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How to cite:

Jones, Allan (2020). Science in the Making: 1930s Citizen Science on the BBC. *History of Education*, 49(3) pp. 327–343.

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Version: Accepted Manuscript

Link(s) to article on publisher's website:

<http://dx.doi.org/doi:10.1080/0046760X.2020.1712620>

<https://www.tandfonline.com/eprint/77ISN4W64EAQHEPUPQQH/full?target=10.1080/0046760X.2020.1712620>

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Science in the Making: 1930s Citizen Science on the BBC

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Abstract

During 1931–1933 several BBC radio broadcasts invited listeners to participate in what would now be termed ‘citizen science’ experiments. Scientists broadcast on a research topic, and asked for relevant data and observations from listeners. Most of these broadcasts were part of the *Science in the Making* series. Topics investigated ranged across natural history, meteorology, auditory perception, dreams and social science. One *Science in the Making* broadcast resulted in an article in a refereed academic journal.

This article describes these broadcasts, the listeners’ role, and the outcomes of the series. It situates them in the context of the BBC’s adult education provision, and examines their educational and scientific contributions. Although the broadcasts were considered successful, they were short-lived. The article investigates reasons for this. It also looks at the reasons for the demise of inter-war adult education provision at the BBC during the later 1930s.

Keywords: adult education; citizen science; educational broadcasting; BBC; science communication

Introduction

In 1932, the annual *Yearbook* of the one-decade old BBC offered some observations on the new field of broadcast adult education. The *Yearbook* observed that not only was broadcasting new, but so also was the type of learner it served. The radio audience was

unprecedented in its heterogeneity of age, experience and motivation.¹ This fact distinguished adult radio learners from virtually all other conventional groups of adult learners. The BBC was therefore obliged to be innovative:

... a technique and a body of principles [for adult education] have to be worked out afresh, without any precedent or previous example to fall back upon.²

Of the educational innovations introduced by the BBC in this era, one of the most adventurous was a series of radio broadcasts in 1931 and 1932 entitled *Science in the Making*. These invited listeners to participate in research that would now be referred to as ‘citizen science’. This article tells the story of these broadcasts, in so far as it can be pieced together in the absence of recordings or complete transcripts of the broadcasts. Through this narrative, we see adult educationalists experimenting with a novel approach to adult education – one designed to serve learners and casual listeners alike – and also experimenting with an innovative approach to science education.³

We also see scientists evolving ways to use the new medium. Some scientists used it to gather new empirical data and thereby extend scientific knowledge. Others, possibly

¹ All the broadcasts referred to in this paper were radio broadcasts. Television broadcasting in the UK did not begin until 1936, initially as an experimental service confined to the London area. It did not achieve wide geographical coverage and popular consumption until the 1950s.

² *BBC Yearbook*, 1932, p. 161.

³ The early years of broadcasting in the 1920s and 30s saw many experiments with styles of presentation, not just in adult education. See Paddy Scannell and David Cardiff, *A Social History of British Broadcasting*, vol. 1 (1922–39) ‘Serving the Nation’ (Oxford: Basil Blackwell, 1991), x.

less imaginatively, gathered data simply to confirm what was already known. I will argue that the latter approach failed to exploit the educational potential of the medium and this form of audience participation.

The young BBC's adult-educational venture can be seen in the context of the flowering of adult-education in Britain following the publication in 1919 of the 'Final Report' of the Adult Education Committee of the Ministry of Reconstruction. Although the Final Report focused on universities, urging them expand their extra-mural provision, non-university bodies were seen as important too.⁴ Naturally the BBC, founded in 1921, was not part of the Committee's vision, but adult education was soon one of the BBC's main preoccupations.

A sign of the BBC's early commitment to adult education was its creation in 1923 of an Adult Education Committee containing non-BBC representatives, and the appointment of an Education Director in 1924. Adult education at the BBC received a boost with the publication in 1928 of *New Ventures in Broadcasting*. This report emanated from a committee chaired by Sir Henry Hadow, and emphasised the importance of broadcast adult education.⁵ The report considered that many types of broadcast, such as talks, readings and drama, could be considered to be educational, but advocated also programmes for adults that were more overtly educational. Among the

⁴ Thomas Kelly, *A History of Adult Education in Britain* (Liverpool University Press, third edition, 1992), 267.

⁵ H. W. Hadow (1928) *New Ventures in Broadcasting: A Study in Adult Education* (London, British Broadcasting Corporation, 1928).

initiatives it stimulated was the expansion of broadcast adult education, and the setting up of listening groups around the country. These groups met to hear and discuss broadcasts under the supervision of a mentor – usually a professional educator.⁶

Broadcasts intended for group-listening were transmitted mainly between 7.00 p.m. and 8.00 p.m. on weekday evenings, and covered a wide range of topics. For example, contemporary with the first series of *Science in the Making* there were group-listening talks devoted to *Marriage: Past and Present*, *The Enjoyment of Literature*, *Virgil and his Times* and *Whither Mankind?*⁷ However, not all talks of a generally educational kind were part of the group-listening scheme.

To accompany educational talks, whether part of the group-listening scheme or not, the BBC generally published brochures containing synopses of the talks and suggestions for further reading. Such brochures were published three times per year, corresponding to the autumn, winter and spring academic terms, and were available by mail-order from the BBC.

The period from 1928 to 1936 was the heyday of the BBC's early involvement in adult education. (In the second half of the 1930s adult education declined, for reasons that will be explained.) The heyday saw steadily increasing time in the schedules devoted to adult education, and several staff appointments from adult-educational backgrounds. One such appointment was Mary Adams, a biologist who, according to a

⁶ Alexandra Lawrie, 'The BBC, group listening, and "The Changing World"', *Media History* 25(3) (2019); 279–291.

