Politicians in white coats? Scientific advisory committees and policy in Britain

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The LSE GV314 Group[1]

Abstract

Do scientists advising government in scientific advisory committees (SACs) in the UK fit the traditional model of offering substantive scientific advice to improve the quality of policy making, are they forums for policy making and negotiation where "the science" is tempered by broader political concerns, or are they simply bodies that legitimise policies already decided upon? The traditional "on tap" model and its alternatives imply differences in how the agendas of SACs are put together, how committees deliberate and how they influence policy, and these implied differences are explored on the basis of a 2015 survey covering the experiences and attitudes of 338 members from 46 scientific committees. The traditional model holds up rather well against models that see SACs filling broader political roles such as policy deliberation and legitimation. The findings suggest that the organization and procedures of SACs indeed allow scientists to offer advice largely without having to engage with or anticipate wider policy considerations and constraints, and that government "steering" or otherwise leading SAC deliberations toward politically desired conclusions is rare.

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There is a central conflict in the role of the scientist in government. The official position is that the scientist contributes the scientific evidence but the policymaker weighs the evidence with other considerations and makes the policy decision: an “on tap but not on top” view of the role of science (see Hoppe and Wesselink 2014: 74). The practicalities are, however, that the world of policymaking is ultimately political and scientists might be expected to have to adapt to this world if they are to make a valuable contribution to it. Among other things they are asked to use their judgment on issues where scientific evidence is sparse or inconclusive and offer views on the likelihood of one proposed remedy for dealing with a problem being better than another. They are expected to argue the case for their view of the scientific evidence in a committee setting with other scientists and possibly also civil servants, lay people and interest group representatives. Trickiest of all they have to convert an “is” to an “ought”; a view or understanding of the science has to become transmuted into a suggestion or recommendation for action. This apparent conflict, the adaptation of scientific modes of reasoning and behaviour to political policy environments, lies at the heart of some of the most influential discussions about the role of the scientist in government, including Collingridge and Reeve’s (1986) analysis of the conditions under which “science speaks to power”, Jasanoff’s (1990) “Fifth Branch” of government or Pielke’s (2007) “Honest Broker”. The conflict accounts for the problematic nature of the "border work" or “boundary roles” of scientists straddling the worlds of policy and scientific research (see Jasanoff 1987; Fischer and Leifeld 2015).

As Spruijt et al (2014: 23) suggest in their meta-analysis of the field, "research on expert roles has remained mostly theoretical" such that it is still possible, seventy years after Robert Merton called for it, for an article taking as its central thrust the argument that "more research" in the field was needed could still be published in a major policy science journal (Fischer and Leifeld 2015). Much of the existing evidence about how such boundary roles are negotiated derives from the

analysis of, or experience derived from, a particular committee or small set of committees (but see Bijker and Hendricks 2009; Rimkuté and Haverland 2015). In this paper we explore the balance of scientist-policy maker roles across a range of scientific advisory committees (SACs) in the UK on the basis of a survey of over 300 members. SACs are formalised bodies, and formalisation brings with it relatively fixed memberships and procedures and the likelihood of developing enduring norms of behaviour. To what extent do the procedures and norms in scientific advisory committees support the "on tap not on top" model?

On tap, bit-part policy makers or under the thumb?

In order to consider this question we must first establish what alternatives exist to the "on tap" model for SACs. One obvious alternative is the "on top" model, with scientific advisory committees being a vehicle for groups of technocrats to shape public policy decisions. While such a view reflects one broad strand of thinking about science and policy, it has not featured significantly in much recent writing about how science and policy routinely interact and we do not propose to focus our attention on it here, although we will revisit our decision briefly in the conclusion. More significantly, recent literature has focussed on two alternative "political" models of the role of SACs which see them as on the one hand policy legitimating bodies or on the other, policy bargaining bodies, each implying a distinctive role for scientists on them.

The policy legitimating function of such bodies is suggested by Rimkutė and Haverland (2015) who distinguish between the instrumental "problem solving" roles of committees and their political roles of "substantiating" (giving weight to policy choices already taken) and "legitimising" (persuading others that policy decisions have merit). Dunlop (2010) approaches a similar set of ideas from the perspective of principal-agent theory when she explores two main political functions of advisory committees: "efficiency", here defined in a specifically political context where the

"advice delivered by the agent contributes to the satisfaction of the principal's policy preferences", and "policy credibility", referring to establishing "citizen confidence" in policies.

