication Network (NSTC-Network). There is the need of a Science Media Network.

vi. Voluntary Organizations: There are several voluntary organizations in India interested in science communication programmes. Some of them even existed when there were no efforts from the side of state to popularise science among people. *Kerala Shashtra Sahitya Parishad*, *Karnataka Rajya Vigyan Parishat*, *Vigyan Parishad*, Allahabad, Vikram A. Sarabhai Community Science Centre, Ahmedabad, Eklavya, Bhopal, etc., are among important voluntary organizations involved in science popularization movement in the country. The Indian Science Writers' Association brings out a newsletter and organizes meetings with prominent scientists as well as media persons.

vii. Indian Science Writers' Association (ISWA): The ISWA was founded by a group of highly motivated and enlightened science writers and journalists in April 1985, with a view to develop and nurture science writing profession in the country. Now, ISWA has some 500+ members from across the country comprising scientists, science writers, science journalists and science communicators from various Indian languages. In pursuit of its broad objectives, the ISWA undertakes a broad spectrum of activities on science writing, science journalism and science communication. ISWA is an active, vibrant and visible organization. Here is a glimpse of its activities:S ince its inception, the ISWA has been publishing an occasional newsletter to have a channel of communication with members spread all over the country. It has initiated ISWA Chapters at various places in the country. Some 10 ISWA chapters have come up so far, which are undertaking various kinds of activities, like training in science writing and science journalism involving students, teachers, journalists and scientists. The ISWA had introduced a Millennium Lecture Series. A number of lectures have been organized so far on various frontline areas of science and technology. The ISWA confers ISWA Fellowships and ISWA Awards on distinguished persons for recognizing their efforts towards promotion of science popularization in the country. The ISWA organizes national seminar every year on some current topic, concerning science and technology. Some of them were; Post GATT India, What is Wrong with Indian Science, Patenting System and Intellectual Property Rights, Challenges in Public Appreciation of Science in Digital Age, etc., with a view to discussing and addressing the issues and problems emerging in this field. An exhibition on Popular Science Periodicals in Indian Languages is also part of these activities. It also publishes the directory of ISWA members from time to time. The Directory is sent to various scientific and media organizations in India and abroad. ISWA has been working in collaboration with government and non-government organizations and has linkages with various agencies interested in science popularization, such as, the CSIR, NCSTC,

National Institute of Science Communication (NISC), ICAR, ICMR, Society for Information Science, Indian Science Communication Society (ISCS), etc. We have organized training programmes with the Department of Atomic Energy and other organizations. Efforts are being made to make joint programmes, with Indian Space RESEACH Organizations (ISRO), British Council Division and UNESCO, etc., including visits of ISWA members to various scientific establishments for writing/reporting on various R&D activities in the country. We are looking forward for more such joint programmes in future and are planning to have many more activities to strengthen ISWA as well as the efforts towards the cause of popularization of science and inculcation of scientific temper among masses. ISWA is an active partner of India-Brazil programme on public communication of science, technology, culture and society.

Major Initiatives in Science Communication

Following are the highlights, where major achievements were observed in the area of science communication in India:

i. Human Evolution: A 144-part radio serial *Manav Ka Vikas* was jointly produced by NCSTC and AIR was broadcast on Sunday mornings simultaneously from nearly 84 stations all over the country in 18 Indian languages during June 1991-February 1994. Among the listeners there were 100 000 children and some 10000 schools registered as dedicated listeners. They were provided kits, posters, etc. as supplementary material. Two unique radio bridge programmes of half-hour duration each were broadcast live through the satellite on February 13th and 20th, 1994. Selected children, who had assembled at five different places in the country, participated in these programmes, which included questions, answers and discussions.

ii. Bharat Ki Chhap: The NCSTC has produced a number of TV programmes on scientific subjects. A 13-part film serial on the history of science and technology in the Indian subcontinent and its

impact on the world, titled *Bharat Ki Chhaap*, originally in Hindi was produced by NCSTC and telecast on Doordarshan in 1989. Regional language versions were subsequently produced in Tamil, Malyalam, Telugu, Gujarati, Marathi, Bengali and Kannada, along with an English subtitled version.

iii. Vigyan Jatha: *Bharat Jan Vigyan Jatha-87* and *Bharat Jan Gyan Vigyan Jatha- 1992* (BJGVJ- 92) were catalyzed by NCSTC, could be considered as the biggest ever science and technology communication movements attempted anywhere. The main themes of BJGVJ - 92 included health, water, environment, appropriate technology, superstitions, scientific thinking and literacy. Science and technology communication software, on the main themes of the *Jatha*, was developed and duplicated both at the central and state levels, which included brochures and posters for publicity, poster sets on water, environment and housing, booklets on topics such as the preparation of science posters and charts, puppet plays, low-cost exhibitions, etc. Some 2,500 government/ non-government organizations were actively involved. The *Jatha* covered nearly 40,000 locations in about 400 districts touching almost a third of the country's population. During the course of *Jatha*, various modes of science communication, especially folk forms, publications, lecture-cum-demonstrations, etc., were employed for science communication among people in far-flung areas. Subsequently, Regional *Vigyan Jatha* is organized to cover a geographical region on a focused science theme relevant to the area.

iv. Children’s Science Congress: The first National Children's Science Congress (NCSC), with the focal theme Know your Environment was organized by the NCSTC Network in December, 1993. The children were selected on the basis of their presentations on their scientific projects at the district level Congresses, followed by state level presentations and finally for the National Congress. The main aim of the congress was to provide open laboratory of the nature for learning with joy and to adopt the method of learning-by-doing. The other objectives were to extend classroom learning to inculcate an understanding of the environment, its problems and prospects and to

help find feasible solutions. Participation was open to children of the age group 10 to 17 years. Until now 21 such congresses have been organized at different places of the country; and it has become an annual feature like Indian Science Congress. Select groups of children from NCSC present their project reports in the Indian Science Congress. Selected children from National Children's Science Congress visited Germany in connection with Germany Festival in India and India Festival in Germany in 2001.

v. Scientific Explanation of so-called Miracles: This is a very popular programme implemented across the country, wherein various tricks and miracles are demonstrated and explained by trained science activists to make the gullible people aware of the scientific tricks/ facts behind such so-called miracles, so that the self-styled god men cannot cheat them. In the event of so-called milk miracle, when religious deities started drinking milk in 1995, the author of this paper demonstrated the phenomenon on television news and the hoax was declined as a result.

vi. Science Communication Courses: In order to develop trained manpower in the area of science communication, training/ educational programmes are being offered at various levels in our country, which are catalyzed and supported by NCSTC: i) Short term courses, which are of 3 to 7 day's duration; the participants are all science activists and enthusiasts, whether students of science at higher level or not; ii) Medium term courses, which are of two to four month's duration; usually for those who want to improve their science communication skills; and iii) Long term courses, which are of 1 to 2 year's duration; run at different universities/ institutions and offer post graduate degrees or diplomas in science communication. Besides, a correspondence course and an online course in science journalism of one-year duration are also available. The main aim is to develop as many science communicators as possible to meet the present and future challenges and requirements. 30 universities/ institutions are running these courses with NCSTC's initiative. Recently, the University Grants Commission (UGC) has

also introduced science communication under its thrust areas of studies.

vii. Research, innovation and development initiatives: There has been a significant and continuing increase in quality, quantity, diversity in this growing area, i.e. science communication, the world over. A good deal of R&D work was done to strengthen and enrich such activities in India.

viii. Knowledge diffusion through science - media orientation: A countrywide programme for training scientists, journalists, writers, teachers, students, and science activists in science writing/ journalism/ broadcasting/ telecasting/ communication in regional languages was conceived by the author and implemented through NCSTC in over 500 district by conducting regional/ state/ national level short-term trainings benefiting 20,000 trainees directly through participation and 500 million audiences indirectly, i.e. ½ population of the country through coverage.

ix. Science & Health Communication through Folk Forms: A Nationally Coordinated one year's Programme on science and health communication through folk forms was developed focusing on woman and child nutrition and implemented. The countrywide project included: i) Zonal Orientation-cum-training of Folk Groups (7 Zones); ii) Performances in States (30 States); and iii) National Performances. The Zonal Orientations held in July-August 2007 at Delhi, Kolkata, Nagpur, Allahabad, Udaipur, Guwahati and Tanjavur. The programme was assessed for its efficacy and impact and was found to achieve the intended objectives. The programme has triggered an interest and excitement in science in general and in health related issues in particular.

x. Science Exhibitions/ Innovation Fairs/ Demonstrations: Thematic science exhibitions/ science fairs/ demonstrations, etc., on different occasions and on specific themes are being organized from time to time, including innovation fairs on National Technology Day, Science Publications, Science Communication Software, Science Communication Products in Regional Languages, etc.

xi. Declarations: To focus on particular aspects of science communication, the following declarations were issued after negotiations and adoption of various consensus decisions at different forums: (a) *"The Benaras Document on Science Fiction 2008"* was adopted on November 13, 2008 at the concluding session of the First National Discussion on "Science Fiction: Past, Present, Future" held at Varanasi focusing the policies and directions for advancing SF in India; (b)*"The Hands-on Science India Declaration 2009"*, was adopted on October 30, 2009 as a major outcome of the 6th International Conference on Hands-on Science (HSCI-2009) held at Ahmedabad; (c)*"The New Delhi Declaration on Science Communication 2010"* was adopted on December 09, 2010 as an important directive document at 11th International Conference on Public Communication of Science & Technology (PCST-2010) held in New Delhi.

xii. Impact Assessment of Science Communication Programmes: A National Review Meeting was organized at Himachal Pradesh State Council of Science, Technology & Environment for assessing and giving future directions for short-term training courses on science writing, science journalism, science broadcasting, and science communication. A National Consultation & Review Meeting was organized at Rajasthan University, Jaipur to review NCSTC's academic courses on science communication and science journalism run by various universities and to consolidate and update syllabi for the same. A National Assessment Workshop for exploring job possibilities and assessing job potential in science communication was organized at Devi Ahilya University, Indore with active participation of representatives from industry, media and academics and the proceedings suggested that there is a need for such specialized courses and demand for the graduated students.

xiii. Centres for Science Communication: Centres for Science Communication at Lucknow University (U.P.); Devi Ahilya University (M. P.); Cochin University of Science & Technology (Kerala), and Krishna Kant Handiq Open University, Guwahati

(Assam) were established to promote higher studies and research in S&T communication/ public understanding of science.

xiv. Science Communication Archives: A Science Communication Archives at Madhavrao Sapre National Media Repository & Research Centre, Bhopal has been started to preserve and retrieve science manuscripts, publications and other information products to facilitate researchers in S&T communication.

xv. Indian Journal of Science Communication: An international peer reviewed research journal in science communication is being published since 2002, which has an International Advisory Board and peer review system and offers print, electronic and open access edition available at < *www.iscos.org* >

xvi. Public Debates on Current S&T Issues: Public debates on current affairs in S&T where public requires adequate awareness to take decisions in matters, like, Bt Cotton, Bt Brinjal, Nuclear Controversies, Iodized Salt, etc., were initiated. A recent debate on "Public Awareness of Nuclear Energy Controversies" was able to attract a house full at 11th PCST-2010.

xvii. Technology Communication: More often, we talk about science communication and scientific temper and less on technology communication and technological temper. A major initiative was taken by NCSTC on 'Technology Communication', including hands-on science, with the objectives: i) to inculcate a technological temper; ii) to develop and nurture the spirit of innovativeness, and iii) to focus on technological approach to problem solving. The programme has 3 major elements: i) orientation of artisans and techno-students towards innovativeness; ii) identification of areas of innovation and developing innovative ideas; and iii) technology awareness. The module was successfully tested and being implemented across the country.

xviii. Science Fiction: The first ever National Discussion on 'Science Fiction: Past, Present, Future' by Indian Science Fiction Writers' Association and Indian Association of Science Fiction Studies at Varanasi during November 10 - 14, 2008 to emphasize role of Science Fiction and S&T communication.

xix. Science Communication through Digital Media/Blogs/Social Media: A module on S&T Communication through Digital Media on various popular science topics were developed including science Webcast and Podcast. A series of training programmes on science communication through visual media was organized across the country.

xx. Science Communication through Cultural Events: The module includes: i) Workshop for Developing Scripts and Exhibits; ii) Demonstration of Exhibits at Cultural Events, i.e. *Shiva Ratri, Durga Pooja, Ganpati Festival, Eid, Pongal, etc.; and iii) Road Show/ Procession/ Prabhat Feri*.