⁷ BBC, *Syllabus of London, Daventry and Simultaneous Broadcast Talks and Lectures*, January–April, (1931).

colleague, ‘raised high the level of broadcast science talks’.⁸ Adams was the first BBC employee known to broadcasting historians to have specialised in science, though she worked on other subjects too.⁹ She largely devised *Science in the Making*. For Adams and for many of her contemporary intellectuals from a scientific background, the promotion of science had a political aspect as science and society were seen as intimately connected, and human progress was identified with ‘the permeation of science through society.’ Broadcasting offered a powerful new tool for increasing this permeation.¹⁰

Science in the Making, Series 1, February–March 1931

All the *Science in the Making* broadcasts were live and unrecorded – as was normal practice at the time. The first series was broadcast on Tuesday evenings at 8.00 p.m., and therefore outside the slot allocated for group-listening. Nevertheless they were clearly educational in intent, and a pamphlet devoted solely to the series was available by mail order from the BBC giving three or four pages of background information for each talk and suggestions for further reading.¹¹

⁸ Richard Lambert, *Ariel and all his Quality*. (London: Gollancz, 1940); 75.

⁹ Allan Jones, ‘Mary Adams and the producer’s role in early BBC science broadcasts’, *Public Understanding of Science*, 21(8) (2012); 968–983.

¹⁰ Robert Bud, ‘The spark gap is mightier than the pen’: the promotion of an ideology of science in the early 1930s’, *Journal of Political Ideologies*, 22, (2017): 170.

¹¹ The pamphlet was *Science in the Making* (Talks pamphlet number 66), British Broadcasting Corporation, 1931. See *The Listener* (11 February 1931): 253 for an advertisement for the pamphlet, where it is priced at four pennies and which advises ‘A huge demand is anticipated’.

The absence of sound recordings from this time means that piecing together the story of these broadcasts has been an exercise in detective work. The pamphlet devoted to the series has supplied some information. Edited versions of the talks were sometimes published in the BBC's weekly publication *The Listener*; and in some cases archival and other sources have been consulted to fill out the story of the broadcasts.

My survey starts with the first series of *Science in the Making*, which comprised the following programmes:

17 February 1931, Lancelot Hogben, 'What is Science?'

24 February 1931, John R. Baker, 'When Does the Blackbird Lay Eggs?'

3 March 1931, Ivan D. Margary, 'Phenology: Nature Study and the Weather'

10 March 1931, Arthur Douglas Middleton, 'Census Returns for Animals'

17 March 1931, John Shaxby, 'When Does a Sound become Noise?'

24 March 1931, Charles G. Seligman, 'What do You Dream About?'

Lancelot Hogben's introductory broadcast did not invite contributions from listeners, so I have excluded it from my survey. I discuss below each of the remaining five broadcasts in the order of broadcasting. After that I will survey the second series of *Science in the Making*.

John R. Baker, 'When Does the Blackbird Lay Eggs?'

At the time of *Science in the Making*, biologist John R. Baker (1900–1984) was a University Demonstrator in the Zoology Department of Oxford University. Mary Adams commissioned many talks from him, judging him to be a '1st class

broadcaster'.¹² She thought his *Science in the Making* broadcast was one of the best in the series.¹³ As will become clear, it was the most scientifically ambitious.

Baker wanted to establish whether the start of the breeding season of birds varied systematically across the UK – in other words, whether it began earlier or later as one moved further, north, south, east or west. He chose to investigate the blackbird as it was ubiquitous and easily identified.¹⁴ He asked listeners to post to him the date when the first egg was laid or seen.¹⁵ As Baker's broadcast was not relayed in Scotland, he also posted notices in Scottish newspapers inviting readers to supply him with the same information.¹⁶ Fourteen months after his *Science in the Making* broadcast Baker gave a sequel, in which he discussed the conclusions drawn from listeners' responses.¹⁷ This was the most scientifically enlightening part of his project.

Baker reported in the sequel that there had been 775 responses. Relative to the responses from other broadcasts this was a large number. According to Baker, listeners' observations showed that egg-laying began sooner in the south of the British Isles than in the north, and the difference could amount to three weeks.

¹² BBC Written Archives Centre, R51/523/1, undated memo from Mary Adams to Ian Cox, probably written in June 1936.

¹³ Ibid. Baker's talk was not printed in *The Listener*, although the questions for participating listeners were (see note 15 below). However, a script, or draft script, exists in the Beveridge Archive at the London School of Economics, 9A/6/1.

¹⁴ John R. Baker 'When does the Blackbird Lay Eggs?', *The Listener* (13 April 1932): 536.

¹⁵ *The Listener* (25 February 1931): 335.

¹⁶ Ina Baker and John R. Baker 'The Breeding-Season of the Blackbird (*Turdus merula* Linn.)', *Proceedings of the Zoological Society of London* 102(3), (September 1932): 661.

¹⁷ The sequel was broadcast on 8 April 1932. *The Listener* edited transcript was: John R. Baker 'When does the Blackbird Lay Eggs?', *The Listener* (13 April 1932): 536–537.

Baker's sequel was unique in the *Science in the Making* series for its exposition of the scientist's thought processes. He was at pains to clarify the question under investigation:

I am not asking whether the blackbird gets any advantage from breeding later in the North. That is not the point. What I am asking is what controls the time of laying the first egg.¹⁸

Having clarified the issue, he emphasised the importance of not jumping to conclusions:

I think you will probably say at once that it is temperature.... Possibly you are right, but there are other possibilities.¹⁹

He discounted the possibility of temperature being the cause because research on other animals had shown the onset of the breeding season to be unaffected by temperature.²⁰

Thanks to listeners' responses, Baker knew that the start of breeding in the south had coincided (more or less) with the spring equinox, when day and night were of equal length throughout the country. If the equinox was the trigger for breeding, Baker argued, there should have been no difference between observations from the south and the north. He offered an alternative and somewhat complex hypothesis relating to the relative durations of day and night before the equinox:

I think the only reasonable explanation is this. Before the equinox, the southern birds had longer periods of daily exposure to light than the Scottish birds. It must be the longer days *before* the equinox that caused the southern birds to breed sooner. ...

¹⁸ Ibid. 536.

¹⁹ Ibid. 536.

²⁰ Ibid. 536.