A policy bargaining function of such bodies is suggested by the work of Krick (2015) who, in addition to endorsing the importance of a legitimizing role, suggests that some scientific committees also serve as forums for policy bargaining between a variety of social interests in which the "scientific" content of the conclusions or recommendations is diluted, if present at all. If a large proportion of SACs have non-scientists on them, her conclusion for what she terms "hybrid" committees might be expected to apply to SACs. The advice hybrid committees produce is "not scientific or academic advice, with its air of objectivity. … Rather, it is the outcome of a process of negotiation and aggregation of different positions that rests on competing experiences, backgrounds, values, convictions and perspectives and refers to a variety of validity norms, such as policy usefulness, social fairness or scientific rationality." (Krick 2015: 489; see also Timotijevic et al. 2013).

We can set out a series of expectations arising from each of these three approaches to understanding how SACs work. Our first task must be to establish how far the "policy bargaining" role role more normally associated with "hybrid" committees might be expected to apply to SACs in the first place; this means establishing whether the composition of many such committees allows the possibility of policy bargaining and negotiation among diverse actors. Then we can go on to examine the evidence supporting these three different roles as they apply to the work of SACs. We propose to do this by focussing on three broad stages of the process of handling issues in SACs; the agenda setting stage, the progress of committee deliberations and at the post-decision or "impact" stage, where the recommendations meet the wider policy world.

We can outline a range of features of SAC activity that one might expect to find associated

with each of these three roles. The roles are not symmetrical or entirely mutually exclusive, so the features associated with them are not simply analysed by focussing on one or two dependent variables; we are here concerned with setting out how far the way SACs work is consistent with each of these three models (Table 1).

Starting with the agenda setting stage of SAC work, one would expect, broadly speaking, with the "legitimising" and "policy bargaining" models, that governments would be particularly concerned with using SACs to handle broader policy issues; above all, those in need of scientific legitimacy or dialogue with social and economic interest representatives. The "on tap" model would see government consulting scientists on a wide range of matters, displaying no particular interest in placing on their agendas matters concerned with broad policy objectives as opposed to details of policy elaboration and implementation.

Table 1 here

The deliberative stage offers perhaps the clearest opportunity to examine the three roles directly; under the "on tap" model the deliberations and outcomes are shaped by "the science"; by technical-scientific criteria and debates. If the "legitimising" role were important in how SACs work we would expect to find significant evidence of government steering SAC deliberations, perhaps through the secretariats of the committees or the civil servants who attend them. For the "policy bargaining" role to be significant in SAC work we would expect those committees with representatives of outside interests on them to have their advice shaped by scientists bargaining with these interests or even anticipating their reactions by using broader social or political criteria to shape their advice.

At the impact stage these models do not of themselves generate any particular expectations

about the frequency with which government follows the advice offered by SACs. Low take-up of recommendations could reflect failure to agree the science, to legitimise or to broker policy compromises; high take-up could reflect the opposite. High or low take-up is not inconsistent with any role. However, each of the three roles lead us to expect different types of advice to be more likely to be followed. For the "on tap" model the degree of scientific consensus might be expected to be closely associated with high impact. With the "policy bargaining" model, by contrast, we would expect that external stakeholder agreement would be associated with high impact. With the legitimising model we would expect to see advice more closely congruent with subsequent government policy (that is to say it is "followed" even though the advice was something of a formality) where government itself has had a strong hand in creating the advice and steering SAC deliberations.

UK scientific advisory committees and the survey

It is not possible to say exactly how many SACs exist, not least because what constitutes such a committee is not clear, despite the fact that government occasionally publishes lists of them (a 2010 compilation lists 72, see BIS 2010). They have a variety of names including "panel", "subgroup" and "council"). Some have extensive structures which include further committees and subcommittees. A committee might have no fixed membership, schedule of meetings or precise role (e.g. the Scientific Advisory Group for Emergencies). Bodies not generally considered "scientific advisory committees" give scientific advice to government, including regulators such as the Human Fertilisation and Embryology Authority (Mintrom 2014; Abdolla 2009). Some are difficult to find out about; the Scientific Advisory Committee on the Medical Implications of Less Lethal Weapons does not divulge details of its membership in order, as it explains in one report, to avoid threats to and lobbying of members (SACMILL 2104: 8). Many other committees do not give details of membership online. In late 2015 it was possible to identify 83 separate organisations that described themselves as advisory committees although we could only find membership details for 46. Our survey was

based on a mailing enclosing a link to an online survey (through the Qualtrics service) to 618 email addresses from the 46 advisory committees described on the website www.gov.uk as scientific advisory committees for which membership details were available. Where the same individuals were members of more than one committee, we chose randomly which committee we would ask them about. 53 emails were returned as undelivered. The 565 delivered emails generated 338 valid responses, indicating a response rate of 60 per cent. This is very encouraging in the light of one recent survey of scientific advisers to EU bodies that managed only a 28 per cent response rate producing 120 responses (Rimkuté and Haverland 2015: 439).

