

# Evaluation of Spooky Science

An Institute of Physics project in partnership with Butlins



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## 1. Executive summary

Spooky Science clearly met its objectives to provide a positive experience of physics for visitors to Butlins. It is estimated that over 2000 people experienced the Spooky Science activities.

People who attended the Spooky Science activities were unanimously positive and made comments such as:

- *'Fantastic.'*
- *'Excellent – superb.'*
- *'Loved it.'*
- *'Really good for the kids.'*
- *'Kids loved it.'*
- *'Fabulous. Very educational. Lovely to see something educational for a change.'*

It encouraged families to talk about the activities immediately after the events. 68% of people responding to an online survey a few weeks later said they had continued to discuss Spooky Science. People talked about very specific science (cognitive or content and knowledge) aspects of the show, *'My kids enjoyed watching the man's head getting bigger after focusing on the spinning wheel [sic] they talked about it on the journey home'* as well as the more general (affective or attitudinal) aspects of the experience, *'We loved all of the experiments'*.

The Spooky Science activities motivated people to follow up their interest both within families, *'We have looked at a diagram of a Van de Graaff generator in one of my Physics books'* and in the wider context of their children's education, *'She told her teacher about it at school'*.

Although most people while at Butlins said they would look at the website, in practice only 36% of the online survey sample did so. The main reasons for not visiting the website were not having enough time and not knowing the web address.

However, the Spooky Science web pages received a total of 3374 visits<sup>1</sup> between Thursday 9<sup>th</sup> October and Sunday 30<sup>th</sup> November 2008. It can be assumed that many, but not all, of these visits were driven by the activities at Butlins.

In the main, people who did not attend Spooky Science activities simply had not seen or heard about them.

The show element of Spooky Science was most successful, with limited participation in the make and take workshop activities.

All of the Butlins staff who were directly involved in Spooky Science enjoyed the experience. However, Spooky Science was staff and resource intensive and the delivery model may need to be simplified to make it sustainable longer-term.

## 2. Methodology

The evaluation methods used were mainly qualitative – questionnaires and surveys – not quantitative methods. This enabled more detailed evaluation of both the content and format of the make and take activities, show and the website, identifying what worked well and what areas could be improved in the future.

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<sup>1</sup> It is not possible from the data collected to know if these were unique users or the same people visiting the pages more than once.

## 2.1 Data collection techniques

An interviewer (also author of this evaluation report) carried out exit interviews with people after selected Spooky Science shows at Butlins Minehead using a questionnaire format (see Appendix 1). She also interviewed people in the main Skyline arena who had not visited Spooky Science as a control sample (see Appendix 2). Self-evaluation feedback forms for both adults and children were given out at some of the Spooky Science activities in each of the three venues (see Appendix 3). Interviews were also carried out with the show presenters, Redcoats and special effects staff at Butlins Minehead.

## 2.2 Purpose

The purpose of the evaluation was to see if Spooky Science met its objectives:

- To provide a positive experience of physics for Butlins visitors;
- To encourage families to talk about the activities after the event;
- To encourage Butlins visitors to go to [www.physics.org](http://www.physics.org) to find out more about physics.

The evaluation was designed to inform the development of similar projects and Institute of Physics outreach practice by addressing:

- Whether the project was appropriate for its audience and location;
- Whether people were more likely to report cognitive (understanding) or affective (attitudinal) changes, using the MLA Inspiring learning For All Framework – [www.inspiringlearningforall.gov.uk](http://www.inspiringlearningforall.gov.uk) (measuring enjoyment, knowledge, attitudes, skills and progression);
- Whether staff and visitors had similar experiences of the project (positive or negative);
- Whether specific factors made the project more or less successful (eg interaction, practicalities, complexity etc.);
- Whether lessons learned can be applied to other situations.

## 2.3 Critique of methodology

With the benefit of hindsight, the methodology revealed a number of weaknesses. An exit interview approach limited the sample size significantly. Using only one data collector to interview participants after Spooky Science shows meant it was difficult to question people before they dispersed and went on to other activities. Issuing Spooky Science stickers to all adults, as well as badges to children attending the show, helped identify people later – but only if they retained their badges in a visible place on their clothing.