Despite his assertion that this was the only reasonable hypothesis, he warned against assuming that he had now definitively identified the trigger for the start of the breeding season:

That is only speculation, though, and you must not attach much importance to it. Facts are the only thing that matter in science.²¹

Two points are worth commenting on here. First, Baker's investigation was a genuine, if modest, venture into the unknown. This distinguished it from most other *Science in the Making* broadcasts, as we shall see. It is not easy to see how his research question could have been addressed without the wide geographical reach and numerous responses that broadcasting could supply. Second, he explained that alternative hypotheses might explain the blackbirds' behaviour, and showed how he was able to adjudicate between these hypotheses on the basis of experimental results.

Shortly after Baker's follow-up broadcast, an article based on the blackbird experiment appeared in the *Proceedings of the Zoological Society of London*, written by Baker and his sister Ina.²² The article covers much the same ground as the follow-up broadcast.

Baker's blackbird experiment was referred to as a success a number of times in subsequent BBC publications and broadcasts. The most significant reference was probably the one by animal ecologist Charles Elton in a broadcast in April 1933 in which he spoke of Baker's experiment as 'extremely successful' and 'the only coordinated piece of work on this subject that exists.'²³

²¹ Ibid. 537.

²² Baker and Baker 'The Breeding-Season of the Blackbird'.

²³ Charles Elton, 'Exploring the Animal World II: Mapping Woodland Birds', *The Listener*, 3 May 1933, p. 712.

Ivan D. Margary, ‘Phenology: Nature Study and the Weather’

The second *Science in the Making* broadcast was by Ivan Margary (1896–1976). His scientific interests ranged across chemistry, botany, animal husbandry, meteorology and archaeology, but thanks to inherited property and income he did not depend on science for his livelihood.²⁴ His broadcast concerned the work of the Royal Meteorological Society, which for a long time had recorded the dates of flowering and fruiting of plants, and of the movements of migrant birds. As part of the Society’s investigation into the relationship between weather and flowering, Margary asked listeners to supply him with the date of flowering of blackthorn bushes and their locations.²⁵ Unlike Baker, Margary gave no follow-up broadcast but BBC *Handbook* the following year reported that:

The results of the blackthorn experiment were in complete agreement with the Society’s own data, and showed that listeners did their work effectively.²⁶

This suggests that respondents simply confirmed RHS’s own survey findings and added nothing new (unlike Baker’s respondents). Possibly the most useful outcome of the broadcast was that 250 listeners were reported to have volunteered to be recorders for the Society’s own schemes.²⁷

Arthur Douglas Middleton, ‘Census Returns for Animals’

The third *Science in the Making* broadcaster, Douglas Middleton, was one of a group of

²⁴ Mavis Priestley ‘Ivan D. Margary’, The RH77 History Group, 2008. Available online at <http://rh7.org/factshts/margary.pdf>

²⁵ ‘Science in the Making’, *The Listener* (4 March, 1931): 357.

²⁶ *BBC Handbook*, (London: BBC, 1932): 171

²⁷ *Ibid.*

young animal ecologists who gathered around the pioneering animal ecologist Charles Elton at Oxford University during the late 1920s and early 1930s. John R. Baker (who conducted the blackbird experiment described above) was another.

Middleton was interested in the spread across Britain of the North American grey squirrel, which had been released in several British locations during the nineteenth century. The grey squirrel was the subject of Middleton's *Science in the Making* broadcast. Although we do not know what Middleton said in his broadcast, the first chapter of his book *The Grey Squirrel*, published a few months after his broadcast, would certainly have been a very suitable source on which to base his broadcast.²⁸ In this chapter, Middleton explained that the grey squirrel introduced into Britain was one of many species and subspecies of grey squirrel found in the USA and Canada. North America also had red squirrels, much like the native British red squirrel. In North America, grey and red squirrels co-existed, although they tended to occupy different habitats. Where they competed for food or territory, the smaller red squirrel was usually victorious.²⁹

By the time of Middleton's broadcast, it was clear that in Britain grey and red squirrels interacted differently from what was observed in North America, and that the native red squirrel was declining. Middleton was particularly interested in whether the red squirrel's decline was due to the introduction of the grey squirrel or whether other factors, notably disease, were responsible.³⁰ Middleton asked listeners to supply

²⁸ A. D. Middleton *The Grey Squirrel* (London, Sidgwick and Jackson, 1931).

²⁹ Ibid. 1–7.

³⁰ A. D. Middleton 'The Ecology of the American Grey Squirrel (*sciurus carolinensis* Gmelin) in the British Isles', *Proceedings of the Zoological Society of London*, part 3 (1930): 838–840

information on their sightings of both grey and red squirrels, and also whether red squirrels appeared to be in decline or suffering from disease.³¹

The number of responses Middleton received, and whether they were useful to his research, is not recorded in any source I have located. However, even before his broadcast Middleton had a network of squirrel watchers reporting to him, and during the course of the 1930s this network increased to several hundreds.³² In the year before the broadcast, with information supplied by this network, Middleton had already created a map of the distribution of grey squirrels in Britain.³³ On three further occasions (1932, 1935 and 1937), Middleton published reports and maps of the distribution of the grey squirrel, and although in these reports he thanked his voluntary observers for their information, *Science in the Making* listeners are not mentioned specifically.³⁴

The similarities and differences between Baker's blackbird experiment and Middleton's squirrel experiment are striking. Both were based in natural history and potentially exploited the wide reach of broadcasting to investigate the geographical variation of their research interest. Baker's blackbird experiment, though, did not disadvantage urban dwellers to the same extent as Middleton's. Also, Baker's experiment crucially depended on straightforward quantitative data supplied by listeners, namely the date of

³¹ *The Listener* (11 March 1931): 406.

³² Crowcroft *Elton's Ecologists*, 16.

³³ Middleton *The Grey Squirrel*, facing p. 22.