While one can doubtless find examples of science-policy relations that fit almost any model, we are interested in offering an account of the mass of routine interactions between science and policy as institutionalised in SACs as measured by a survey of members drawn from all such organisations. This method contains its own problems and biases. Our survey looks at the self-reported behaviour and observations of members of SACs. Such data is subject to potential biases about which we can say rather little but hypothesise a lot. Scientists and other members may have an interest interest in conveying a particular image of themselves and how committees work in order to avoid cognitive dissonance or even to avoid repercussions on their roles as advisers or even their careers. To be weighed against this possibility of bias is the possibility that a survey can say something about a broader range of advisory committees than would be possible with any feasible study design (through case studies or in-depth interviews) aimed at avoiding the potential bias of self-reported behaviour. It is certainly difficult to imagine how one can understand the relationship between scientific advice and policy without understanding the context of particular policies or pieces of advice in a way possible mainly though the case studies that constitute much of the evidence in this area. However, it is not our intention to explain or understand the whole relationship between science and policy but rather cast light on one particular institution: the

scientific advisory committee. We will consider in the conclusion whether other evidence in the field suggests that our findings might be challenged on the basis of the bias arising from self-reported behaviour and observations.

We also need to add that the survey is based on the individual as the unit of analysis. In order to sustain our claim to anonymity we could not ask questions about the specific committee to which individuals belonged, as questions such as those covering age, gender, scientific discipline could in many cases identify individuals if the specific committee were known. We also gave a commitment to respondents that we would not discuss survey data referring to individual committees. Having the individual and not the committee as the unit of analysis means that when we give percentages, they should not be interpreted as directly reflecting the percentage of committees to which various attributes apply, but refer to the percentages of respondents to the survey.

SACs as "hybrid" organizations

SACs are not just about scientists. They can be quite diverse bodies composed of different types of members or participants. The definition of what a "scientist" is cannot be resolved here. However different committees have different provisions governing who can turn up and participate in them. Of the 338 respondents to the survey, two-thirds (67 per cent) described themselves as "scientists or scientific experts". These will be referred to as "scientists" and those describing themselves as members of the committee in any other capacity as "non-scientists". Of the scientists most were in life sciences (75 per cent) followed by physics, chemistry, maths and engineering (13 per cent) and social sciences (9 per cent). The 33 per cent of respondents who did not describe themselves as scientists, the "non-scientists", included 22 per cent who described themselves as "professional practitioners", 4 per cent as "lay" members and 3 per cent as representatives of

groups or NGOs (the remaining 4 per cent put themselves in the “other” category). The remarkably low representation of women on advisory committees suggested by our sample (28 per cent) is even lower among scientists (24 per cent) than non-scientists (38 per cent), a statistically significant difference (differences reported in this paper as significant are at the $p<.05$ level using a chi squared test).

Of all the scientists responding to the survey, only one third (31 per cent) served on committees composed exclusively of scientists and without lay or “non-scientist” members. To say that such members are not scientists might, in fact, be misleading insofar as many of them responded that they had "familiarity with the scientific issues" covered by the committee before they were invited to join it. 75 per cent of the 105 we have for convenience labelled "non-scientists" told us they had an academic or professional qualification in the field, 63 per cent had practical experience in the field and 24 per cent said they had developed a familiarity with the field through other means; only 8 per cent said they had "no prior familiarity with the scientific issues" in the field of the committee before they became members. Of the non-scientist respondents, a large proportion (79 per cent) saw themselves as there to "ensure that the interests of different stakeholders and affected parties are represented". Other functions included taking care that "the language of the committee’s advice is clear and understandable (75 per cent), making sure "decisions of the committee are communicated effectively to all concerned" (59 per cent), preventing the discussion from becoming "too abstract and academic" (52 per cent) and giving greater weight and legitimacy to the decisions of the committee (44 per cent).

The survey suggests that the presence of non-scientists in committee meetings is not merely symbolic. Certainly the extent to which the language of committee discussions makes it easy for them to contribute seems to be variable, with 36 per cent agreeing that “Committee discussions are

often conducted in technical scientific language that non-scientists find hard to understand", an identical percentage disagreeing and 28 per cent saying they neither agree nor disagree. However, 72 per cent of the non-scientists agreed that "non-scientists on the committee are frequently able to argue and debate the technical issues alongside the scientists" (14 per cent disagreed, the remainder neither disagreed nor agreed) and 59 per cent agreed with the proposition that "the views of the non-scientists on the committee have a big impact on the conclusions we reach" (8 percent disagreed, the remainder neither agreed nor disagreed). As we will see below, there was no significant difference between scientists and non-scientists in their estimation of their own personal impact on committee decisions.