xxi. Campaigns on Total Solar Eclipses: Science popularization programmes built around the total solar eclipses on the belt of totality for viewing total solar eclipses in 1995, 1999 and 2009 have been hugely successful.

xxii. Year of Scientific Awareness (YSA 2004): With an initiative taken by DST, the Year 2004 was observed as Year of Scientific Awareness across the country; followed by Year of Physics 2005, Year of Planet Earth 2008, and Year of Chemistry 2011.

xxiii. Indian Science Communication Congress (ISCC): With a view to providing a platform for encouraging scholarly interaction between science communication researchers and practitioners, scientists and communicators, science communication faculty members and students, etc., for further advancement of science communication profession, the Indian National Science Communication Congress was started in 2001. Since then 10 annual congresses (2001-2010) have been organized so far involving over 2000 researchers, scientists, journalists, including international delegates. A special session for young researchers from over 50 universities has been an attractive feature of the ISCC. The aim is to establish S&T communication as an independent discipline of scientific knowledge and expertise and promote research. The 14th ISCC-2014 is scheduled to be organized in December 2014.

xxiv. Science Communicators' Meet at Indian Science Congress: The 1st Science Communicators' Meet was organized at Indian Science

Congress, Visakhapatnam, 2008; followed by 2nd Science Communicators' Meet at Indian Science Congress, Shilong, 2009; 3rd Science Communicators' Meet at Indian Science Congress, Trivendrum, 2010; and 4th Science Communicators' Meet at Indian Science Congress, Chennai, 2011. The programme is being implemented through Indian Science Congress Association. The 8th Science Communicators Meet will be organized as part of Indian Science Congress at Mumbai in January 2015.

xxv. International cooperation: A variety of programmes are envisaged for developing international cooperation in science communication, some important ones are given here: (a) 11th PCST-2010: The 11th International Conference on Public Communication of Science & Technology (PCST-2010) was organized in India in December 2010 with International Network on Public Communication of S&T, Australia attracting 600 science communication experts from 51 countries; (b) 6th HSCI-2009: The 6th International Conference on Hands-on Science (HSIC-2009) was organized in India in October 2009 with International Network on Hands-on Science, Portugal attracting 350 delegates from 20 countries.

xxvi. Online Science Communication Networks: Online science networks are immensely beneficial for connecting science communication professionals and bringing them together in India and abroad: sciencefictionwriters@yahoogroups.com; popularsciencewriters@yahoogroups.com; iswaindia@yahoogroups.com.

Science Policy and Science Communication

Jawaharlal Nehru, the first Prime Minister of India, introduced the concept of modern scientific temper in India. He dreamt of the children of the country acquiring scientific temper (Pattnaik, 1992) Accordingly the Constitution of India has special provision 'to develop the scientific temper, humanism and the spirit of enquiry and reform' as one of the 'Fundamental Duties' mentioned under Part IV A, Article 51 A (h).

i. Scientific Policy Resolution: Prime Minister Nehru presented the Scientific Policy Resolution on March 4, 1958, which has been a guiding factor for development of science and technology in the country. Special attention was given to the scientific approach in the resolution, which reads as follows:

It is only through the scientific approach and method and the use of scientific knowledge that reasonable material and cultural amenities and services can be provided for every member of the community, and it is out of recognition of this possibility that the idea of a welfare state has grown.

ii. Technology Policy Statement: To give direction to the technological development in the country the Government of India announced the Technology Policy Statement in January 1983. The spirit of innovation and awareness about balance in technological development and environment was given special importance, among others in the statement.

iii. The Sixth Plan: The promotion of scientific temper and dissemination of scientific information among people was given due importance in the report of the working group on science and technology for the sixth plan (December 1980). Special provision was made for science popularization under science and technology chapter in the Sixth Five Year Plan, approved by the National Development Council. Consequently, the NCSTC was formed in 1982. Thereafter, the NCSTC was given the mandate for formulation of policy, programmes for science communication in the country. The need for national science communication policy was emphasized in the first convention of the Indian Science Writers Association (ISWA). Efforts were under way in the NCSTC for formulating a science communication policy.

iv. Reviews of NCSTC Activities and Programmes, 1989, 1996, 2002: The Department of Science & Technology, Govt. of India has formed different review groups to review NCSTC activities

and programmes and to suggest future strategies for science communication from time to time. The First Review Group was formed under chairmanship of noted physicist and science fiction writer Dr. Jayant V. Naraliker had given its report in 1989. The Second Review Group had worked under chairmanship of noted ocean scientist and Member, Panning Commission (Science & Technology) and gave report in 1996. The Third Review Group had Prof. S. K. Joshi, noted physicist and former Director General, CSIR as its chairman, which gave its report in May 2002.

v. Science and Technology Policy 2003: Govt. of India has announced a comprehensive 'Science and Technology Policy 2003' that carries a section on "Public Awareness of Science and Technology" (Govt. of India, 2003, 25).

vi. Science Technology & Innovation Policy 2013: The new policy was unveiled at the 100th session of the Indian Science Congress, Kolkata on January 03, 2013 that emphasizes science communication as well.

Challenges and the Way Forward

In spite of well-planned and well-structured efforts of science communication in India, there are certain challenges before us, to be met. In spite of repeated and multifold efforts of spreading scientific information and inculcation of a scientific temper among Indian people, even today there prevail lots of superstitions among people who are still ignorant about common scientific principles of day-to-day life. Hence illiteracy and ignorance are major challenges. The level of literacy has increased as compared to earlier times, though it has not reached the desirable level. Scientific literacy is drastically low in the country. The science communication has still not succeeded in attracting the media to the extent that it could appear on the front page or become a lead story, like the politics, films or sports. The coverage of science in print as well as in the broadcast media has not arrived even up to a minimum desirable level (Patairiya, 2001). It is rather disappointing to note that leading science magazines have ceased their publication, like *Science Today*, *Science Age*,

Bulletin of Sciences, Research and Industry, *Invention Intelligence,* etc. and Indian editions of foreign science magazines, like *Vigyan* (Scientific American), *World Scientist* (La Recherche), etc., could not survive. Several Hindi and Indian languages' science magazines have faced the same fate. India has 22 recognized regional languages. Hence, communication in many languages is yet another great challenge. The quality of scientific translation could not achieve the level of excellence in most instances; this is mainly due to lack of equal command and training in both the languages and non-availability of appropriate terms

Mass media has its commercial compulsions, which superimpose all the science communication efforts and leave a negative impact in the minds of the audiences. Instead of including scientific information, they prefer to generate more revenue by including non-scientific, meta-scientific or occult information, etc (Bruce, 2005).

The science writing is still dry and boring, and interesting styles of writing, like fiction, poetry, satires, skits, discussions, etc., have not found adequate space and time in the media. Even most of the science writers could not contribute sufficiently such an interesting science material to the newspapers/ magazines. Merely occasional appearance of something in the name of science fiction cannot serve the purpose.

In view of the present pace of science communication programmes, their potential and impact towards shaping the lives of the people and making them more informed and rational, nobody would be able to afford not to have the scientific information confronting day-to-day life of the people, as it will be going to become essential and integral part of most of the human activities in the near future. That is why, even today, almost every parent is intended to provide modern scientific and technological knowledge to his or her child. Although, there may be ample scope for unevenness, deprivations, limitations and lack of effectiveness of various science communication programmes and activities, however, despite various constraints and impediments, it may not be an unrealistic idea that science communication has a promising future in India and other developing countries.

As obvious from the preceding paragraphs, India has been able to take initiatives in a number of newer programmes in the area of science communication, which were not tried out elsewhere and can take lead in

these innovative areas. Similarly, we would also like to welcome other new ideas, methodologies, programmes available in other parts of the world and we can work together to better serve the mankind. Recently we have been able to develop cooperation at bilateral and multilateral levels with different countries. Of course there is ample scope for furthering such efforts in developing countries, especially in South Asian Regional Countries in matters of science communication. We can take initiative in mobilizing likeminded people in these countries to form Science Writers'/Journalists' Associations in their respective countries, with help from international organizations, in order to enhancing scientific literacy and scientific temper, which are considered to be the basic elements for development of any society in a more coherent manner.

A common science and technology news and features pool can be formed to facilitate writers/journalists to get/exchange information on scientific research and developments for further dissemination through mass media. There is a great shortage of properly trained science writers, journalists, communicators, illustrators in various parts of the world, though, a number of training programmes are conducted at various places. Therefore, more training programmes are needed, which may preferably be conducted jointly to give more opportunity to developing countries and their participation must be ensured. That apart many more joint collaborating programmes in the area of science communication can be worked out and implemented for further advancement of science communication to better serve the people.

Conclusion

Looking at the population, size and make up, variety of languages, urban-rural, digital divides, prevalent disparities, poverty, illiteracy, inadequate opportunities, facilities, services, reach of mass media, and so on, India is poised with many challenges, that offer opportunities and possibilities in S&T communication:

i. The beginning of science communication during ancient period can be traced back from the dissemination of the information about development of primitive stone tools, through the pedestrians from

one place to another, sometime around 150000 years ago in Shivalik region of Himalayas.

ii. The exchange of technical information about the use and control of fire and fire churning technology by sage Atharvan was the next step.

iii. The cave drawings and cave paintings depicting human life of Stone Age as well as illustrations of animals, plants are the true examples of science communication, by the early man in Indian subcontinent, about 40000 years ago.

iv. Then the ancient man started exchanging information and knowledge about sowing, irrigation and other agricultural practices through public relations or mutual discussions some 10000 years ago.

v. The process of communication progressed from body language to the well-developed oral and written languages during the course of the time.

vi. Guru-Shishya Parampara communicated knowledge through oral communication to generations after generations.

vii. The scientific outlook has always existed in Indian Society, in the form of logic, reasoning and method of acquiring knowledge, as evident from a number of ancient scientific works, rendered during Vedic, post Vedic and classical periods, in India.

viii. The medieval period has been important for the preparation of a large number of commentaries on earlier and contemporary scientific works. This can be considered a great milestone on the road of communication, as the information about most of the ancient and classical works mainly reaches us only through these commentaries and commentators.

ix. Construction of Jantar Mantar by Sawai Jai Singh II, preparation of scientific volumes under Mughal emperors, etc., are the notable examples of science communication during medieval period, although such information was not available to the public at large, and was limited to the privileged class only.

x. The science communication in its real term took shape during modern period, with the publication of the first scientific journal,

"Asiatick Researches," a quarterly from the Asiatick Society, Calcutta in 1788.

xi. There has been a continuing development in the formation of scientific institutions and publication of scientific literature. Subsequently, scientific publications also started appearing in Indian languages by the end of 18th century. The publication of ancient scientific literature and textbooks at mass scale started in the beginning of the 19th century.

xii. Scientific and technical terms had been a great difficulty for a long time for popular science writing. Even in the absence of scientific terms science books could not be written, some authors had refused to write, while some accepted the task, if they were provided with the technical terms in the desired language along with their explanations.

xiii. Science journalism started in 1818, with the publication of *Digdarshan* in Bengali, Hindi and English. Other newspapers had also started giving scientific information.

xiv. Science communication activities could not grow sufficiently during 19th century, however a number of publications were brought out in different Indian languages and on various scientific subjects. The science communication was mainly limited to publication of books and scientific journals, except a few popular science articles on latest developments.

xv. In the beginning of the 20th century, some new trends emerged. Science congresses, scientific and industrial exhibitions, seminars, industrial and technological museums, public lectures, popular science magazines, etc., were a few among the newer developments towards science communication. However, the pace of these activities remained low and no significant effort was seen to popularize science among the people and inculcate a scientific outlook among them. More or less the same pattern continued until independence.

xvi. The first Prime Minister of India, Pundit Jawahar Lal Nehru gave an impetus to scientific pursuits and development of scientific outlook. The independent India is witnessing a rapid growth in the efforts on

science communication and popularization. The use of broadcast and digital media has opened new vistas of science communication. The revolution in information technology has made possible to get scientific information from around the globe within seconds, on our fingertips.

xvii. The Indian science was translated from Sanskrit to Arabics and other languages probably without mentioning the fact of the source; that is why the majority of world literature does not cite Indian contributions to the important discoveries, i.e. the discovery of the Zero (0), the Decimal System, the Astronomical findings, the Discovery of Wireless Communication by Jagdish Chandra Basu, and so on.

xviii. The present study underlines the significant history of Indian achievements, one substantially ignored in the West. While the author of this paper visited the Central Library of the Moscow State University in Russia, he was happy to see the copies of the Vedas in the library, but the index card indicated: "The Vedas – Composed somewhere in Asia"; though, as a matter of fact the Vedas were composed in India during the Vedic Period.