³⁴ A. D. Middleton 'The Grey Squirrel (*Sciurus carolinensis*) in the British Isles, 1930–1932', *Journal of Animal Ecology*, 1(2) (Nov., 1932): 166. A. D. Middleton 'The Distribution of the Grey Squirrel (*Sciurus carolinensis*) in Great Britain in 1935', *Journal of Animal Ecology*, 4(2) (Nov., 1935): 274–276. B. T. Parsons and A. D. Middleton 'The Distribution of the Grey Squirrel (*Sciurus carolinensis*) in Great Britain in 1937', *Journal of Animal Ecology*, 6(2) (Nov., 1937): 286–290.

egg-laying, to test a hypothesis. Middleton's objective was vaguer, and he already had methods for gathering relevant data. Observations from listeners may have been useful, but would not have been crucial for settling an issue as they had been in Baker's blackbird project.

John Shaxby, 'When Does a Sound become Noise?'

In 1931, at the time of his broadcast, John Shaxby (1879–1948) was a member of academic staff at the Cardiff Institute of Physiology. His specialism was sound localisation, and during 1932–4 he was involved with a project using large concrete acoustic mirrors on the English south coast to locate distant aircraft. This acoustic form of ranging was largely superseded during the Second World War by radar.³⁵

Shaxby's main topic in his broadcast, and the one that he sought listeners' assistance on, was auditory masking, which he referred to simply as 'masking'.³⁶ This is the phenomenon of one sound rendering another inaudible. It can happen when two sounds occur simultaneously, with one sound much louder than the other. It can also happen when two sounds occur in quick succession and one is louder than the other. In recent decades auditory masking has been exploited in compressing the size of audio files, for example MP3 files, but at the time of Shaxby's talk it had no practical application.

³⁵ These few biographical facts I have found on Shaxby are from J. Gareth Jones, Elizabeth M. Tansy and Douglas G. Stuart, 'Thomas Graham Brown (1882–1965): Behind the Scenes at the Cardiff Institute of Physiology', *Journal of the History of Neurosciences*, 20(3) (July 2011): 188–209.

³⁶ John H. Shaxby 'When Does a Sound Become Noise', *The Listener* (1 April 1931): 563–4.

Shaxby summarised the findings of the recent research at Bell Laboratories, which showed that the degree of masking of one sound by another was related to their closeness of pitch:

A masking tone interferes very little with much lower notes [that is, lower in pitch] even if it itself is loud: it causes the maximum trouble, as one might expect, with notes of nearly its own pitch,....³⁷

Thus the closer in pitch two sounds were, the greater the masking effect of the louder on the quieter. Shaxby seems to have used his broadcast to test the validity of the Bell Laboratory findings by playing test tones and masking tones of various pitch differences and asking listeners what they heard.

Figure 1(a) is a screen shot of my reconstruction of the first part of Shaxby's tests.³⁸ The horizontal direction of Figure 1(a) represents time, and the further right an event is on the axis the later it occurs. At the top of Figure 1(a) is a sequence of forty-two test tones, which are 'beeps' of constant frequency. Each successive beep is quieter than the one before, which is indicated in Figure 1(a) by the decreasing height of the vertical bars representing the beeps. The beeps are potentially masked by the simultaneously played masking tone in the lower half of Figure 1(a). The masking tone

³⁷ John H. Shaxby 'When Does a Sound Become Noise', *The Listener* (1 April 1931): 563.

Shaxby's allusion to research at Bell Laboratories was almost certainly a reference to the work of Harvey Fletcher, Bell's Acoustical Research Director. Shaxby's broadcast appears to be based on pages 167–175 of Fletcher's book *Speech and Hearing* (New York, Van Nostrand, 1929).

³⁸ My account of Shaxby's experiment is pieced together from hints in the following sources: *Science in the Making*, Talks Pamphlet no. 66, British Broadcasting Corporation, 1931, p. 23. J. H. Shaxby 'When Does a Sound Become a Noise?', *The Listener* (1 April 1931): 563–4. *BBC Yearbook* 1931 (London: British Broadcasting Corporation): 171–2.

is continuous, having a constant amplitude and frequency.³⁹ The masking tone was fixed at 495 Hz (which is slightly sharper than the B above middle C) throughout all the experiments, but the frequency of the test beeps varied from test to test. The total duration of the sequence in Figure 1(a) is about 85 seconds.

(a) test tones getting quieter

(b) test tones getting louder

Figure 1 Reconstruction of Shaxby's masking test

³⁹ All tones in Figure 1(a) and 1(b), whether, masked or masking, are sine waves, but in the images the waves are too closely packed for individual cycles to be visible so they appear as solid blocks.

Shaxby's procedure was first to play the forty-two diminishing beeps without the masking tone, presumably to give listeners a clear idea of what the beeps sounded like. Then followed a series of three tests, each using a different frequency for the test beeps.⁴⁰

In the first series of tests the beeps had a frequency of 615 Hz, which is about four semitones above the masking tone of 495 Hz and therefore relatively close in pitch to it – and therefore according to Bell Laboratories vulnerable to masking. Having played the sequence of beeps without the masking tone, Shaxby re-played them accompanied by the masking tone. Listeners were asked to count the beeps they heard through the masking tone. If a listener reported hearing, say, thirty-eight beeps, Shaxby assumed that the beeps heard were the first thirty-eight, and that the final four, being quieter than the preceding thirty-eight, had been masked by the masking tone.

My reconstruction shows that the listener soon picks up the rhythm of the regularly spaced beeps, and can easily predict the onset of the next beep. There is a danger that the listener could anticipate rather than hear the quiet beeps at the end of the

⁴⁰ Descriptions of the test do not indicate the duration of each beep (or test tone), the period of silence between each beep, or whether the series of beeps starts at the same loudness as the masking tone or at a different loudness. In my reconstruction the masked and the masking tone start equally loud, each beep lasts one second, and the silence between each is one second. Similarly, the descriptions of the experiment do not indicate the amount by which the loudness of each beep is reduced relative to the one before. I have chosen a constant reduction of 1.5 decibels from one beep to the next. This means after the first beep, the size (or amplitude) of each successive beep is about 84% of the one before. It would be natural for an acoustician such as Shaxby to use a constant number of decibels for each reduction as it gives what appear subjectively to be equal sized changes in loudness.

series. This presumably explains the next step of the experiment, in which Shaxby again played the test beeps together with the masking tone, but this time the test beeps started quietly and became louder as shown in Figure 1(b). Now if the listener reported hearing thirty-eight beeps Shaxby would assume that the first four (the quietest) were inaudible, and that the first audible beep could not have been anticipated and therefore was not imagined. However, Shaxby appears not to have explained this experimental subtlety.