Even though one-third of respondents are on committees without non-scientific or "lay" members, this proportion probably exaggerates the number of respondents on committees composed exclusively of scientists. Most respondents reported that their committees also have civil servants in attendance and participating. Meetings are attended by members of the Committee Secretariat, the main role of which is putting together the agenda for the meeting and preparing the minutes. Yet meetings are usually attended by other civil servants – only a handful of respondents (3 per cent) told us that, leaving aside members of the Secretariat, no civil servants attended their meetings. It appears common for civil servants to be full members of the committee; 38 per cent reported serving on a committee with civil servants as members, 37 per cent reported that officials other than those who are members attend all or most meetings and a further 22 per cent said civil servants attend "some" meetings. Advisory Committees in general appear from their membership to contain "a dichotomy of the competing and simultaneous emphasis upon the technocratic bases of policy ('normal science') and the ethos of stakeholder engagement (or extended peer community)" (Timotijevic et al. 2013: 80) and as such may well be expected to go beyond just discussing "the science".

The agendas of SACs

The agendas of Committees appear to be predominantly set by the government departments or agencies they serve (Table 2). Almost all (92 per cent) respondents, including non-scientists, stated that the government department or agency was a source of the committee's agenda and four-fifths (79 per cent) said it was one of the two most important sources. Yet members of the committee are also a significant source of the agenda, with one third (34 per cent) describing it as one of the two most important. The third most important source of SAC agendas according to our respondents was that which is "obligated" -- items referred to the committee as a matter of course as part of its established remit. For example, the Commission on Human Medicines has to advise on licensing applications and on representations that applicants make. On its own this finding does not really help us decide between the “on tap”, legitimising or policy bargaining functions of committees since in all of them the government’s agenda setting role is expected to be strong.

Table 2 here

We might be able to make some distinction between the three interpretations of the roles of SACs by looking at the different types of issues referred to them. The predominant description of what members spent their time discussing emphasised the importance of scientific issues, supporting the “on tap” perspective. The respondents to the survey tended to agree that they were there to give general advice on the "state of scientific knowledge"; 85 per cent saw this as a "major part" of their work and only 2 per cent as not part of their work at all (Table 3). Whether this advice referred to scanning the environment for “problems and opportunities that might require a policy response from government”, which we have labelled "blue skies thinking" in Table 3, or referred to implementation and casework was more variable. Two-thirds (64 per cent) described blue skies thinking as a major part of their work, only a third regarding implementation (39 per cent), casework (35 per cent) and detailed policy content (24 per cent) as a major part of their work.

Table 3 here

The evidence does not suggest that broader policy issues, those one would associate with a "legitimising" or "policy bargaining" role, were more likely to be placed on the agenda by government departments or agencies. Respondents giving government agencies as one of the two most important sources of agenda issues were no more likely to report "blue skies" advice as a major type of issue referred to them than those who said their SAC agendas came predominantly from elsewhere. Using the same measure, the only significant bias from government as agenda setter as regards requests for the type of advice set out in Table 3 is that government appears less likely to refer implementation or casework issues to the SAC. It must be added that by this measure those giving "members of the committee" as one of the main sources of agenda items were also significantly less likely to say that their SAC discussed implementation issues. Such detail (implementation, detailed policy content and casework in Table 3 appears to arise from the obligated terms of reference of the committees. Of all the sources of agenda items, the only significant correlation between agenda source and the preponderance of blue skies advice on the agenda can be found where those saying "another advisory body" or "another public body" was one of the main sources of their SAC agendas were also more likely to say that such blue skies issues were an important part of their work. While statistically significant, it must be borne in mind that fewer than one in five respondents claimed either of these among the most important sources of agenda items.

Deliberations in SACs

As discussed above, the diversity of perspectives represented in a large proportion of committees -- lay, group representatives and civil servants, many of whom may be policy people – appears to be consistent with a policy deliberation role for SACs. Moreover one of the features of policy advice often assumed to draw scientists away from considering the science alone and towards

broader cues on which to base their suggestions, is also significantly present in the committees: uncertainty. While a large proportion of the scientist members of the committees (41 per cent) agreed that there is “little uncertainly” in the science usually discussed by their committee, a sizeable proportion disagreed (34 per cent); the remainder neither agreed nor disagreed. However, one cannot simply extrapolate from such environmental circumstances that scientists are drawn into conducting debates over policy. Faced with policy questions scientists can, and often do, prefer to keep away from offering anything other than judgments on the science (see Schwach et al 2007).