In more developed nations, "the science museums, planetariums, exhibitions, lectures, audio-video media and high-end technological application" approach dominates the 'state-of-the-art' in this field, which is capital intensive and urban oriented. In India, same results are achieved through "folk forms, Vigyan Jatha, print and visual media, road-shows, and people's involvement" approach, which is cost effective and fits into our social milieu. However, India is not legging behind in modern approach and has been able to make world records, especially in case of Science Express - Science Exhibition on Wheels. India was able to win international bids and organize international forums - 6th HSCI-2009, and 11th PCST-2010. Many developing countries are more or less following western approach but it is refreshing to note that after organization of these forums in India, not only developing but several developed nations are willing to try Indian models. Moreover, if scientific literacy implies disseminating knowledge of science, its wonders, its scope, its application, etc., then perhaps in Indian context

scientific and technological temper has more meaning and relevance. What we would like to see is that our population at large, particularly the illiterate and backward rural community, develops a scientific outlook rather than being told about facets of science alone that allows informed and logical application of S&T and elimination of superstitions and ignorance. In India, therefore, more organic approach has taken shape and making inroads. Use of local languages, dealing with everyday S&T problems, using surroundings and environs at home, in field and outdoors, learning by doing, are some of the elements of this parallel approach of science communication and popularization movement in India.

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Appendix

Science communication courses in India:

i. M.Sc. in Mass Communication in S&T, Lucknow University, Lucknow
ii. M.Sc. (Tech) in Technology Communication, Indore University, Indore

iii. M.Sc in Science & Technology Communication, Anna University, Chennai
iv. Postgraduate Diploma in Science Journalism, Makhanlal Chaturvedi National University of Journalism & Communication, Bhopal
v. M.Phil. in Science Communication, Kannada University, Hampi, Karnataka
vi. M.B.A. in Science Communication, Makhanlal Chaturvdi National University of Journalism & Communication, Bhopal
vii. Diploma in Science Journalism, Madurai Kamraj University, Madurai
viii. Postgraduate Diploma in Science Communication through Distance Education, Devi Ahilya University, Indore
ix. Diploma in Science Journalism through Distance Education, Indian Science Communication Society, Lucknow
x. Diploma in Science Communication through Web Enabled Online Learning, Indian Science Communication Society, Lucknow
xi. Certificate Course on Science Fiction, Indian Science Writers Association, New Delhi
xii. Special Paper in Science Communication as part of PG Course in Journalism & Mass Communication, Rajasthan University, Jaipur
xiii. Special Paper in Science Journalism as part of PG Course in Journalism & Mass Communication, Purvanchal University, Jaunpur
xiv. Semester Course in Science Journalism as part of PG Course in Journalism & Mass Communication, Hyderabad University, Hyderabad
xv. Semester Course in Science Communication as part of PG Course in Journalism & Mass Communication, Gandhi Gram Rural University, Gandhi Gram
xvi. Special Paper in Science Journalism as part of PG Course in Journalism & Mass Communication, Saurashtra University, Rajkot
xvii. Certificate Course in Science & Environment Journalism, Vishwa Bharti University, Shanti Niketan
xviii. Special Paper in Science Journalism as part of PG courses in Journalism & Mass Communication, Cotton College, Guwahati

xix. Special Paper in Science Journalism as part of PG courses in Journalism & Mass Communication, Guwahati University, Guwahati

xx. Special Paper in Science Communication as part of PG course in Journalism & Mass Communication, Banaras Hindu University, Varanasi

xxi. Special Paper in Science Communication as part of course in Media Studies, Anna University, Chennai

xxii. Diploma in Science Communication, K.K. Handique State Open University, Guwahati, Assam

xxiii. Certificate Course in Science Communication & Media Practices, Indian Science News Association, Kolkata

xxiv. Certificate Course in Science Communication & Media Practices, Science Association of Bengal, Kolkata

xxv. Certificate Course in Science Journalism, Vigyan Parishad, Allahabad

xxvi. Certificate Course in Science Journalism, Jeevaniya Society, Lucknow

xxvii. Certificate Course in Science Communication, Punjab Agricultural University, Ludhiana

xxviii. Certificate Course in Science Communication through Television, Development & Educational Communication Unit, Space Applications Centre, ISRO, Ahmedabad

xxix. Diploma in Science Communication through Audio-Visual Media, C-DIT, Trivandrum.

xxx. MS degree programme in science communication, National Council of Science Museums (NCSM), Kolkata in collaboration with BITS, Pilani.

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Quo Vadis – Citizen Participation in Germany

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Quo Vadis – Citizen Participation in Germany

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Abstract

Even though the discourse about citizen participation in Germany is influenced by the international context, it contains some specific German peculiarities. For example, in Germany there is a strong interdependence between the protest culture, the public discourse about democracy, and scientific research activities. This dependence has had a very strong impact on the participative structures in Germany. This article considers how these three social spheres have developed since the 1950s. While some parts of the German society were in favor for more citizen participation, the development of this idea took almost 50 years to spread. Today there is almost a unison demand for it not only within the public but also across all relevant parties. In this context, the article addresses some current discourses about the realization of participative processes in Germany. Finally, promising approaches and currently open questions, which might be important in the future, are discussed.

Keywords: citizen participation, protest, policy process, decision making

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Quo Vadis – Participación Ciudadana en Alemania

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Abstract

El discurso sobre participación ciudadana en Alemania contiene peculiaridades alemanas, a pesar de estar influenciado por el contexto internacional. Por ejemplo, en Alemania hay gran interdependencia entre la cultura de protesta, el discurso público sobre la democracia y las actividades de ciencia e investigación. Esta dependencia tiene un gran impacto sobre las estructuras participativas en Alemania. Este artículo considera cómo estas esferas sociales se han desarrollado desde los cincuenta. A pesar de que algunos sectores de la sociedad alemana estaban a favor de más participación pública, el desarrollo de esta idea tardó casi cincuenta años en generalizarse. Hoy hay gran demanda de participación pública no sólo entre el público sino también entre varios actores sociales. En este contexto, este artículo analiza algunos aspectos sobre los actuales discursos referentes a procesos participativos en Alemania. Finalmente, el artículo gira en torno a varias prometedoras iniciativas y algunas preguntas que pueden ser importantes en el futuro de la participación pública.

Palabras clave: participación ciudadana, protesta, proceso político, decisiones

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In recent years several large-scale and infrastructure-related projects in Germany led to pro-tests. Such projects are for example the railway project Stuttgart21, the Airport Berlin-Brandenburg International (BBI), but also several smaller projects as the construction of wind-turbines on regional level in the context of the German Energy-Transition (see Nolte 2011, 11). In many cases the protesters fear negative consequences for valued goods in their living environment originating from these projects. Being confronted with these protests a political and scientific discourse emerged, claiming almost in unison more citizen involvement. Citizen involvement in this context is proponed as method or tool that leads to better political decisions in objective means, higher legitimacy and fewer controversies within society (see Geißel et al 2014, 13f.; Hutter & Teune 2012: 9; Schröter 2016, 119). Generally public participation can be understood as "(…) as a set of processes that include representatives of different social groups organized by a third party with the purpose of initiating a discourse and cooperative counselling process aimed at informing collectively-binding decisions" (Schroeter et al. 2016, 117). Even though the link between protests and the claim to more citizen involvement seems to be logical at first glance, a closer look to the history of political culture in Germany reveals bigger and more frequent protests during the 70's and 80's. At this time vigorous large-scale protests e.g. against the structural expansion of the Frankfurt Airport with more than 100,000 participants took place (see Nolte 2012, 366; Rucht 1994, 263; Schröter 2016, 119). Protesters demanded next to other things more citizen participation without having significant success. Compared to these incidents the current protests happen in a minor extend but seem to have a stronger impact on political changes towards more citizen participation.

In this context the article examines the imposing question of what factors can be identified that corroborate to some degree the different political reactions to the demand of public participation. Therefore, the first two sections focus on protests and the public debate about citizen participation: The first part summarizes the history of citizen participation and protest while the second part refers to the current debate about it in Germany. The sections

three and four will discuss the scientific development within the field and the current debate about participation in science.

The History of Citizen Participation and Protest in Germany

The Federal Republic of Germany was founded in 1949, strongly aligned with the ideals of representative democracy, which involves that political parties play an important role within the political system. The people wields most of its power during political elections to select its representatives while only little direct influence on political decisions is granted. One reason for that can be seen in the experiences of the founding fathers and mothers of the German constitutional law (Grundgesetz) with the collapse of the Weimar Republic (see Geißel & Kersting 2014, 1; Sartori, 2006, 94).

With the spread and internalization of democratic values during the 60ies first political pro-tests emerged among young people, mainly students. The movement stood up for revolutionary ideas like anti-imperialistic and anti-capitalistic thoughts in connection with the philosophies of Marx, Lenin or Marcuse. But they also demanded more direct influence on democrat-ic decisions (see Nolte 2012, 361ff.; Rucht 1994, 152). In respond to these demands chancellor Willy Brand initiated a political initiative under the slogan "Let's dare more democracy" ("mehr Demokratie wagen"). Based on this initiative more participatory chances mainly through changes within the urban planning legislation were offered. These new opportunities to participate were selective offers and information events within the planning process. A further expansion of participatory offers was not realized as the in initiative dissipated soon (see Geißel et al., 2014, 13; Geißel & Kersting, 2014, 1). Direct citizen participation was extended but still limited.

In the 70ies and 80ies the New Social Movements originated from the student revolts. De-spite its origins the New Social Movements overcame Marxist and communist ideas and broke up with the imagination to stand in line with the workers movement of the 19th century. All revolutionary claims were given up too. A diffuse concept to reform capitalism and the representative democracy replaced these ideas (see Nolte 2012, 361ff.; Rucht 1994, 152)

The terminus "New Social Movements" does not subsume all democratic protests at that time but refers to a certain type of protests that is strongly associated with the political left in Germany. The proponents of the different movements like the women's movement, the peace movement, the movement against nuclear power or the environmental movement promoted non-conservative and post-materialistic values. They understood themselves as extra-parliamentary opposition that distanced itself sharply form the established political parties (see Rucht 1994, 246-250).

Especially the environmental or ecological movement had big impacts on the political land-scape in Germany. The movement was organized as a non-hierarchic network of independent local groups quite similar to citizens' initiatives. On regional and national levels contact and coordination agencies were established mainly to organize large-scale protests (see Nolte 2012, 366; Rucht 1994, 263; Schröter 2016). During the 70ies and 80ies many environmental associations were founded e.g. the association for environmental and nature preservation (BUND) but also national groups of international environmental organizations as Greenpeace or WWF. In the 80ies the Greens were institutionalized as a political Party on a national level (see Rucht 1994: 264ff.; Schröter 2016, 120).

All in all the New Social Moments successfully influenced the agenda and reshaped institu-tional structures within civil society and politics. This can be mirrored in the evolution of the landscape of political parties in Germany from three within the period between 1950 and 1980 up to six parties until today. Only their demand for more citizen participation was not responded: While the Social Democrats (SPD) and the Liberals (FDP) adopted a relatively open-minded attitude to the issue the more conservative Christ Democrats (CDU) remained reluctant (Rucht 1994, 249).

With the end of the 80ies the New Social Movements lost some of their dynamic and protests became less frequent. Reasons for this can be seen e.g. in the political establishment of non-conservative parties, the cease of political issues through the end of the Cold War 1989 and the absorption of ecological themes by the other parties (see Schröter 2016, 120ff.).

A closer look to the current protests reveals that still today many protesters identify them-selves as leftists (see Becké et al 2011, 19; Schröter 2015, 3, Schröter 2016, 120). Protesters show a strong consent for democratic values

like the freedom of speech, press and others. They still demand more options to participate directly in political decision processes. Despite form that, the attitudes of current protesters differ much form that in the 80ies. Many people criticize the condition of the democratic system in Germany. They feel their interests being ignored because political decision makers are more committed to the interests of economy. This leads to deep mistrust of the political parties and of the politicians (see Bebnowski et al. 2010, 13; Becké 2011, 12; Schröter 2015, 2).