This entire procedure of masked beeps getting quieter and then louder was repeated using test beeps that were progressively higher in frequency, and therefore progressively further from the masking tone (and therefore, according to Bell's findings less susceptible to masking). In the second test he used beeps of 760 Hz (approximately seven semitones above the masking tone) and the third and final test he used 1000 Hz (approximately twelve semitones, or an octave, above the masking tone).

Shaxby referred to his radio experiment as 'probably the biggest mass-experiment ever attempted'.⁴¹ He had 900 usable responses from listeners,⁴² which was considerably more than were generated by other broadcasts in the first series of *Science in the Making* for which response statistics are available. The first test tone (closest in pitch to the masking tone) was found to divide listeners into three groups: those for whom all the beeps, even the loudest, were masked; those for whom about half the beeps were masked; and those for whom there was no masking. The second test tone, being higher in pitch and further away from the masking tone than the first, could be heard by many listeners down to the quietest beep. So far these results confirmed Bell's findings.

⁴¹ Ibid. 564.

⁴² John H. Shaxby 'When Does a Sound Become Noise', *The Listener* (1 April 1931): 564.

The third test tone (1000 Hz, or nearly 12 semitones above the masking tone), was the highest and furthest from the masking tone, and could therefore have been expected to be least effectively masked of all. Participants could therefore have been expected to hear all, or nearly, all the test tones. In fact they generally reported hearing only about half of them.⁴³ This would appear to have contradicted Bell's findings, which would have been a significant result. However, I suspect Shaxby used this third test to illustrate a comment he had made earlier in this talk about the masking of tones well above the masking tone:

[I]f the masking tone is reasonably low in pitch it needs to be of extraordinary intensity to have much effect on high notes.

That is to say, if the test tone is well above the masking tone, there is little or no masking effect unless the masking tone is very loud. If Shaxby did use the third test to illustrate this, he would have needed to change the relative loudness of masked and masking tones compared to that in earlier experiments, for example by making the masking tone much louder.

Shaxby gave no follow-up broadcast, but a brief summary of his findings appeared in *The Listener*.⁴⁴ In this he said that his experiment to have been 'a real success'. The context suggests that he meant that Bell's findings had been resoundingly confirmed.⁴⁵ In fact Shaxby's experiment was essentially an exercise in confirming existing findings rather than (as in Baker's blackbird experiment) the discovery of new findings. Shaxby concluded his summary of listeners' responses by saying that he

⁴³ Ibid.: 564.

⁴⁴ Ibid.: 563-4.

⁴⁵ Ibid.: 564.

would give a fuller report when all the data had been processed, but I can find no record of such a report being broadcast or published, nor of Shaxby giving further broadcasts.

Charles G. Seligman, ‘What do You Dream About?’

Charles Seligman (1873–1940) trained as a physician, but at the time of his broadcast was Professor of Ethnology at the London School of Economics. During the First World War he served as a medical officer, treating soldiers for shell shock. From this work he developed his interest in the relationship between psychology and anthropology.⁴⁶ In his *Science in the Making* broadcast he investigated the prevalence of certain types of dream among listeners. Underlying his investigation were three assumptions which modern listeners would probably find hard to accept:

That dream analysis is a legitimate branch of science.

That the symbolism of dreams gives access to deep personal and collective history.

That race is a meaningful scientific term.

In his broadcast, Seligman referred to the recent elevation of dreams to a proper field of scientific study:

It is only during the last quarter of a century that the study of dreams has reached a stage that may truly be called scientific and so has enabled us to use them as an

⁴⁶ F. J. West, ‘Seligman, Charles Gabriel (1873–1940)’, *Oxford Dictionary of National Biography* (Oxford: Oxford University Press, 2004); online edn, May 2012.
[<http://www.oxforddnb.com/view/article/36011>, accessed 12 Sept 2013]

important element in the study of psychology and the treatment and cure of nervous disorders.⁴⁷

Seligman was concerned in his broadcast with a set of ubiquitous dream ‘types’:

[M]y purpose now [is] to consider dreams from the standpoint of the anthropologist, to show how certain dreams which may be called ‘type’ dreams, occur in every people no matter what their cultural condition or the race to which they belong...

Among the recurring types were dreams of flying, raw meat and loss of teeth. Not only were these ubiquitous, but their interpretation was consistent across cultures and ‘races’. Flying portended good fortune, raw meat portended misfortune, and loss of teeth portended loss of friends or relatives. Seligman saw in these dream types a way of exploring a primal, universal unconscious:

[Type dreams’] main interest and importance lies in the chance they offer of exploring and comparing the unconscious of the Caucasian and other races. To put it briefly, the identical symbolism (that is, identical symbols with the same meaning attached to them) found in the dreams of unrelated races, differing profoundly in their civilisation and social organisation, can only signify that the unconscious of all these races is qualitatively much the same.⁴⁸

Much of Seligman’s talk was given over to the elaboration of these dream types, and the interpretations they were given.⁴⁹ Seligman asked listeners to supply him with accounts

⁴⁷ Charles G. Seligman, ‘What Do You Dream About?’ *The Listener* (8 April 1931): 580.

⁴⁸ Ibid.

⁴⁹ Seligman covers much of the same ground, and more, in Charles G. Seligman, ‘The Unconscious in Relation to Anthropology’, *British Journal of Psychology*, XVIII(4) (April 1928): 373-387. In this article he suggests that, besides dreams, others ways of studying

of five dream types: flying, raw-meat, tooth-loss, climbing and intelligent-animals. He also asked listeners to supply their name, address, sex, age, marital status and occupation, but not racial classification.⁵⁰ Possibly he assumed his audience to be ‘racially’ homogeneous. (The only personal information requested by other broadcasters in the *Science in the Making* series was name and address.) Many listeners’ responses survive among Seligman’s papers.⁵¹

Seligman reported to Mary Adams that he had had 92 responses from men and about 163 from women.⁵² These were low response rates compared with other broadcasts in the series. (Another report, cited below, puts the total number of responses at 300.) The flying dream was most common type, and animal dreams were also common, but the others were less common than expected.