Some scientists indicated that they use evaluative criteria that go beyond the directly relevant scientific evidence alone. When asked, 33 per cent agreed with the proposition that "my own scientific advice is more often based on my judgment than on specific pieces of research"; 43 per cent disagreed and the remainder neither disagreed nor agreed. Yet only a small portion of the scientists tended to bring policy or political criteria into the construction of their advice: 15 per cent agreed with the proposition that their advice needed to consider "what is politically feasible and not the science alone", with 73 per cent disagreeing. It must be added that the importance of political feasibility as a consideration is far less likely to be accepted by life scientists (11 per cent agreed with its importance for their advice) than those in physics, maths and related disciplines (21 per cent) and social scientists (37 per cent). This finding does not, of course, tell us whether political feasibility is deliberately left out so that scientists just give “the science”, or whether it is not considered due to lack of appreciation of political constraints (see Lawton 2007: 465).

Over two-thirds of scientists, 69 per cent, claimed never to have been lobbied by outside interests, 20 per cent had been lobbied "once or twice" and 11 per cent more than that. Those that had been lobbied more often were, unexpectedly, somewhat less likely to argue that “need to consider what is politically feasible and not science alone”, but this was not statistically significant.

In giving advice, scientists predominantly reported that they could stick to the science, a feature that does not support the proposal that SACs engage in broader forms of policy deliberation.

What kind of discussion takes place in the meetings? Our evidence can only give a broad indication of the types of conflicts that might emerge given the diversity of scientific and non-scientific participants in discussions (Table 4). Scientific disagreements appear to be common, but not a characteristic feature of discussions within the committees; while 88 per cent said they occurred sometimes ("less than half the time"), only 10 per cent said that they happened in the majority of discussions. And the often-suspected use of such committees to help continue academic disputes by "scoring points" off scientific colleagues seems rare, with four-fifths (79 per cent) never witnessing this. Scientists may act as advocates for a particular position, but few (4 per cent) thought this happened very frequently and 59 per cent said this never happened at all. Disagreements between scientists and non-scientists appear slightly more common than disagreements among scientists (15 per cent said they experienced them in the majority of discussions; the question was only posed to those where the committee contained non-scientist members), but a large proportion (35 per cent) also categorically stated that such conflicts never happened.

Table 4 here

Although the survey offers evidence of moderate levels of divergent views, especially among scientists and between scientist and lay members, the evidence is also striking that decisions are made on the basis of consensus: all respondents (100 per cent) stated that decisions were based on consensus more than half the time or always, not one respondent stated that consensus was less frequent than that.

The question of how moderately diverse views can be brought to a largely consensual set of recommendations cannot be answered by our questionnaire alone. Of course it is always possible that greater conflicts can play out in private meetings between scientists and politicians and officials rather than in the meetings themselves, as Smith (1995: 299) suggested was in the case in the Advisory Committee on Nutrition's 1934 deliberations on nutritional standards. That does not detract from the central point that the SAC itself does not appear to be a forum for policy bargaining. The evidence that the presence of individuals and groups other than scientists in the committees generally turns them into politicised or even broader policy discussions is not strong.

Taking the perceived role of government members of the committees in helping generate consensus as an indicator, the evidence for a "policy legitimising" role of SACs does not appear strong either. As Table 4 suggests, members believe that secretariats are predominantly neutral, with only 13 per cent suggesting they were neutral less than half the time. The evidence on the role of civil servants is slightly more supportive of a legitimising role. The survey also asked whether the civil servants present (and the question did not distinguish between members of the secretariat and other civil servants attending the committee) can have a significant impact on decisions. Only 14 per cent thought they did so more than half the time or always, 37 per cent never and 49 per cent sometimes. Yet this does not support a view of legitimation being a prominent role of committees. Where civil servants have an impact it cannot be assumed that they steer the discussion towards a prescribed solution. One respondent wrote that "the civil servants are very skilled at steering the group towards decisions that will not be troubling for the government, even without directly intervening in the formal discussions". However, another offered a fundamentally different view of civil service influence and the relationship of science to policy; "In my experience [the] secretariat has an important influence in facilitating the discussion via background papers, draft statements etc. but aims to reflect the views of the Committee rather than pursue a preferred outcome. Hence yes,

influential but neutral". A third respondent's comments challenged the whole notion that, where influential, the civil servants' role can be characterised as making sure the decision is in line with established policy preferences:

> The science alone is still presented, but may often require acknowledgement that reliance on that advice may well go in a politically unacceptable direction. In this fashion, first, common cause is made with the civil servants - who have to take political acceptability into account in the way that an advisory committee member need not. Second, it presents a basis for the civil servant or other policy makers to develop and argue for a position which challenges what is politically feasible.

Civil servants play an important role in the deliberations of the committee, but this cannot on its own be accepted as firm evidence of them stewarding SACs in a "legitimising" role.