In detail the values among the protesters did not vanish but appear much more individualized and diversified. Protesters still use arguments that indicate a wish to preserve the environment. But these argumentations are striking: Often the argument for environmental preservation is linked to the region in which most of the protesters live. In other words the protesters refer to the concept of homeland in the sense that they identify themselves strongly with a certain region. It is very likely that changes are rejected within a region, if the residents within that area perceive this region as being burdened with too many changes. Compared to the environmental movement back in the 70ies the argumentations focus not so much on environment in an ecological sense but on the concept of nature (see Marg et al 2013:106f, Schröter 2016, 121). Overarching altruist values are transferred to the context of an actual project. Not surprisingly most protesters engage for a specific goal referring to one crucial project.

Another interesting observation during public participation processes and debates is the mixing of alternative and conservative arguments and ideas. Political positions that used to be incompatible turn to converge whilst political positions that traditionally seemed to be quite similar become increasingly conflicting. One example is a conflict between “green” positions that could be observed during the planning phase of a wind turbine project in Ehingen (a community located in the Baden-Württemberg, southwest of Germany.) During the project a conflict flared up between the Greens and the BUND (Federation for Environment and Nature Germany) on the one side and NABU (Federation for Preservation of Nature) on the other. One group emphasized that wind turbines might cause accidents with animals like birds and bats, while the other group pointed out that wind turbines contribute to

climatic perseveration (see Schröter 2015, 3; Südwestpresse 2015: w/o. P.; Schröter 2016, 121).

All in all current protests are much more project related. Protesters use a portfolio of conservative and alternative arguments that rather blur established political positions than representing a strong opposition between them. The protests itself appear as a coalition of meanings against a certain project yet representing no common normative core.

Citizen Participation – Current Status of the Public Debate

The label "crisis of democracy" reflects much of current public debate about citizen participation in Germany. Since the 90ies this debate centered on changes regarding major institutions of democracy in Germany. A frequently used term is "disenchantment about politics". It refers to a number of empirical observations, e.g. to the decline of total voters within national and federal elections, the decreasing number of party memberships but also to increasing dis-trust towards political elites. In this context political decision-makers and public administration began to offer more citizen participation within decisions processes on a communal level. These offers were often punctual, informal and had no direct impact on the decision (see Merkel 2015, 8). During the 2000s many German cities and communities published guidelines for citizen participation to implement high quality participation processes (see Geißel & Kersting 2014, 1, Klages 2014, 6). Participatory processes comprised citizen households, but also par-ticipation methods to resolve conflicts e.g. about public construction projects.

The protests against large-scale and infrastructure related projects in the last years lead to ex-acerbating perceptions of the "democratically crisis". With the protests new termini like "Wutbürger" (literally fury citizen) entered the debate (see Krubjuweit 2010, 26). Many citizens not just those protesting criticize the political system for offering too little direct influence on important political decisions. The negative positions towards the functioning of the political system among those people protesting make it very unlikely that public conflicts can be solved by changing the party system, similar to the 80ies (see Geißel et al 2014, 13f.; Hutter &Teune 2012, 9; Schröter, 2016, 121f.).

But in conjunction with the mixture of conservative and alternative positions also new political possibilities come in sight: The approximation between these political positions helped conservative parties to assume ideas they earlier rejected as being alternative e.g. the idea of citizen participation. Currently conservative parties have better possibilities to take over new ideas without displeasing their supporters. One of these ideas is to offer more citizen participation on federal and national levels. Empirical investigations show that regardless to their engagement in the protests many German citizens are in favor for more citizen participation (see Scheer et al. 2014, 15). A positive position on citizen participation appears democratically responsive as well as necessary to address risen distrust in political parties.

All this leads to an increasing use of public participation methods on federal and national levels since 2005. People are asked to participate in consultative processes, deliberating about issues like the future energy supply, climate and traffic but also what having a good live means to them. As an example for the new willingness to listen to the demands of citizens among political parties and administrative bodies the project of "BEKO" can be mentioned. It is a state-wide participation initiative in Baden-Württemberg on the future of energy production and use. With high effort the input of over 1500 citizen was included in a legislative proposition on future energy use (see Schroeter et al 2016, 119). In Baden-Württemberg also a new political campaign "the policy of being heard" was instigated in 2012. Citizen participation has become a cross-party demand that is supported by most of the general public (see Gabriel & Kersting 2014, 81).

Next to political decision makers and administrative officials, public participation processes are increasingly used within the planning process of entrepreneurial projects that might trigger public criticism, e.g. the contraction of automotive test tracks. More and more entrepreneurs fear their projects and along with them their investments being delayed or even stopped. Rea-sons for this are next to protests, legal actions initiated by NGOs and citizen groups. In this context the German industry is about to change its behaviour towards public participation: For example, the VDI (literally "Association of German Engineers", an umbrella organization of a variety of enterprises including also global-players) published a guideline on public participation (the VDI 7000) fostering its members to use more and more structured participation. Even

though his new favour for participation is certainly stronger motivated by the reliability of investment planning then by social justice or democracy theory, it still reflects some change towards the topic (see VDI 7000).

Policy Process Research – Scientific Roots of Public Participation

The scientific discourse about public participation in Germany is closely related to the protest culture of Germany at the one hand and to the political discourse about public participation on the other. The debate is strongly influenced by political scientists as well as sociologists. Within political science the discourse about public participation can be put into a contextual relationship with policy process research. In the US the field was strongly influenced by the work of Harold Lasswell. His merit was twofold: he understood policy process research as scientific analysis and at the same time as a contribution to serve democracy (see Saretzki 2008, 34). The field is still reflecting this dichotomy between political consulting and scientific work. Second Lasswell presented a depiction of seven functional categories within the political pro-cess. This was basic concept for the idea of the policy cycle. While the approach was widely spread within the USA, especially in the 1960ies and 70ies, political scientists in Germany were skeptical about it (see Weible 2014, 7). In the first years after 1968 many younger scientists refused it as being too little critical of the ruling classes, elderly scientist criticized it as too less normative and too much behavioristic (see Janing & Toens 2008, 7). Reform policies in the early 1970ies led to a growing demand for policy consultation in Germany and changed that situation somewhat. Apart from the mainstream some research about planning processes was now carried out resulting in a euphoric atmosphere about planning within science and public. This came to an early end due to the oil crisis in the mid 70ies but also because the attempts to control other social systems by political interventions failed. The approaches of "Political control" were more and more criticized for being technocratic e.g. by the proponents of the New Social Movements (see Saretzki 2008, 40).

With the 80ies many new theories within the international field of policy process research were developed. In contrast to the policy cycle approach these concepts emphasize the constructivist character of policies (see Weible

2014, 8). At the same time there was second, mi-nor, discourse about public participation especially in Germany. This discourse was mostly carried out among philosophers e.g. by Jürgen Habermas or Karl-Otto Apel who developed normative theories within the field of citizen participation that are still significant today. In connection to this discourse a minor group of social scientists who worked within a more empiric field proponed public participation e.g. as a possibility to reduce infrastructure and technology related conflicts. Since the 70ies and 80ies many case studies (national and international) were carried out and led to a growing body of literature about different participation methods, classifications and evaluations (see Rowe and Frewer 2004, 515; Rowe & Frewer 2005, 256-258; Wesselink 2011, 2689)

After a view euphoric years about the triumph of democracy after 1989 the "crisis of democracy" became more and more an important subject within the scientific discourse, leading to new concepts within the policy analysis. These are for example the concepts of participative policy analysis and discursive policy analysis. At the heart of both is the demand for a stronger comprehension of citizens within the policy making process. While the participative concept claims to overcome expert related decision making by including the knowledge of citizens, the discursive concept takes a more constructivist perspective stressing the procedural steps like problem framing, arguing and a commons search for solutions (see Saretzki 2008, 43f.). All in all, the current situation within the policy process research can be interpret as carried by a participative or deliberative turn.

The Current Debate about Public Participation in Sciences

Scientific works about public participation (somehow still in the tradition of Lasswell) refer mainly to two fields, a theoretical and an empirical one. The theoretical field contains questions about theories of democracy and society that allow to discuss the opportunities and limitations of citizen participation in the context of the democratically crisis. The reasoning for and against citizen participation contains very different arguments ranging from normative to instrumental and substantive ones (see Wesselink et al. 2011, 2690). These arguments are linked with a variety of different perspectives on the aims of citizen participation. Generally, these can be traced back to six

philosophical traditions that contribute to subject of citizen participation. The six theoretical concepts are the functionalist concept, the neo-liberal concept, the anthropologic concept, the emancipatory concept, the post-modernist concept and the discursive concept (see Renn & Schweizer 2009, 177ff.).

With the help of this classification some differences between national discourses about citizen participation become visible: In contrast to the theoretical discourse in the US relatively little attention to the anthropologic concept is paid in Germany. Other concepts like the discursive are much more popular. The reason for this is not at least the fact that one of the most known social-philosophers of the 20st century influenced especially the German theoretical discourse about citizen participation: Jürgen Habermas. He promotes a consensual conception of democracy. The idea of discursive democracy is at the heart of his work. This means the fundament of democratic decision making is coming to a rational consensus between individuals. Within a rational discourse individuals exchange and challenge mutually arguments and rea-sons without any external pressure. A consensus as result of a discourse is not just the basis for a democratic decision but additionally leads to social integration as the actors communicate about values and norms. Social coherence, inclusion in democratic procedures and democracy are closely related within this concept (see Bora 2005, 18f.; Mouffe 2010, 19-21).

Together with the political debate that emphasizes very much on the idea of citizen participation to deal with the "crisis of democracy" the above depicted discourse appears be currently almost hegemonic. Less attention is paid to other ideas that contribute to the debate. One well-kwon political scientist within that field is Chantal Mouffe. She claims the individual rationalism if being self-consistent in the sense of Habermas had to contain a irreducible element that has to reject any idea of political antagonism within a political decision (see Mouffe 2010, 19). While Habermas is emphasizing on consensual decision-making in politics, Mouffe points to an antagonistic component within these processes that generally leads to the exclusion of different interests, positions and groups. According to her opinion the potential of democracy is the institutionalization of the antagonistic moment within the democratic process such as debates or even elections (see Mouffe 2010, 22). From that point of view political conflicts and disagreements seem to be necessary conditions for democracy. These reasons lead to the

conclusion, that the current democratic crisis should be resolved by exacerbating conflicts within the political system, that is to sharpen political differences between political parties that have become more and more similar during the last decades i.e. by pursuing catch-all strategies (see Mouffe 2010, 45).

Besides these ideas other existing suggestions favor proposals for reforms on the top of political hierarchies. For example, the implementation of political decision-making bodies with a very high level of expertise within a certain field. Independent form parties and politics such expert boards could make supreme-court-like decisions. To extend the terms of office for certain committees is another suggestion. This could help to minimize delaying unpleasant decisions or very popular decisions in the context of election campaigns (election gifts) (see Offe 2003, 18f).

Next to theoretical works empiric investigations refer to public participation in at least two distinct perspectives. The first perspective are studies that have a strong project relation. With-in that context research questions ranging idiosyncratically between normative questions of how participation should be designed and practical considerations to realize these normative standards. One of the most frequently discussed topics in this regard is to avoid biases in the selection of participants. Many evaluations show a disproportionate number of elderly, males that are formally very well educated. One suggestion to provide a more balanced participation structure is e.g. to use random sampling or to set up elections in order to select "citizen participation representatives" (see Bebnowski et al 2010, 5; Becké et al 2010, 5; Butzlaff et al. 2013, 74; Marg et al. 2013, 96; Merkel & Petring 2011, 10; Schröter 2015, 4). Surprisingly there are almost no theoretical efforts that try to explain how public participation works.

Next to this, there is a growing body of literature about qualitative and quantitative studies that overcome the case specific perspective. One example is a study that has been carried out by the Bertelsmann Foundation 2014. Within a representative sample of N=2007 it is one of the biggest quantitative studies that has been conducted about multiple democracy in the last years in Germany (see Bertelsmann Stiftung, 2014). Frankenberger et al carried out another interesting work in the context of the study "Monitoring Democracy in Baden-Württemberg". Using qualitative methods, the authors were able to

depict political living worlds. The values characterizing these different living worlds were closely related to different types of participa-tion like social participation and citizen participation (see Frankenberger et al., 2015, 151-221).