The low response rate suggests that this project had some flaws. Possibly these ‘ubiquitous’ dreams were not ubiquitous at all. Also, Seligman reported that many respondents did not describe any of the five dream types he had asked for.⁵³

the unconscious are through neuroses and other abnormal conditions, and through myth, legend and ritual.

⁵⁰ Royal Anthropological Institution, 50 Fitzroy Street, London, Seligman papers, MS262/5/6/2.

⁵¹ Royal Anthropological Institution, 50 Fitzroy Street, London, Seligman papers, MS262/10-11 and MS262/8/218-267. Seligman’s radio experiment was not the first time he had sought accounts of dream types from a wide audience. In the early 1920s he submitted a request to a publication related to folklore asking for accounts of dreams of tooth loss, flying, fire, climbing, being insufficiently clad, and raw meat. Royal Anthropological Institution, 50 Fitzroy Street, London, Seligman papers, MS262/5/6/3

⁵² Royal Anthropological Institution, 50 Fitzroy Street, London, Seligman papers, MS262/5/6/2, undated report to Mary Adams.

⁵³ Royal Anthropological Institution, 50 Fitzroy Street, London, Seligman papers, MS262/5/6/2

In his 1932 Huxley Memorial lecture on ‘Anthropological Perspective and Psychological Theory’, Seligman said of the universal symbolism of dreams:

Of the actual dreams of primitive people, the more records I examine the more I am struck by their frequent apparent, I might say obvious amenability to a Freudian explanation; indeed, in many instances, such an explanation seems inevitable, though naturally there are many cases in which nothing can be predicated.⁵⁴

The published version of this memorial lecture has a footnote to the above statement which refers to the radio experiment:

Last year I spoke about dreams on the wireless and received accounts of some 300 correspondents. In a fair number of these the symbolism (Freudian) was glaring; in many, on the other hand, no conclusions could be reached, but the whole collection left on my mind a strong impression of the correctness of Freud’s teaching with regard to dreams.⁵⁵

Thus Seligman’s broadcast appears to have been an exercise in confirmation rather than discovery. From a vantage point nine decades after Seligman’s broadcast we might be sceptical whether this ‘confirmation’ of Freudian dream theory was any such thing; but clearly Seligman regarded it as such.

Science in the Making, Series 2, February–March 1932

Seligman’s broadcast described above was the final instalment of Series 1 of *Science in*

⁵⁴ Charles G. Seligman, Anthropological Perspective and Psychological Theory, *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 62, July–December 1932, pp. 193–228; pp. 216–7.

⁵⁵ Charles G. Seligman, Anthropological Perspective and Psychological Theory, *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 62 (July–December 1932): 217.

the Making. As the series was considered a success, a second series was presented the following year. It ran from February to March 1932.

The second series could more appropriately have been named *Social Sciences in the Making* as it was devoted to the single topic of ‘Changes in Family Life’. It formed part of the science strand of an eight-month adult-education project in which all parts of the BBC’s adult education output between September 1931 and April 1932 were thematically linked by ‘the forces of social transformation in the modern world’.⁵⁶ The umbrella title for this project was *The Changing World*, and it was devised by Mary Adams and her colleague Charles Siepmann.

Science in the Making: Changes in Family Life

‘Changes in Family Life’ comprised six weekly broadcasts from 17 February 1932 to 23 March 1932. Broadcasts were on Wednesday evenings at 7.30 p.m., so they formed part of the group-listening scheme (unlike the first series of *Science in the Making*). A sequel was broadcast on 7 April 1932 in which preliminary findings were discussed.

The series was devised by economist and social reformer William Beveridge (1879–1963), who at the time of the broadcasts was Director of the London School of Economics and Political Science (LSEPS).

Historian Chris Renwick has written that Beveridge hoped to use his position at LSEPS to effect a methodological transformation of social science in general, and of

⁵⁶ BBC Written Archives Centre, Hyman Levy File, letter from Mary Adams to Levy, 31 May 1931; letter from Charles Siepmann to Levy 24 September 1931. For more on ‘The Changing World’ project, see Alexandra Lawrie, ‘The BBC, group listening, and “The Changing World”’, *Media History* 25(3) (2019); 279–291.

economics in particular. Beveridge considered that the social sciences were too little grounded in empirical evidence, and too closely connected with politics.⁵⁷ He felt they would benefit from a closer association with natural science, and to this end he set up a department of Social Biology at LSEPS, the remit of which included genetics, population studies, vital statistics, heredity, eugenics and dysgenics.⁵⁸ The department's first professor, appointed in 1930, was the biologist Lancelot Hogben (the introductory broadcaster in the first series of *Science in the Making*), around whom a team of researchers soon gathered.⁵⁹

The topics in the radio series 'Changes in Family Life' fitted Beveridge's conception of social biology. They ranged across the changing legal status of married women, trends in the age at which couples married, the changing size of families, heritability and non-heritability of characteristics, trends in women's employment, social class in relation to education and social mobility, roles within marriage, and social policy in relation to marriage and families.⁶⁰ The changes surveyed in the series ranged across time, geography, social class, and gender. Listeners were invited to

⁵⁷ Chris Renwick 'Completing the Circle of the Social Sciences? William Beveridge and Social Biology at the London School of Economics during the 1930s', *Philosophy of the Social Sciences*, 44(4), (2014): 478–496.

⁵⁸ José Harris, *William Beveridge: a Biography*, Oxford University Press, 1977; pp. 286–7.

⁵⁹ Renwick 'Completing the Circle of the Social Sciences?': 478–496.