We asked a question about the perceived personal influence of respondents on committee decisions. In answer to the question of how often their own contribution shaped the deliberations of the committee, 12 per cent replied "always or nearly always"; 52 per cent "more than half the time"; 25 per cent "less than half the time" and 2 per cent "rarely or never" (5 per cent did not know). Scientists were no more or less likely than non-scientists to claim such influence on deliberations. The influence of SAC members by this measure did not appear to be reduced when civil servants appeared on the scene – indeed those respondents on committees with civil servants (other than from the secretariat) in attendance at every meeting were significantly more likely (70 per cent) to claim influence more than half the time or always than those very few (N=10) whose SACs were never attended by civil servants (30 per cent). Any perceived lack of neutrality of the secretariat had no effect on evaluations of personal influence. By these measures empirical support for SACs filling a prominent "legitimising" role is not strong.

Neither did a host of variables related to a policy deliberation role have any effect on perceived personal influence; whether there were non-scientists on the committee, whether the respondent tended to look "beyond the science" in framing advice, whether there was frequent disagreement between scientists and non-scientists. What did affect personal efficacy? Those who spent more time on SAC business felt significantly greater efficacy (77 per cent claimed a high influence on deliberations if they spent a day a week or more on SAC business, compared with 53 per cent that spent a day a month or less); those with longer service, for example 71 per cent of those with over 5 years service claimed a high influence while only 43 per cent of those with less than one year did so. Gender made no difference to perceptions personal influence. While we cannot claim to have "explained" variations in personal influence evaluations, they seem to be related more to how much individuals put into their work than any general committee characteristic arising from its role as scientific, policy legitimising or policy deliberation forum.

We did not ask any questions about the role of the committee chair whose role is likely to be crucial in developing a consensual position. Two of the 124 comments written at the end of the survey spontaneously mentioned a dominant role of the chair in securing consensus, but the evidence that civil servants or chairs frequently seek to railroad members to support the kinds of conclusions they want them to reach is simply not there. We must conclude that to a very large extent the consensus is natural or negotiated rather than manipulated or enforced.

The impact of committee decisions

Members of the committees believe the government follows the advice of the SAC they sit on: 85 per cent claim a high degree of influence, with 46 per cent saying government followed its advice "always or nearly always", 39 per cent " more than half the time" 8 per cent "less than half the time" -- the remaining 7 per cent said their committee only rarely gave advice. While this is not

more consistent with any one of the three roles in particular, looking at the influence claimed by different groups does suggest that scientists are more likely to claim influence than others. The percentage of respondents saying their advice was “always followed” did not vary between scientists and non-scientists. However, the 63 non-scientists who were professional practitioners (many of these are likely to be medical practitioners though we did not specifically ask) were somewhat more likely (54 per cent) than the 206 scientists (46 per cent) to claim the committee advice was “always followed); both were significantly more likely than the 36 other non-scientists (33 per cent), to claim such impact for their conclusions.

Life scientists were especially likely to report that the advice of their SACs was followed: 53 per cent of life scientists said that their committee's advice was always followed compared with 26 per cent of other scientists, a statistically significant difference. Women scientists were somewhat more likely (50 per cent) to report higher levels of impact for their committees than men (43 per cent), but the low numbers (50 women to 161 men) and small difference mean that this is not statistically significant. The more scientists are asked to comment on specific cases and detail, the more likely they were to report a high impact for their committee: where "specific cases" were a "major part" of the committee's work, 56 per cent reported their recommendations were always followed compared with 40 per cent of those on committees for which it was a "minor part" and 33 per cent for committees not dealing with specific cases at all. Where scientists reported the science their committee tends to deal with is less certain they are less likely (38 per cent) to report such high impact of committee decisions than those who agreed that the science left little uncertainty (59 per cent). That scientific agreement is strongly associated with impact is further suggested by the fact that those respondents who say that scientists “never” disagree were more likely to claim high influence for their committees.

The importance of consensus for the impact of the committee is also underlined by the fact that those who reported consensus was "always or nearly always" achieved were more likely (52 per cent) than those who only reported consensus "more than half the time" (26 per cent) to say that their committee's decisions were "always followed". Reports of frequent disagreements among scientists were statistically significantly associated with lower perceptions of committee impact as were frequent disagreements between scientists and non-scientists, the latter offering some support for the “policy bargaining” model. Support for the “legitimising” role is much weaker here. The question of whether advice was always followed was not significantly related to perceptions of whether the secretariat was perceived as more or less frequently neutral or whether the civil servants were more or less active in shaping deliberations. In fact, while not statistically significant, the respondents believing that civil servants “never” had a big impact on deliberations were more likely (51 per cent) to believe their advice was always followed than those who thought civil servants shaped things sometimes (44 per cent) or always (20 per cent).