Summary

All in all, the development and the current discourses can be interpreted as a participative turn that reached the German society. The demand for citizen participation has been playing a central role since the early 1960ies within many protest movements. But only since 2000 it spread into the general public, as well as in political and administrative decision-making bod-ies. Important reasons for that may be seen in convergence between alternative and conservative world views but also within the current protests and the perception of the "democratically crisis". This change is also reflected by the scientific discourse.

But nevertheless the future of citizen participation in Germany seems to be open. At the moment many participative processes at different levels of governance are taking place. These efforts are accompanied by the hope to realize the opportunities that come along with participative concepts. Simultaneously many commercial providers for moderation and facilitation appear. These take over the work of volunteers and contribute to the commercialization of science and public participation. These providers insist on more citizen participation due to their economic interests. Advising political decision makers in that way could lead in the long run to an inflationary use of citizen participation methods and to participation fatigue (see Saretzki, 2008, 49).

Even though much research within the field of citizen participation is done, many open questions about how participation processes work remain. One of the most pressing questions is the lack of a theory about public participation that interprets public participation as a social situation. Within such a theoretical framework, assumptions about the question how public participation works could be addressed. This could help to develop a more realistic view on the question how much the organization of a participation process could influence its results. But aside from the scientific discourse still

some questions remain open. Within the political field one major discussion focuses on the question whether the German democratic system should prefer to realize the ideal of participative over the ideal of plebiscitary democracy or vice versa. Another virulently discussed question refers to multi-level governance – due to the federalist structures on a lower system level and the fact that the German political system as a whole nests within the European Union, citizen participation has to deal with some complex issues.

Notes

[1] There are already two articles published by Regina Schröter in German language, focusing on the comparison of different protest events in Germany and to some extend to the advantages of citizen participation in this context. In order to promote transparency these articles are cited within the text, along with the originally studies.

[2] Habermas qualifies the assumption about consensus being the result of a discourse which was published e.g. in "The theory of communicative action" in later works (see Habermas 1981 (1995).

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Implementar o Conceito de Public Engagement with Science and Technology: Visões e Reflexões sobre a Prática

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Implementar o conceito de Public Engagement with Science and Technology: Visões e Reflexões sobre a Prática

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Resumo

O envolvimento dos cidadãos na ciência e tecnologia tem sido sobejamente reconhecido como desejável para contornar os desafios que a sociedade enfrenta atualmente. Conseguir uma participação pública efetiva na ciência tem sido, no entanto, um objetivo bastante complexo e difícil de obter em pleno. Várias entidades têm tentado pôr em prática essa participação, originando diversas propostas sobre os modos de «fazer engagement». Identificar diferenças e semelhanças entre essas propostas, e analisar os seus pressupostos e implicações pode contribuir para repensar e ajustar ações futuras. Neste artigo reflete-se sobre os propósitos que o envolvimento dos cidadãos na ciência deve servir, quem deve envolver, de que forma, em que momento, e que métodos utilizar para avaliar os seus impactos, apresentando-se, ainda, uma reflexão sobre alguns limites impostos por este tipo de processos.

Palavras-chave: ciência, engagement, participação pública, democracia deliberativa

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Poner en Práctica el Concepto de Public Engagement with Science and Technology: Visiones y Reflexiones sobre la Práctica

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Resumen

Para hacer frente a los retos que enfrenta la humanidad se considera cada vez más deseable una mayor participación pública en ciencia y tecnología. Lograr una participación efectiva del público en la ciencia ha sido, sin embargo, un objetivo bastante complejo y difícil de obtener en su totalidad. Varias entidades han tratado de poner en práctica esta acción, lo que resulta en una serie de propuestas sobre la mejor forma de "promover la participación". Identificar las diferencias y similitudes entre estas propuestas y examinar sus presuposiciones e implicaciones puede contribuir a replantear y reajustar las acciones futuras. En este artículo se refleja en los fines que la participación pública en ciencia y tecnología debe servir, a quién involucrar, cómo, en qué momento y qué métodos utilizar para evaluar su impacto, presentando también una reflexión sobre algunos de sus límites.

Palabras claves: ciencia, compromiso, participación del público, democracia deliberativa

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Implementing the concept of Public Engagement with Science and Technology: Visions and Reflections on Practice

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Abstract

Public engagement with science and technology has been increasingly recognized as desirable for proper management of the social and environmental challenges facing humanity. However, achieving an effective public participation in science and technology has proven to be a quite complex objective and one that is difficult to fully reach. Several bodies have tried to implement public participation, resulting in different proposals on ways to "do engagement". Identifying differences and similarities between those proposals and examining their assumptions and implications can contribute to rethink and to adjust future actions. This article presents a reflection on the purposes that public engagement with science and technology should serve, who to involve, how, when and which methods to use to assess the impacts of participation, as well as on the limits of participatory processes.

Keywords: science, engagement, public participation, deliberative democracy

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O conceito de public engagement with science and technology (PEST) adquiriu uma grande notoriedade nas últimas duas décadas, como meio de garantir a democratização da ciência, estando muitas vezes no centro das reflexões dos Estudos Sociais de Ciência. O significado do conceito «engagement», no entanto, nem sempre é claro, notando-se alguma ambivalência e discrepância entre os vários teóricos que se têm debruçado sobre esta temática (eg. Bucchi, 2008; Irwin, 2008; Lewenstein, 2003; Trench, 2008; Wynne, 2006). Concordando nos pressupostos de que esse envolvimento é facilitador da integração dos públicos não especialistas no debate de temas científico-tecnológicos e de uma aprendizagem recíproca entre esses públicos e a comunidade científica, favorecendo uma democratização dos processos de resolução de questões neste campo, as posições assumidas por esses teóricos divergem, no entanto, quanto aos objetivos específicos que o engagement deve cumprir. A multiplicidade de posicionamentos a este respeito resume-se basicamente a três argumentos principais (Carr et al., 2013; Fiorino, 1990; Stirling, 2008): razões de ordem instrumental, visando a restauração da legitimidade da ciência e da confiança do público na mesma; razões de ordem substantiva quando o objetivo passa pela obtenção de resultados melhores devido à inclusão de toda a expertise relevante nos processos de decisão; razões de ordem normativa, pretendendo concretizar os valores de abertura, transparência, pluralidade e democracia cidadã.

Assim, para além de ser entendido como uma estratégia para promover a transparência e facilitar a capacitação dos cidadãos, ampliando a sua atitude positiva em relação à relevância da ciência (RCUK, 2012), o engagement é percecionado também como um instrumento facilitador da partilha de competências, conhecimentos e capacidades e da compreensão de problemas complexos (NCCPE, 2012), numa perspetiva inclusiva tendo em consideração que prevê a consulta de cidadãos comuns (CAPE, 2008). Passando sempre por uma abordagem comunicativa bidirecional, a sua ação pode focar-se na transmissão de conhecimento, na colaboração ou na integração receção das competências, da experiência e do conhecimento do público (Prikken & Burall, 2012), abrangendo duas componentes distintas: a componente educacional, quando promove a participação dos jovens em

atividades de aprendizagem produtivas; e a componente de democracia participativa (também referida muitas vezes como participação pública ou diálogo público) quando é utilizado na transferência do poder das elites para os cidadãos, como forma de promover o debate entre os cidadãos, a comunidade científica e os decisores sobre questões científico-tecnológicas no processo de tomada de decisão política (Armbruster-Domeyer, Hermansson & Modéer, 2011).

Esta última «leitura» do engagement, associada a uma maior transparência no processo decisório e que atribui um papel de destaque ao cidadão no processo, está presente na maior parte da literatura científica produzida a este respeito (eg. Borchelt & Hudson, 2008; Carr et al., 2013; Elam & Bertilsson, 2003; Gregory, Agar, Lock & Harris, 2007; Lewenstein, 2014; Rowe, Horlick-Jones, Walls, Poortinga & Pidgeon, 2008; Wooden, 2006). Esta é, de acordo com Lewenstein & Brossard (2006), a forma mais ativa de envolver o público na ciência, uma vez que proporciona real autoridade pública aos cidadãos na definição de políticas públicas com a sua participação direta na definição da agenda científica, através de uma análise reflexiva e crítica da sua cultura científica, e das preocupações e prioridades sociais.

O conceito surge, ainda, associado a intervenções de instauração da confiança do público (Bradbury, Branch & Focht, 1999); de garantia de qualidade em processos em que os factos são incertos, há valores em disputa, os riscos são altos e as decisões urgentes (Ravetz, 1999); e de caráter institucional quando é promovido pelas instituições para assegurar a sua própria sustentabilidade e o bem-estar da comunidade (Lewenstein, 2014).
Essa ambivalência relativamente ao engagement está presente, também, nos posicionamentos dos cientistas (Davies, 2013a, 2013b; The Royal Society, 2006), verificando-se uma múltipla sobreposição de significados, que parece coexistir pacificamente (Davies, 2013a, 702). O seu «significado na prática parece estar intimamente ligado a contextos particulares» (Idem), sendo «determinado em termos de pequena escala, local e individual» e construído «como um conjunto um tanto aleatório de histórias, acidentes, e pessoas» (p. 703-704) a partir de «diferentes práticas e experiências» (p. 702). Entre esta multiplicidade de sentidos ressaltam vários aspetos dominantes (Davies, 2013a, 2013b).

Ele é entendido como um conceito múltiplo (ou diverso) nos seus impactos, podendo produzir um conjunto vasto de possíveis resultados em momentos e contextos diferentes – melhorar a qualidade de vida, esclarecer e capacitar os cidadãos, legitimar o papel da ciência, entre outros - e adotar uma diversidade de formas flexíveis e adaptáveis a diferentes tipos de projeto (Davies, 2013b). Esta diversidade está presente em outros estudos (eg. Casini & Neresini, 2012; Escutia, 2012; The Royal Society, 2006). Davies (2013a) refere também que ele é entendido como uma conceção relacional porque supõe a criação de relações novas e produtivas, entre a comunidade e/ou a instituição científica e os cidadãos, com vista a um benefício mútuo, a uma colaboração, ao cruzamento de conhecimentos e perspetivas, implicando «"conectar", "quebrar barreiras", ser "aberto e disponível", ou providenciar "acesso"» (p. 695). Existe, também, a perceção de que é orientado por resultados podendo afetar diferentes realidades de formas diferentes. Ele pode ser direcionado para o debate público; capacitação dos cidadãos, esclarecimento de incompreensões; consciencialização pública da importância da ciência; ou para a consolidação de uma atitude de confiança na ciência. Foi mencionada, também, a sua contribuição para melhores resultados, prestação de contas e a transferência de tecnologia.

Em termos dos benefícios pessoais que este relacionamento pode representar, as opiniões dividem-se, havendo quem o considere uma tarefa gratificante e positiva e outros que olham para ele como uma obrigação ou como uma tarefa difícil ou mesmo perigosa.

São vários os autores que relatam o «gozo» e a «satisfação pessoal» dos cientistas em comunicar aos cidadãos os resultados do seu trabalho e dar a conhecer as potencialidades da ciência, estando essa satisfação muitas vezes relacionada com a eficácia e a experiência positiva que tiveram no passado com ações nesse campo (Burchell, Franklin & Holden, 2009; Davies, 2013b; Escutia, 2012; Pearson, Pringle & Thomas, 1997; Poliakoff &Webb, 2007; The Royal Society, 2006). Por outro lado, ele é percebido, muitas vezes, como uma obrigação ou responsabilidade (Casini & Neresini, 2012; Davies, 2013b), como algo que é suposto fazer para atrair novas fontes de financiamento, manter a independência da ciência face à política, legitimar o seu trabalho, captar novas vocações, prestar contas e perceber as expetativas dos financiadores (Casini & Neresini, 2012; Davies, 2008, 2013b, Escutia,

2012; Storksdieck, Stein, & Dancu, 2006; The Royal Society, 2006; Tisdale, 2011). Na investigação de Davies (2008, p. 420), é claro, ainda, que comunicar com o público é uma tarefa complexa, «difícil ou perigosa e (…) uma experiência negativa para os cientistas envolvidos», porque é difícil conseguir a clareza e a compreensão que esse tipo de comunicação requer e um bom balanço entre ser "interessante" e dizer a "verdade", podendo ser potencialmente perigosa se o público interpretar mal a mensagem ou der mau uso a essa informação.