⁶⁰ *Listener* transcripts were published in the following editions: 24 February 1932, pp.257-259 and 292; 2 March 1932, pp. 305-307; 9 March 1932, pp. 342-344; 16 March 1932, pp. 368-370; 23 March 1932, pp. 417-418; 6 April 1932, pp. 510-511; 13 April 1932, pp. 546-547. A book of the talks was published: William Beveridge, *Changes in Family Life*, (London: George Allen and Unwin, 1932).

complete and return a questionnaire about their own families.⁶¹ Meetings to plan the questionnaire were held at LSEPS, and committee members included Beveridge, Lancelot Hogben, Hyman Levy and Mary Adams.⁶² The questionnaire, which was not associated with any particular broadcast of the series and could be completed by listeners at any time during the series and for some time afterwards, turned out to be one of the most complex and controversial aspects of the series. At the first meeting of the questionnaire committee, Hogben and Levy drew attention to the need to be able to conduct a proper statistical analysis of the responses in order to uncover areas for further investigation. Beveridge disagreed, arguing that simply accumulating testimony from listeners would usefully enlarge the picture of changes in family life. His view prevailed.⁶³

An indication of the controversial nature of the questionnaire, which during development grew to a 12-page pamphlet, comes from a short article in *The Times* in January 1932, a few weeks before the series began. This reported that the questionnaire had been described as an ‘amazing inquisition’. (It included questions about how husbands and wives had met each other, whether either had been married before, and the reasons for the termination of any earlier marriages.) However, for the anonymous author of *The Times*’s article, the questionnaire’s creators – incorrectly characterised as BBC staff – were not so much inquisitors as

⁶¹ William Beveridge Archive, London School of Economics, 9A/6/1. Letter from Adams to Beveridge, 1 May 1931.

⁶² William Beveridge Archive, London School of Economics, 9A/6/1. Questionnaire Committee meeting, 30 June 1931.

⁶³ Ibid.

...ineffective busybodies. All newspaper experience of voluntary questionnaires of this kind goes to show that they are answered mainly by humourists or by the cranks.’⁶⁴

Beveridge retaliated a few months later in his sequel to the *Changes in Family Life* series:

When the form was first published one or two of the London newspapers said that nobody would fill it in except cranks and practical jokers; they said this so solemnly and with such an air of knowing everything (in fact with their usual air) that I almost believed it myself for a while. But they were quite wrong, and I was wrong to believe them. The cranks and practical jokers have hardly shown their heads.’⁶⁵

The questionnaire appears to have yielded around 10 000 responses – a much larger response than for any broadcast in the first series of *Science in the Making*.⁶⁶

Beveridge’s sequel broadcast was devoted solely to the questionnaire, and in it he gave some preliminary findings based on an examination of 500 questionnaires, although he himself had looked at only a ‘handful’ of forms.⁶⁷ (Systematic scrutiny of the forms was

⁶⁴ ‘A Family Scrutiny’, *The Times* (30 January 1932): 11

⁶⁵ William Beveridge, ‘Seven Thousand Family Records’, *The Listener*, 13 April 1932, p. 546

⁶⁶ Figure for the number of responses received from listeners varied considerably. In his broadcast on 7 April 1932, Beveridge said that about 7000 responses had been received (William Beveridge, ‘Seven Thousand Family Records’, *The Listener* (13 April 1932): 546-7). By the end of April 1932 the figure had risen to 8000 (William Beveridge, *Changes in Family Life* (London: George Allen and Unwin): 137). A final total of 12 000 was claimed in a note published three years later (‘How the Public Responds to Broadcasting’, *The Listener* (2 October 1935): 561).

⁶⁷ William Beveridge, ‘Seven Thousand Family Records’, *The Listener*, 13 April 1932, p. 546-7. According to the book of the talks (William Beveridge, *Changes in Family Life*,

actually undertaken by a research assistant appointed to LSEPS for the task.⁶⁸)

Beveridge concluded his talk with an upbeat assessment of the value of the information received:

We ought to be able to make an interesting and valuable study [based on the questionnaires already received].⁶⁹

No such study appears to have been made, and Beveridge's broadcast seems to have been the end of the road for this study.

Possibly a problem with Beveridge's research was that, like so much of *Science in the Making*, it did not reveal anything that was not already known. For example, in his broadcast on the survey's preliminary findings Beveridge reported on the declining birth-rate as revealed in the parts of the form where respondents were asked not only about the size of on their own family but also those of their parents. Also Beveridge reported on the 'loosening of family ties and authority, and a strengthening of real ties,' 'real ties' here referring to those based not on traditional power structures and loyalties but on shared commitments.⁷⁰ But Beveridge and his co-presenters had already referred to trends such as these in the six broadcasts in the *Changes in Family Life* series.

London: George Allen and Unwin, 1932, p. 137), by the end of April 1932, 8000 completed questionnaires had been received, and more were still arriving.

⁶⁸ Christopher Langford, 'David Glass and the PIC', online at <http://www.cpc.ac.uk/events/?action=story&id=70>, accessed 8 September 2017. Glass was later to become a distinguished social scientist specialising in demography and population studies.

⁶⁹ William Beveridge, 'Seven Thousand Family Records', *The Listener*, 13 April 1932, p. 547.

⁷⁰ William Beveridge, 'Seven Thousand Family Records', *The Listener* (13 April 1932): 546-7.

Lack of novel findings might not have been a problem if the survey method had allowed quantitative conclusions to be drawn. For example, Beveridge observed that

....nearly all the forms I have read, whether coming from husbands or wives, confirm [that] economic dependence of the wife in marriage to-day is hardly ever mentioned as a grievance or a difficulty,....

But there was no way of telling from the responses how representative of the general population this lack of grievance was.⁷¹ Similarly, Beveridge observed that ‘one gets hardly any accounts of unhappy families,’ but this might simply have indicated that unhappy families were too distressed to complete the questionnaire.⁷²

Another issue was raised by John Shaxby (one of the scientists in Series 1). He commented in a letter to Beveridge that the questionnaire asked respondents about their brothers and sisters. If all members of one generation of a large family completed the form, there would be multiple responses referring to the same set of siblings, who would thereby be over-represented.⁷³ It appears therefore that inadequate methodological procedures resulted in this survey being of little scientific use.

After Science in the Making

Following the broadcasts described in this article, *Science in the Making* continued to be used as a title for science broadcasts during the 1930s, but its orientation shifted towards topical science, and listener participation was no longer solicited. A couple of one-off

⁷¹ William Beveridge, *Changes in Family Life* (London: George Allen and Unwin, 1932), 134.