Conclusions

On its own, a questionnaire survey of its members cannot explain how any advisory committee actually works. Nevertheless, a survey of members of a range of committees allows us to identify some broad trends and does allow us to say that there is very little evidence that the mass of daily interactions between government and scientists follows either a “policy legitimising” or “policy deliberation” logic. While there are bits of evidence that these functions can be filled at times by SACs, taking the mass of everyday interactions between government and scientists, advisory committees seem substantially more frequently to work according to the “on tap” model. Government might dominate the agenda of such committees, but one would expect this even with an “on tap” model where government looks to SACs for “the science” which policy makers rather than scientists turn into policy proposals or practice. There is little evidence of a widespread

tendency by government to seek to steer the committee deliberations in a particular policy direction. While civil servants do appear to have an influence on what SACs decide in a significant proportion of cases, we cannot necessarily describe their activity as pushing the scientists and other members of the committee towards a favoured set of proposals, as some of the respondents were at pains to tell us in the written comments discussed above. It is perhaps unsurprising that scientists are no more likely than anyone else to devote serious amounts of time to a largely ritual or tokenistic project like policy legitimation, and our evidence supports this argument. Undoubtedly it is quite possible that the few indications we had that secretariats, other civil servants or powerful chairs steer scientists towards making decisions consistent with their wishes rather than with the science, are more widespread than the survey responses asking for perceptions of influence indicate, not least because respondents may be unwilling or unable to acknowledge the degree to which their work is being steered. All we can say is that the sparseness of the existing evidence that this railroading takes place suggests that it is highly unlikely that the consensus that seems to predominate in committee decision making is manufactured by such coercive or hegemonic mechanisms. If this were happening to a significant extent, the bigger puzzle would be why scientists accept nomination to such committees and devote significant amounts of time on it (66 per cent spend a day or more a month on their committee work).

Neither is there much evidence that SACs draw scientists into a world of policy deliberation where they go beyond their scientific knowledge and develop broader policy skills, as suggested by the policy deliberation model. SACs are hybrid in terms of their composition, but they seem in their operation and focus to concentrate on deliberating the science rather than seeking some form of agreement or accommodation between different social, economic and political interests. There is a some support for the idea that where the scientists disagree with the non-scientists, the SAC has less impact on government action, but this is perhaps the only small piece of evidence in its favour.

Does any of the evidence suggest that it would be mistaken to dismiss the "on top" argument that sees the possibility of SACs being vehicles for a new technocracy? The efficacy of committees – the notion that the advice committees give is, according to its members, often followed – is perhaps the strongest evidence in support of this argument. But as the evidence also suggests, this impact is more likely to be over matters of detail and implementation than over broad policy directions. We do not believe that there is much in the responses to our questionnaire that suggest a privileged place for a scientific elite in public policy making in Britain.

Do we have any reason to think that these findings are a product of the survey methodology and reliance on the self-reported behaviour and opinions of SAC members? The honest answer is that we cannot know. Some respondents suggested in their comments that SAC meetings were stitched up by policy people, but whether this means that this happened rather infrequently or that the bulk who suggested a more open exchange were either misguided in their evaluations or tailored their views to offer some sort of rosy view of how things work for an outsider cannot be settled here. It is possible that the findings are at variance with some of the case study-based analyses such as those of Krick (2015) and Dunlop (2010) because policy case studies tend to look at scientific advice on bigger ticket policy issues while our survey includes a mass of lower level advice on matters such as human reactions to veterinary medicines and appeals against revoked licenses for laboratories working on genetically modified organisms.

In general, the traditional "on tap" model appears closer to the experience of how committees actually operate. While scientists often deliberate issues with representatives of professions and groups as well as policy civil servants in attendance, and while the science may be uncertain on many of the matters they discuss, only few scientists, one in seven, frame their advice

taking political feasibility into account. Even fewer life scientists, one in ten, do this, and they make up three quarters of the scientists in the survey. Consensus appears to be a very important decision rule for committees, both in the frequency with which respondents said it was found and in the importance consensus appears to have for explaining the consequent impact of committee decisions. In just about as strong a manner as one could reasonably expect, the evidence attests to the general validity of the traditional model.

Is this finding of an "on tap" role likely to be confined to the United Kingdom? The "legitimising" and especially "policy bargaining" models around which we have structured our discussion are derived from the experience of other countries, above all Germany and the European Union. While we cannot here offer a cross-national comparative analysis of scientific advisory committees, we can point to some institutional features that appear to make SACs in the UK less likely to fulfil legitimising and bargaining roles. Krick's (2015) study, which suggests a strong "legitimising" role for committees, looks at German advisory committees with defined and moderately high-profile policy missions: to develop proposals for policy in areas such as migration policy and vocational education. Her research suggests that one would be less likely to find a legitimising role, and more likely to find a substantive role ("instrumental") closer to an "on tap" model, where the issues command less public attention. Because the world of SACs is one of low-profile routine, higher profile policy and everything in between, it is likely that the high profile policy issues attracting more active government involvement of the kind found by Krick in some of her committees could be being dwarfed by the more routine science-policy interactions which she would expect to be characterised by such "instrumental" relations. Furthermore, unlike both Krick's German advisory bodies the emphasis in the institutional structure of SACs is on mobilising scientific advice rather than providing a "policy forum" in the form of "a knowledge exchange or negotiation venue for political, scientific, and corporate members dealing with these issues" (Fischer and Leifeld