Desafios da Prática de Engagement

Conseguir colocar o «engagement» em prática tem-se mostrado um grande desafio para as várias entidades que se tem mostrado empenhadas em pragmatizar o compromisso de envolver os cidadãos na ciência. Sendo crucial envolver diálogo, debate e consensualização de posições, estes objetivos são de difícil concretização, requerendo mudanças procedimentais, identitárias e outras face ao paradigma do défice. Esse esforço tem originado, portanto, diversas propostas sobre os modos de «fazer engagement». Nesta secção procuramos complementar a discussão iniciada por Delgado, KjØlberg & Wickson (2011) e contribuir para uma reflexão sobre os desafios associados à prática de engagement, nomeadamente sobre quem envolver, como fazê-lo, em que momento e como avaliar o impacto das ações.

Os Públicos

Ao contrário do modelo de défice, o engagement olha para o público como um participante ativo na discussão e análise dos temas e problemas, pretendendo que ele se envolva, coloque questões, troque perspetivas, conhecimentos e experiências; ou seja, que assuma as questões ao mesmo nível que a comunidade científica como agente essencial na produção do conhecimento, no contexto de «fóruns híbridos» (Callon, Lascoumes & Barthe, 2001). Deste modo, em vez de distinguir os vários tipos de público tendo em conta apenas o seu nível de conhecimentos e de interesse pela ciência, o engagement diferencia-os considerando o seu grau de interesse e

também o seu nível de envolvimento nas questões, o contexto do debate e a sua expertise em relação ao tema.

Assim, de acordo com as suas necessidades, interesses, atitudes e níveis de conhecimento, este grupo heterogéneo, multifacetado e imprevisível que constitui o público-alvo da comunicação pública de ciência integra os (outros) cientistas, os mediadores (comunicadores de ciência, jornalistas, educadores, formadores de opinião), os decisores (em instituições governamentais, científicas e educativas), o público (os três grupos anteriores e outros sectores e grupos de interesse), o público atento (interessado e razoavelmente bem informado sobre questões científicas) e o público interessado (numa determinada área ou questão mas não necessariamente bem informado) (Burns, O'Connor & Stocklmayer, 2003). Se considerarmos que estes públicos não são «dados» mas «construídos performativamente» em relação à ciência, temos de ter em consideração a existência de públicos-em-geral (PiGs-Publics-in-General) e de públicos-em-particular (PiPs-Publics-in-Particular), sendo que a diferença entre ambos está no interesse ou no envolvimento demonstrados relativamente a uma determinada área substantiva da ciência (Michael, 2009). Se os PiGs são constituídos em torno da ciência-em-geral, os PiPs definem-se em relação a questões científicas particulares, sendo estes, na opinião de Michael (2009), os públicos mais autênticos porque são construídos em circunstâncias e espacialidades específicas que lhes atribuem uma identidade.

Estes públicos variam e podem distinguir-se, ainda, de acordo com o tema em debate e o contexto, diversificando-se como «comunidades imaginadas» (Anderson, 1991), construções analíticas e invenções retóricas. A mesma pessoa pode assumir diferentes papéis em diferentes momentos, ou ao mesmo tempo, e comportar-se de forma diferente em cada um desses papéis, constituindo-se o público pelo conjunto complexo e heterogéneo de atores e de relações que surgem desses contextos específicos (Einsiedel, 2008; Michael, 2009). Na perspetiva de Mohr, Raman & Gibbs (2013), dependendo do modo como é imaginado ou como se agrupa, para além do público difuso (voz captada através de sondagens de opinião e inquérito), há um conjunto de outros públicos plurais que ainda estão por se materializar e que ainda não expressaram uma posição em relação a uma determinada questão, movimentando-se em espaços onde podem operar os processos de diálogo.

São os públicos latentes (mas com potencial para se tornarem ativos), os públicos ativistas (ONG ou movimentos sociais) e os públicos da sociedade civil (grupos de voluntariado e terceiro setor). O desafio está na capacidade de manter o diálogo aberto com esses públicos de uma forma mais ou menos articulada.

A expertise é a variável adotada por outros autores para diferenciarem estes públicos, uma vez que determinados problemas são de difícil resolução através de um envolvimento alargado dos públicos, principalmente se, como acontece muitas vezes, a duração do processo for insuficiente para reunir consenso. Para Jasanoff (2003b), a visão da expertise, em particular, é reducionista, denunciando um equívoco conceitual em relação à forma como o público em geral obtém esse conhecimento baseado na experiência. Para a autora, as pessoas adquirem e desenvolvem a sua expertise através do contexto cultural, político e histórico específico e não tanto pela familiaridade que podem parecer ter com os assuntos. Esta visão é limitada também em relação à legitimidade dos vários atores envolvidos, uma vez que desvaloriza o papel das instituições e não tem em consideração a eventual imparcialidade do poder dado à expertise, devendo levar-se em conta tanto a participação da sociedade como os conhecimentos de especialistas. É necessário assegurar uma forte democraticidade e, ao mesmo tempo, uma boa expertise na gestão dos problemas que a ciência coloca à sociedade moderna para garantir um equilíbrio entre poder e conhecimento.

Felt & Fochler (2010) salientam, também, que os cidadãos podem ser, ao mesmo tempo, indivíduos ativos na discussão de questões tecnocientíficas e indivíduos que aproveitam esses espaços para definir o seu papel, seja através da diferenciação nas suas posições; de uma ação de recolha de informação para definir a sua perspetiva; da reivindicação de uma maior autoridade em relação aos cientistas para falar sobre determinadas questões devido ao justo conhecimento de causa adquirido pela sua própria experiência; ou, ainda, para silenciar ou influenciar argumentos contrários aos seus. Essa definição deve depender, por isso, do contexto e ter em consideração os impactos «desviantes» que a participação de «grupos de interesse» ou de cidadãos demasiadamente «neutros» podem produzir.

Em síntese, as conceções dos públicos da ciência são díspares e não é fixa a identidade dos mesmos. A construção dessa identidade depende de posições

«políticas» e axiológicas diferentes sobre o lugar do cidadão nos processos sociais que envolvam conhecimento. A propósito da definição do conceito de públicos e a forma como eles se constituem, Jasanoff (2014, 23) sugere uma nova forma de olhar para esses públicos como um conceito mais robusto em que estes são «constituídos dinamicamente por mudanças nos contextos sociais», sendo que os públicos «não são todos iguais, mas são guiados por "epistemologias cívicas" culturalmente condicionadas» (Idem). Como referem Stilgoe, Lock & Wilsdon (2014, 8) «devemos pensar num "público" menos como uma entidade pré-existente e mais como um espaço onde ditos públicos se formam seletivamente».

Os Formatos e os Modos de Envolvimento

No planeamento de uma ação de engagement é fundamental pensar criteriosamente nas formas de apelar à participação dos públicos e no(s) tipo(s) de participação que a ação pode promover. As ações de engagement podem variar significativamente no tipo de participação que potenciam e no modo de interação com o conhecimento que promovem. Podem ser menos intensas, tendo como objetivo providenciar informação sobre algumas questões; ter uma intensidade média, quando se pretende percecionar os pontos de vista dos cidadãos em relação a essas questões através de mecanismos participativos de consulta; e de elevada intensidade quando o público é chamado a participar na tomada de decisão (Rowe & Frewer, 2000). A literatura é rica na análise de diferentes modalidades de envolvimento do público, sejam elas de caráter participativo menos intenso ou revestidas de um enquadramento deliberativo mais vincado. Do primeiro caso são exemplos os encontros face-a-face (cafés de ciência ou palestras), ações realizadas através das redes sociais, os fóruns ou a participação em grupos focais; no segundo, inscrevem-se as conferências de consenso, os júris de cidadãos, os workshops de cenário, ou o mapeamento deliberativo. Recentemente, o projeto europeu «Public Engagement Innovations for Horizon 2020» (http://pe2020.eu/) fez um mapeamento dos métodos e ferramentas existentes, tendo identificado e validado 57 modalidades. Também Rowe & Frewer (2000) listaram mais de 100 ações deste tipo, mais ou menos formalizadas e ainda variantes que combinam diversos métodos.

Einsiedel (2008) e Rowe & Frewer (2005) salientam que a seleção do tipo de iniciativa deve ter em conta os objetivos da ação, mas também o problema em análise ou o grau da controvérsia científica, de forma a facilitar o diálogo, o envolvimento com o conhecimento de base, o debate entre vários públicos, um explícito reconhecimento de valores e a deliberação ou recomendação. De acordo com estes autores, as iniciativas distinguem-se pela abrangência do enfoque nas implicações da ciência para a sociedade, na compreensão do mundo ou na natureza do processo científico, e, sobretudo, pelo seu impacto nas prioridades institucionais e nas políticas públicas. Rowe & Frewer (2000) mostram, no entanto, que há uma tendência, pelo menos na área do risco, para selecionar o tipo de ação de acordo com os objetivos que os organizadores pretendem atingir e não tanto numa perspetiva de produzir vantagens para os participantes, apontando dificuldades em declarar categoricamente que determinado método é melhor do que outro. O recurso a métodos híbridos que cruzem as potencialidades dos métodos mais tradicionais parece ser uma abordagem potencialmente eficaz.

A figura 1 elenca a variedade de ações de participação pública, tendo em conta a tipologia da convocatória adotada e o grau de participação pretendido no processo de construção de conhecimento. Ilustrando o modelo interpretativo proposto por Bucchi & Neresini (2008), a figura contempla não apenas os formatos participativos patrocinados por entidades, como são os casos das sondagens de opinião pública, a avaliação participativa da tecnologia e as iniciativas deliberativas democráticas, como também os formatos participativos mais espontâneos de que podem ser exemplo os protestos e as mobilizações públicas, as associações de pacientes ou a investigação que se baseia na comunidade. O modelo foi inspirado em Callon et al. (2001, 175) e enfatiza a intensidade da cooperação entre os diferentes atores nos processos de produção de conhecimento, por um lado, e, por outro, o grau de influência que os organizadores podem impor tendo em conta o formato da convocatória, sendo que algumas formas de participação pública têm um caráter aberto e de imprevisibilidade.

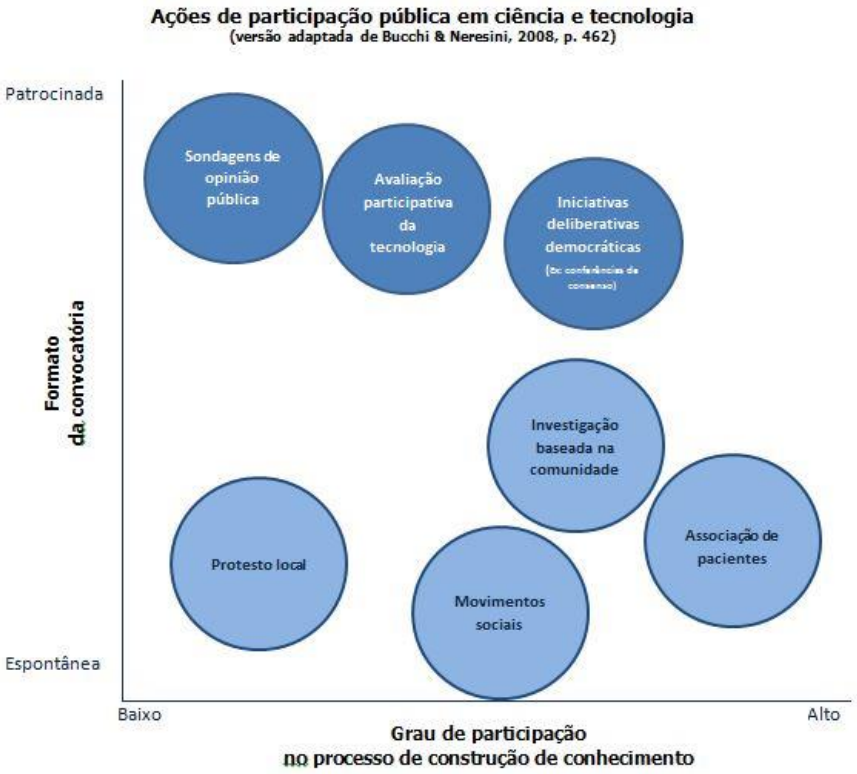

Figura 1. Grau de participação pública

De acordo com Bucchi & Neresini (2008), este esquema permite salientar alguns aspetos importantes na participação pública. Primeiro, uma problemática pode ser objeto de intervenção dos cidadãos através de vários tipos de ações de participação pública ao longo do tempo, «por exemplo, quando um protesto público induz uma instituição a patrocinar a organização de uma conferência de consenso ou de um painel de cidadão» (p. 463). Segundo, o padrão dessa participação raramente se pode prever tendo em conta as suas características estruturais ou os objetivos estabelecidos pelos organizadores dessas ações, ou seja, «um protesto público, por exemplo, pode levar a renegociação de uma decisão consensual» (Idem). Terceiro, os

formatos patrocinados serão sempre seletivos, inclusivamente os que visam um envolvimento mais alargado como é o caso do referendo, e os de participação mais intensa podem marginalizar grande parte do público pelo elevado grau de conhecimentos especializados que os participantes devem deter para que o seu envolvimento na discussão seja efetivo.