⁷² Ibid., 132.

⁷³ William Beveridge Archive: 9A/6/6 Letter from John H Shaxby to William Beveridge, 26 February 1932.

broadcasts during the next few years did, however, ask listeners to provide observations and these produced scientifically useful results. On 7 October 1932, Brian J. Marples (1907–97) gave a broadcast ‘Where do Starlings Sleep?’ in which he asked listeners to send information about the roosts used by flocks of starlings. Based on these responses he published an article in an academic journal.⁷⁴ On 28 April 1933, Charles Elton (1900–91) spoke in the series *Exploring the Animal World* and asked listeners to report on woodland bird populations. This too led to a publication in an academic journal.⁷⁵

However, by the mid-1930s the whole business of adult education at the BBC was under question. In 1934 an internal BBC review looked at adult education provision. The context of this review was summarised by a BBC manager a couple of decades later:

[During the late 1920s and early 1930s] adult educational work made deep inroads into the time available for general broadcasting. The results were disappointing. The maximum audience claimed for the group listening movement at any time was 20 000 over the whole country, whereas the general audience was increasing rapidly at this time. When the group listening scheme started there were 2½ million licences. Six years later, in 1934, when the time came to review the results of the scheme, there were 6½ million.⁷⁶

To put these statistics in perspective, 20 000 group listeners as a percentage of the 6.5 million licence holders in 1934 would have amounted to approximately 0.3%. In essence, prime broadcasting time and resources were being devoted to a tiny fraction of

⁷⁴ B. J. Marples, ‘The Winter Starling Roosts of Great Britain, 1932–1933’, *Journal of Animal Ecology* 3(2), 1934, pp. 187–203.

⁷⁵ Charles Elton, ‘A Reconnaissance of Woodland Bird Communities in England and Wales’, *Journal of Animal Ecology*, 4(1) (1935): 127–36.

⁷⁶ BBC Written Archives Centre, G.41/52 ‘Further Education’ (15 May 1952) in R15/152/1

the potential radio audience. From the mid-1930s onwards the time devoted to adult education was progressively reduced. The brief era of listener-participation in science broadcasting decisively ended with Mary Adams's departure in 1937 to join the fledgling BBC television service.

Conclusions

When Mary Adams left BBC radio in 1937, she wrote a memo to her successor in which she reviewed the types of science broadcast she had produced. She singled out *Science in the Making* for commendation:

The experiments we have tried in securing the co-operation of listeners in making appropriate observations have been, I think, fairly successful. *Science in the Making* was one series of that kind & in 2 contributions at any rate, results of real value were got (John Baker on Blackbirds & Shaxby on sound reception). Beveridge's Family Forum was an attempt to get information on social matters for objective analysis. This questionnaire method involves trouble & expense, but occasionally it is well worth it.⁷⁷

Adams picks out the three broadcasters who had the highest response rate from listeners. Overall she judges *Science in the Making* to be 'fairly successful' on the strength of the scientifically useful results produced by Baker's and Shaxby's broadcasts. As only two broadcasts were mentioned as producing useful results, the modest assessment 'fairly successful' seems reasonable.

What of the educational value of these broadcasts? Here Adams's assessment is rather surprising: '[t]hese talks are of value because they show methodology.'⁷⁸

⁷⁷ BBC Written Archives Centre, R51/523/1, undated memo from Mary Adams to Ian Cox, probably written in June 1936.

⁷⁸ Ibid.

Methodology, in the usual scientific sense of hypothesis formation and experimental design for empirical verification, figured little in the presentations. For example, Shaxby's subtle strategy of reversing his sequence of tones in his sound-masking experiment appears not to have been commented on in the broadcast. Maybe, though, by 'methodology' Adams meant something more general about the way scientists worked than just experimental design and hypothesis testing. I will return to this point later.

Given that Adams considered these broadcasts to be scientifically 'fairly successful', it is natural to wonder why they were so short-lived. Documentary evidence on this point is lacking. As an approach to scientific research, *Science in the Making* had two virtually unique characteristics to offer. First, it held out the prospect of unusually large data sets, as attested by Shaxby's claim that his 900 respondents constituted 'probably the biggest mass-experiment ever attempted'. Second, these large datasets had wide geographical distribution. These two features were essentially what enabled John Baker to make his discovery about the variation in birds' breeding time across the UK. Yet, from a research point-of-view, many of the *Science in the Making* broadcasts were scientifically unambitious. As we have seen, listeners' help was often enlisted to confirm findings that were already established. Despite this lack of ambition, two experiments that were essentially exercises in confirmation (Shaxby's experiment with tones and Beveridge's survey of families) were among the most popular, judged by numbers of responses. Thus *Science in the Making* potentially offered relatively large numbers of listeners an opportunity to engage with science although respondents formed a tiny proportion of the listenership. Perhaps, then, when Adams said these broadcasts 'show methodology' she meant they gave listeners a taste of scientific

activity, and an opportunity to participate in it – even if the science was unambitious and methodological issues were hardly touched on.

The lack of follow-up broadcasts for discussion of listeners' data seems to have been a missed opportunity. Such broadcasts could have shown how results were analysed and conclusions drawn, as in John R. Baker's sequel, which was the most scientifically illuminating part his project and yielded the greatest educational dividend. Once again, documentary evidence on the reasons for this lack sequels is missing, but it is worth quoting again from Mary Adams's memo to her successor, cited at the beginning of these conclusions. Adams wrote '...facts are only interesting to our public if they are attractively presented.'⁷⁹ She went on to say that an appreciation of the methods of science 'is more important for the G.P. [general public] ... than even results.'⁸⁰ To make sense of this comment we should observe that Adams was writing about the general listenership rather than those actively participating in the BBC's educational project. In making this comment, Adams reflected the BBC's increasing concern with the needs of its general listenership, and its realisation that it could not justify devoting so much prime broadcasting time to adult education.

Acknowledgement

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⁷⁹ Ibid.

⁸⁰ Ibid.