2015: 365) which might be expected to bring with it a policy bargaining function. It is possible that the "on tap" model is especially applicable in our UK SAC case not primarily because of any cultural disposition of UK governments to treat scientists in a particular way, or of scientists to behave in a particular way, but because the bulk of science-policy interactions in SACs tend not to involve high-profile policy issues. This view is supported by the Rimutke and Haverlund's (2015 :445) finding, based on a small survey of scientists routinely giving advice to European Commission DGs, as opposed to members of higher profile policy advisory committees, that "instrumental use of knowledge is dominant" in much the same way that the "on tap" model comes out most strongly in the UK.

It is quite possible that wider features of the operation of SACs in the UK mask a legitimising function: government generally appoints SAC members and may choose members more likely to support the thrust of policy. Organisational turnover might over the longer term reinforce the strength of the "on tap" model. At the time of our survey we learned that several listed committees no longer existed, or at least not in the form described. We cannot rule out the possibility that committees that survive are likely to be those in which it is possible to maintain the "on tap" approach and those where it is not possible are reorganised or abandoned. Thus McEldowney, Grant and Medley (2013: 99) suggest that the Badger Panel, set up 1996 to oversee the controversial badger cull aimed at reducing the incidence of tuberculosis in cattle, was disbanded in 2003 in part because the wide range of interests included in it, including conservation interests as well as scientists and veterinarians, meant that "it had not been easy to achieve a unified view" and the Department for the Environment, Food and Rural Affairs came to believe that "the strategy of creating encompassing groups which attempted to reconcile differences between highly divergent positions" did not work and "reliance was placed on much smaller, inclusive groups".

Whether or not turnover and selective appointment are part of the story, the answer to the question of adaptation of scientists to the policy world, our research suggests, is not to be found in scientists being pushed into a world subordinate to policy, where they simply legitimise government policy or discard significant amounts of scientific expertise to be able to bargain with other policy actors. Neither is it to be found in the internal mental struggles of scientists. Whether they should be "honest brokers", "advocates" or "pure scientists", for example, is for Pielke (2005:10) largely a choice scientists make “in how they relate their work to policy and politics”. Rather we would expect to find the answer in the structures and internal dynamics of the organization of the committees themselves: how the secretariats and chairs formulate the agendas such that scientific evidence and judgments do not have to second guess wider policy aspirations and constraints, how members of committees recognise and defer to the expertise and judgment of other members and how discussion is steered while maintaining sufficient confidence of members that their own perspective on the matter is not being sidelined. Scientists are likely to be just as capable of going beyond the science and developing and offering normative views on policy issues of concern to them as any other person offering advice to government. How SACs are structured, and how they work in practice, seem to make the expression and airing of conflicts about policy issues a less significant part their work.

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Table 1: Outline of empirical expectations of different roles at different stages in SAC issue handling

Role	Stage of Issue Handling		
	Agenda	**Deliberation**	**Impact**
On tap	Diversity in issues referred by government	Concentration on "scientific" criteria as basis of advice	Government follows advice contingent on agreement among scientists
Legitimising	Government priority to broad policy issues	Government "steering" of advice	Government follows advice where it agrees with government policy
Policy bargaining	Government priority to broad policy issues	Policy compromises important for advice	Government follows advice where different stakeholders agree

Table 2: Sources of SAC agendas

	An important source		*Among two most important sources*	
	N	%	N	%
From a government department or agency	300	92	255	79
From members of the committee	240	73	110	34
Obligated	116	36	49	15
From outside government	138	42	39	12
From another advisory body	158	48	31	10
From another public body	147	45	28	9
Other	19	6	3	1

Table 3: Types of advice SACs give

	State of scientific knowledge	*Blue skies*	*Implem-entation*	*Case-work*	*Outside bodies*	*Detailed policy content*	*Other*
Major part of work	85	64	39	35	27	24	37
Minor part of work	13	28	40	19	39	43	8
Not part of work	2	8	21	46	33	32	55

N=322

Table 4: Conflicts within SACs

Percentage saying that …	*Never*	*Sometimes*	*Mostly/ always*
The secretariat is neutral (N=312)	3	10	88
The scientists disagree among themselves (N=310)	10	81	10
Lay members tend to disagree with scientists (N=238)	35	60	15
Some scientists act as advocates for a position (N=309)	59	37	4
Some scientists score points off each other (N=309)	79	19	2