O modo de convocar os públicos é uma questão essencial. Ainda que se possa optar pelo convite como forma de assegurar a representatividade da amostra de públicos, há quem saliente que as iniciativas abertas são a melhor expressão de um ideal normativo de democracia, sem uma predefinição de quem é relevante, como deve participar ou que enquadramentos debater (Delgado et al., 2011; Michael, 2009). No entanto, em comunidades menos participativas a segunda opção pode ser uma dificuldade, impedindo a concretização das ações, tendo em conta que nem sempre os cidadãos se mostram voluntariamente disponíveis para participar neste tipo de iniciativas, pelas mais diversas razões. Essa realidade está espelhada, por exemplo, nas conclusões dos vários relatórios produzidos a este respeito (European Commission, 2012; Felt, 2003). De acordo com Felt & Fochler (2008), a opção por formatos restritos ou mais alargados deve ter em conta a cultura política, ajustando-se, na opinião de Hamlett (2003), aos desafios que o desenvolvimento tecnológico pode introduzir em contextos específicos.

Cormick (2011) frisa que a maior parte deste tipo de atividades favorece o público comprometido, não havendo, na sua opinião, uma variedade de metodologias suficiente para envolver um espectro mais abrangente de cidadãos. O autor refere que muitos exercícios de envolvimento incluem apenas dois tipos de atores (os cientistas e os cidadãos ou o governo e os cidadãos), não sendo inclusivos, e coloca as diferentes partes a trabalhar umas contra as outras e não em colaboração (Cormick, 2012). O tradicional pressuposto de que se o público entender bem a ciência vai aceitá-la melhor ainda está muito presente em muitas ações de envolvimento.

Katz-Kimchi, Martin, Weber & Taylor (2011) consideram relevante que o envolvimento dos cidadãos ative a memória cultural para fortalecer a identidade de um grupo e o seu sentido de eficácia e que seja explicada aos participantes a importância da sua participação. A promoção da interatividade e da aprendizagem ativa são igualmente de valorizar, devendo haver um esforço em ajustar o tipo de informação a disseminar e a forma como será

apresentada à audiência, tendo em conta os diferentes estilos de aprendizagem e conhecimentos prévios. Cormick (2012) e Rowe & Frewer (2000) salientam, também, a relevância de: assegurar a representatividade do conjunto de cidadãos afetados pela questão, inclusivamente grupos desfavorecidos; assegurar a independência, a imparcialidade e a integridade na condução do processo, impedindo o controlo do processo através da definição da forma como vão ser utilizados os seus resultados; e promover o envolvimento numa fase atempada. É também importante definir os objetivos e a abrangência/influência desses processos nas decisões e, consequentemente, nas políticas formuladas, e garantir a transparência do processo, assegurando a acessibilidade aos recursos, a definição de tarefas, a estruturação do processo de tomada de decisão e uma boa relação custo-eficácia.

Concluindo, existe uma grande variedade de ações de participação pública na ciência e tecnologia e a definição do tipo de iniciativa mais adequada dependerá sempre da forma como se convoca o envolvimento dos cidadãos e da abrangência de ação que se pretende conseguir com essa participação no processo de produção de conhecimento e no processo de tomada de decisão.

Momentos para Realizar Ações de Engagement

É consensual que o timing é um fator muito importante nas ações de engagement. Apesar de habitualmente se concretizarem no fim do processo de investigação, as evidências apontam para que diferentes «modelos de engagement» sejam adequados a diferentes fases, tendo em conta que existe um ciclo contínuo que começa na seleção da área de investigação e percorre a fase da pesquisa e a aplicação de resultados (Jackson, Barbagallo & Haste, 2005) (ver figura 2). Para além de facilitar o debate público sobre os pressupostos subjacentes às questões, esse envolvimento deve permitir uma participação na definição da agenda (Rowe & Frewer, 2000).

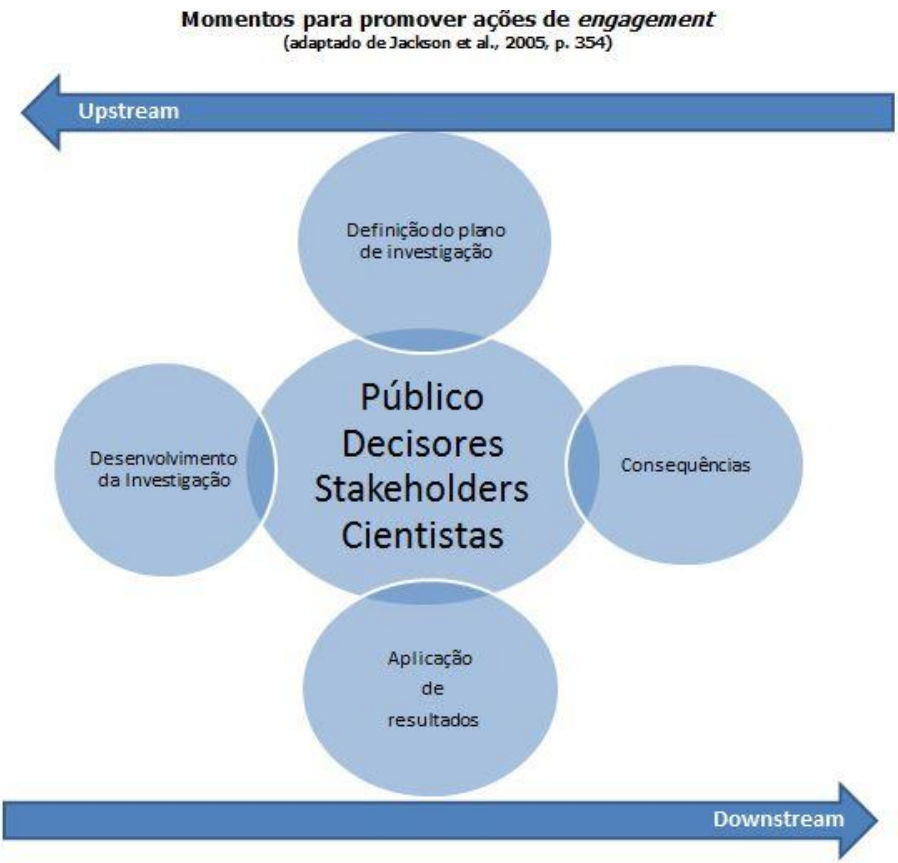

Figura 2. Momentos para promover açoes de engagement.

Aquilo que é normalmente designado como upstream engagement, ou seja o envolvimento dos públicos na conceção e desenho dos projetos de investigação, justifica-se, segundo Jackson et al. (2005), se implicar uma deliberação numa escala reduzida, uma vez que nessa fase existe um elevado nível de incerteza sobre resultados, benefícios e riscos. Uma deliberação mais alargada só pode ocorrer numa fase final quando já existem evidências sobre as consequências e potenciais aplicações de um projeto ou ideia. É defensável, no entanto, que ao longo de todo o ciclo se realizem outras ações de comunicação. Os mesmos autores alertam que a realização destas ações não

deve substituir o processo político mais amplo de debate, apenas complementá-lo, principalmente na fase final em que, conhecidas as aplicações e consequências mais evidentes de determinado conhecimento científico, se exige escrutínio regulatório e legislativo.

A ideia de que as contribuições dos cidadãos devem ser tidas em conta na definição da agenda da ciência, fundamentalmente durante as fases iniciais do desenvolvimento científico e tecnológico (midstream/upstream) e não apenas no momento da sua conclusão (downstream), é apoiada num editorial da Nature publicado em 2004 (S/A, 2004) e por Wilsdon & Willis (2004), como garantia de equilíbrio de poder e uma obrigação ética e política, assegurando uma maior confiança na ciência por parte do público. De acordo com o artigo da Nature, o upstream engagement não é uma panaceia, mas vale a pena fazê-lo desde que se verifiquem duas condições fundamentais: que estes processos sejam realizados em prazos mais alargados do que aquilo que é habitual e com financiamento próprio, e que as instituições se comprometam genuinamente a aceitar as deliberações resultantes destes processos. Alguns autores consideram que o upstream engagement deve ser o modelo adotado preferencialmente em campos de conhecimento mais controversos como a nanotecnologia, os OGM ou a genética (Delgado et al., 2011).

Apesar de haver um considerável consenso em relação ao princípio de envolver os cidadãos em fases iniciais da investigação a fim de identificar, debater e incorporar conscientemente os seus valores sociais no desenvolvimento científico e tecnológico, alguns autores criticam e questionam a racionalidade e a eficácia destes projetos. Uns salientam que o conceito de upstream está relacionado com o modelo de inovação linear, menosprezando-se o papel da coprodução de inovações através de redes sociais e técnicas (Joly & Kaufmann, 2008). Outros veem-no como uma forma tácita de controlo social e de legitimar uma ideologia através da assimilação dos públicos (Wynne, 1995), impedindo-os, na realidade, de controlar ou decidir que tecnologias devem ou não ser desenvolvidas, já que as regras da propriedade intelectual garantem que este tipo de conhecimento permaneça inacessível (Cozzens & Woodhouse, 1995). Outros ainda referem que apesar de estes processos trazerem novas vozes para o processo decisório (ex. grupos ativistas), outros atores sociais perdem força (ex. indústria), colocando em causa o seu cariz democrático (Tait, 2009).

Assim, dependendo do momento em que se apela à participação cidadã, o engagement pode evoluir para um modelo de crítica ou de deliberação (Trench, 2008). No primeiro caso, os cientistas e o público negoceiam os significados, sendo o termo «crítica» usado em analogia com o processamento de experiências e interpretações artísticas e outras expressões culturais do público. A deliberação apresenta-se como a forma «mais elevada» de participação pública, requerendo um conjunto mais amplo de entendimentos sobre processos democráticos.

Avaliar os seus Impactos

Para compreender a dinâmica e a construção performativa dos públicos neste tipo de exercícios, Felt & Fochler (2010) analisaram quatro eventos de envolvimento cidadão realizados na Áustria, entre 2002 e 2005, tendo verificado que em nenhum dos casos os públicos foram motivados a desenvolver uma visão clara do que seria o sucesso das ações, registando-se uma discrepância entre aquilo que se debateu e o que se concretizou, e não havendo uma discussão crítica capaz de enunciar medidas concretas. A avaliação dos impactos das ações de engagement é essencial para perceber se a estrutura, o conteúdo e os resultados estão de acordo com a estratégia pré-definida, reduzindo o nível de incerteza, através da produção de uma evidência sistematizada que facilita a medição, a análise, a explicação e a compreensão (Neresini & Pellegrini, 2008). Ela é essencial financeira, pragmática, ética e moralmente, permitindo corrigir erros, garantir uma verdadeira representatividade de todos os públicos e a concretização das suas contribuições. (Rowe, Horlick-Jones, Walls & Pidgeon, 2005). No entanto, ainda que a definição de critérios de avaliação seja fundamental, ela é difícil de concretizar.

As principais dificuldades situam-se ao nível teórico-normativo (o que devemos avaliar) e ao nível prático (como é que avaliamos). Em relação ao primeiro tópico, não é fácil reunir consenso sobre os pressupostos que identificam uma ação de engagement. No entanto, e baseados numa revisão da literatura, Rowe et al. (2008) verificaram que a maior parte das avaliações empíricas que se realizaram até hoje nesta área assumiram alguns critérios como universais. A partir dessa informação, os autores estabeleceram um

standard framework baseado em critérios de aceitação (relativos ao que pode ser aceite pelos participantes como justo) e de processo (relativos à construção e implementação de um procedimento). Nos critérios de aceitação integram-se a representatividade da amostra do público; a independência e a imparcialidade do processo; o envolvimento desde o seu início; a influência e o impacto real na política; e a transparência do processo de decisão. Em relação ao processo, advoga-se a acessibilidade aos recursos; a definição clara da natureza e do objetivo do exercício participativo; a tomada de decisões de uma forma estruturada e que seja eficiente financeiramente.

No entanto, pode não ser adequado definir padrões universais uma vez que as especificidades de cada ação são marcantes para a sua avaliação. De acordo com Neresini & Pellegrini (2008), os resultados de uma avaliação apenas são válidos em relação aos objetivos e ao contexto do projeto em que foram obtidos, sendo que avaliar uma atividade cujo objetivo é a transmissão de conhecimentos não é o mesmo que avaliar uma atividade que visa a promoção da discussão, o que pode dificultar a avaliação. Qualquer processo de avaliação deverá, portanto, ser sensível ao contexto e à natureza da ação.

Ao nível das ferramentas de avaliação, é importante tornar o mais claro possível o público-alvo, os objetivos do projeto, da sua avaliação e dos dados obtidos (Gammon & Burch, 2006). A melhor estratégia deve passar por aplicar ferramentas qualitativas ou quantitativas diferentes tendo em conta os objetivos próprios de cada atividade, combinando a utilização de várias técnicas que possam colmatar os pontos fracos de cada uma delas (Rowe et al., 2005). As entrevistas fornecem informações detalhadas, mas não produzem dados quantitativos; os questionários não facilitam a obtenção de informações com profundidade; os grupos focais oferecem profundidade, mas são dispendiosos e demorados; a observação, apesar de ser uma ferramenta potencialmente poderosa, ainda está pouco explorada. Neresini & Pellegrini (2008) avançam com um «design experimental», uma nova forma de avaliar que permite comparar a situação ex ante com o resultado ex post; no entanto, também este processo apresentou limitações ao nível de homogeneidade da constituição e da comparação dos grupos, das condições de recolha dos dados e da construção das hipóteses.

Em relação ao momento ideal para avaliar, vários autores (Gammon & Burch, 2006; Neresini & Pellegrini, 2008) defendem que a avaliação de uma

atividade de engagement deve ter lugar durante três fases do processo: na fase de conceção da ação, durante a sua implementação e na sua conclusão. A primeira avaliação permite perceber que temas interessam ao público e o que é que ele sabe acerca deles, testando-se ideias e mensagens e adaptando-se os recursos disponíveis aos objetivos pretendidos. A avaliação formativa deve ter lugar durante a concretização da ação, de forma a garantir que os dados obtidos são abrangentes e relevantes, permitindo a deteção de falhas e a introdução de modificações. A ação deve terminar com uma avaliação sumativa aos resultados do projeto para determinar a sua eficácia, os resultados diretos (outputs) e os benefícios globais (outcomes), sendo essencial definir concretamente o que se entende por "eficácia" nesse tipo de processos (Rowe & Frewer, 2000).

Concluindo, a definição de critérios de avaliação é fundamental, mas difícil, principalmente ao nível teórico-normativo (o que devemos avaliar) e ao nível prático (como é que avaliamos). Para além da definição de critérios específicos de avaliação é necessário conceber instrumentos de medição adequados, considerando que as características intrínsecas dos métodos podem influenciar a sua eficácia, bem como fatores contextuais e ambientais.

Os Limites dos Processos de Envolvimento com os Cidadãos

Apesar das suas potencialidades, os processos de engagement colocam, como vimos, vários desafios e podem mesmo ser geradores de novos problemas sociais, políticos e éticos, devendo estas questões ser objeto de estudo em futuros trabalhos de investigação.

A implementação do engagement é questionada, por exemplo, por Jasanoff (2003a) porque este pode ser utilizado como um meio ou como um fim e num formato muito generalista, sem discussão sobre os seus objetivos e os métodos utilizados. O nível de conhecimento dos participantes e a disponibilidade dos recursos materiais podem limitar o aproveitamento em pleno das potencialidades deste tipo de procedimentos. A implementação numa fase tardia limita a identificação de alternativas ou uma influência cidadã sustentada. Por seu turno, a transparência pode exacerbar a controvérsia em vez de acabar com ela e, sendo limitada por «discursos formais estabelecidos» pode impedir o consentimento de pontos de vista fora desse enquadramento

(Cormick, 2012; Jasanoff, 2003a; Stilgoe, Lock & Wilsdon, 2014), servindo como estratégia de gestão de conflitos com as comunidades (Cronin, 2008; Rowe & Frewer, 2000).

Além disso, diferentes culturas tecno-políticas enformam a participação e a cidadania em relação aos problemas tecnocientíficos (Felt & Fochler, 2010), e, portanto, quando esse envolvimento é promovido através de formatos top-down, a participação dos cidadãos fica restringida e o processo é pouco democrático (Felt & Fochler, 2008; Irwin, 2008). É importante prestar mais atenção «aos formatos de envolvimento público e às hierarquias que podem ser incorporados neles» (Davies, 2011, p. 76). Irwin (2014, 74) questiona se estaremos a fazer o suficiente para «pluralizar a prática e oferecer maneiras de pensar que não impliquem que todos os "défices" podem e devem ser evitados». Em muitos casos este tipo de atividades favorece o público comprometido, ocorrendo em ambientes fabricados (Cormick, 2011) e sem qualquer impacto nas políticas formuladas ou nas tecnologias desenvolvidas (Cormick, 2012). De acordo com o autor, estes exercícios são pouco inclusivos, integrando apenas os cientistas e os cidadãos ou o governo e os cidadãos, estando ainda muito presente o tradicional pressuposto de que se o público entender bem a ciência vai aceitá-la melhor ainda.

É essencial, portanto, perceber em que fases do processo de investigação é realista levantar questões de responsabilidade pública e de interesse social; se os discursos institucionais dominantes acerca de risco, ética e responsabilidade social são adequados para abordar estas questões; como se pode conciliar a necessidade de manter a independência da ciência e o dinamismo económico das suas aplicações; e se é realista assumir que os cidadãos podem exercer uma influência construtiva sobre o ritmo e a direção da mudança tecnológica (Macnaghten, Kearnes & Wynne, 2005). Em relação ao último ponto, Lewenstein (2011, pp. 820-1) questiona «como é que se pode dar o estatuto de colaboradores às pessoas na produção do conhecimento ao mesmo tempo que é possível, e até provável, que elas não compreendam o próprio conhecimento», acrescentando que se eles forem utilizados apenas como «sujeitos experimentais, não gozam do estatuto nem da autoridade de cocriadores de conhecimento».

Parece ser, ainda, importante aferir qualitativa e quantitativamente as alterações produzidas ao nível das atitudes e dos comportamentos (Neresini

& Pellegrini, 2008), uma vez que a legitimidade do envolvimento depende dos seus inputs e também dos seus outputs (Stilgoe, Lock & Wilsdon, 2014), e perceber se a participação está a ser utilizada apenas como uma promessa de «democratização da democracia» (Giddens, 2000), promovendo apenas um «falso» equilíbrio entre o poder que detêm a comunidade científica, os decisores políticos e os cidadãos na resolução de uma questão, sem existir um claro interesse nos contributos dos cidadãos.

Como refere Davies (2011, 76), «o envolvimento do público - caracterizado pela expectativa de "benefício mútuo" e "intercâmbio aberto" que colocamos em nós mesmos - não é fácil» e em alguns casos «o diálogo equitativo não surge naturalmente». Há, ainda, algum desconhecimento sobre o próprio significado dessa participação e dos processos sociais que são gerados (Felt & Fochler, 2008).

Considerações Finais

Como vimos, os processos de *engagement* oferecem um conjunto de potencialidades e colocam alguns desafios ao nível do seu enquadramento teórico e conceptual, sendo essencial aprofundar conhecimento acerca da sua prática. O *design* dessas ações depende de uma variedade de definições do conceito e das posições normativas que estão na sua génese. A partir de uma reflexão acerca de aspetos concretos relacionados com os públicos a envolver, os modos de envolvimento, os timings e as formas de avaliação do impacto das ações de *engagement*, pode-se perceber que essas ações devem ser vistas como «laboratórios», com espaço delimitado, acesso seletivo e regras e relações de poder próprias, nos quais os públicos participantes podem testar e experimentar o seu papel e a sua posição na sociedade em relação a determinados desenvolvimentos científicos (Felt & Fochler, 2010), numa pragmatização da verdadeira essência da participação cidadã, ou seja, uma interação significativa entre as várias partes envolvidas na questão em discussão.

O sucesso destas ações implica contar com resistências e eventuais obstáculos, proporcionar múltiplas e variadas oportunidades de diálogo e a realização de um *follow-up* para perceber os impactos de tais ações, tendo em consideração as especificidades dos contextos e das situações em que esses

exercícios são realizados e os diferentes entendimentos daquilo que deve ser o envolvimento dos públicos na ciência. Dado que «a prática e a reflexão crítica não são atividades separadas», esses processos devem levar «a sério e de igual forma a "prática reflexiva" e a "reflexão prática"» (Irwin, 2014, p. 74).

A maior parte da investigação em torno destas questões tem-se centrado em países anglosaxónicos e/ou do norte da Europa e como tal as características que se discutem no artigo circunscrevem-se a esses contextos socioculturais; é importante, por isso, desenvolver mais investigação sobre outras realidades, estando em preparação, à data da publicação do artigo, outros artigos que versarão sobre Portugal e Espanha, fazendo referência a aspetos que se assemelham e que se diferenciam da realidade de alguns países do norte da Europa.

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The Little Green Book

William Atkinson[1]

1) York University. Canada

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Review

Lawson, Hal A., Caringi, J., Pyles, L., Jurkowski, J. & Bozlak C. (2015). *Participatory Action Research*. New York, NY: Oxford University Press. ISBN: 978-0190204389.

This fine volume lives up to its jacket billing as a 'pocket guide to social work research methods.' Numberless are the theoreticians who lecture fellow academics, and the world in general, on how to conduct their business; far fewer are the writers who support their theoretical analyses and prescriptive recommendations with thoroughgoing, committed field experience. Hal Lawson and his colleagues are in the latter, much more useful set. Instances in this guidebook of their passionate engagement are many; this review will table but a few.

Participatory action research (PAR) is an approach that has steadily gained traction in social work, both within the USA that is home for the five authors, and beyond it. And as Lawson explains in his two introductions – the first describing PAR in general terms, the second more case-specific – PAR has five main elements. Lawson calls them 'priorities', but as a sometime professor of writing I must table a quibble that a program can no more have five priorities, defining 'priority' as 'an absolute and overarching demand', than a hunter can simultaneously chase five rabbits. These constituent elements are: enlistment of local stakeholders who likely lack formal training in social work; an iterative approach of planning initial action - performing the action - studying its efficacies and failures - and repeating the process, while continuously maintaining close monitoring; tabling new knowledge emerging from the iterative process of Element Two, thus justifying the R-for-Research in PAR; ensuring the new knowledge corresponds to the genuine needs of stakeholders, especially the local participants outlined in Element One; and carefully avoiding what Lawson calls 'policy homogenization' – the tendency (dear to the hearts of so many academic social workers) to overgeneralize from a given case and infer global/universal laws that sound grand, but are practically useless.

The rest of the book deftly illustrates how these elements may work out in practice. Child welfare teams reduce adolescent obesity in lower-income US communities; aid workers detect and mitigate sociopolitical oppression in the global south; geographical areas hard-hit by natural disasters such as earthquakes and hurricanes have their circumstances ameliorated at maximum speed; the vestiges of colonial oppression are teased out, spotlighted, and shamed into retreat.

While Lawson and colleagues are wisely suspicious of grand principles whose pursuit may compromise the real and immediate needs of a specific situation, however, they do not shrink from practical generalizations. These include: stakeholders must be treated as co-originators of new knowledge, not simply 'subjects' or even 'participants'; groups rather than individuals must be engaged and empowered; effective solutions treat people as resources, not problems; both the strategy and tactics of social work must at all times be culturally sensitive; PAR is invariably preferable to "one and done" studies run by fly-in, fly-out professionals; university-based academics need local 'cultural brokers' to be effective; and initial conflict and resistance, if seen as potential assets rather than barriers, can open the door to the greatest social gains.

The handbook concludes with a comprehensive list of useful resources – texts, videos, academic personnel, and institutional points of entry. My own conclusion: Here is a publication that should be in the hip pocket of every social worker. The Little Green Book may catalyze miracles that change the world.

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