The ambition to systematically control the sample in terms of gender, size of group and number of children was unrealistic. People were interviewed as soon as they were identified but no obvious bias seems evident (see section 3. Demographics).

The self-evaluation feedback forms were not given out consistently at all Spooky Science activities across venues – hence the discrepancy in the number of forms returned (see sample size in section 2.4 below). Issuing self-evaluation feedback forms on the days that the interviewer was present reduced the number of face-to-face respondents (they said they had already completed an evaluation) therefore it was decided to stop using the forms on those days.

Interviewing people who had not visited Spooky Science was problematic – the fact that they were interviewed acted as a form of marketing and led people to say they would go to it. In some cases, however, there were no more shows running in the course of their stay so expectations were raised and then not able to be met.

It was difficult to obtain good quantitative data on the attendance at Spooky Science activities across all three venues. A mechanism for recording numbers attending workshops and shows

across all three sites was not in place, therefore only estimates can be made of the total number of people who experienced Spooky Science (see also 2.4 below).

## 2.4 Sample

There are no records from Butlins of the total numbers attending Spooky Science activities. The show venue at Minehead had capacity for about 75 people (approximately 50 seating and 25 standing). On the two days of observation the four shows were at capacity most of the time (and on occasion people were turned away). Therefore, at Minehead over four days the potential audience was 1200, and an estimate based on the two days of observation suggests about 1000 people saw the show. Significantly fewer attended the make and take activities (see section 4.9). Attendance was less consistent at Skegness and Bognor (and some shows at Bognor were cancelled due to a clash with a conference) but it is reasonable to assume that 2000+ people in total experienced the Spooky Science activities in person<sup>2</sup>.

The Spooky Science web pages received a total of 3374 visits between Thursday 9<sup>th</sup> October and Sunday 30<sup>th</sup> November 2008. However, the data collected does not distinguish between unique users and the same people visiting the pages more than once. 2493 visits were made to the interactive Flash version of the website and 881 were to the text only version of the site. This may suggest that building web pages using Flash can be a barrier to access for some users<sup>3</sup>. It can be assumed that most, but not necessarily all, of these visits were driven by the Spooky Science activities at Butlins.

The brief was to obtain feedback from a range of visitors to Butlins resorts, especially:

- Families with children aged 6 –12
- Families with children 3-6

The target was to question an equal number of male/female respondents, and to target families with equal mix of 1, 2 and 3+ children. In practice, anyone who could be identified as having participated in Spooky Science in the vast Skyline arena was questioned. The response rate was exceptionally high with only one family rushing past saying that they did not have time to answer the questions. All other respondents were extremely willing and happy to talk.

Interview data was collected over two full days when Spooky Science shows were running at Butlins Minehead, on Tuesday 21<sup>st</sup> and Saturday 25<sup>th</sup> October 2008.

Face-to-face exit interviews were carried out with 41 respondents (often couples or family groups so the actual number of people consulted was actually much higher) immediately after the Spooky Science shows at Butlins Minehead. 25 people (again couples or family groups) in the Skyline arena who did not attend Spooky Science were also interviewed face-to-face.

In addition, 157 written self-evaluation feedback forms were filled in by participants themselves across all three Butlins sites where the Spooky Science activities were running:

- 25 forms were completed by children and 17 by adults at Minehead;
- 6 forms were completed by children and 5 by adults at Skegness and
- 53 forms were completed by children and 51 by adults at Bognor.

The data suggest that self-evaluation feedback forms are more popular with children than with adults.

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<sup>2</sup> Note this is less than the anticipated (and resourced) participation rate of 6000 due to the inconsistent marketing and scheduling of the Spooky Science activities across the three venues.

<sup>3</sup> Although in fact some search engines automatically directed users to the text version of the site.

35 respondents volunteered to give email addresses or telephone numbers and were contacted a few weeks following the Butlins activities to ask them to complete a short online questionnaire relating to follow up (see Appendix 5). The survey was constructed using Survey Monkey tools (<http://www.surveymonkey.com>) to make it as straightforward as possible to complete. 22 people completed the online survey and three others were contacted by telephone and their feedback inputted manually. The online survey therefore generated 25 responses.

### 3. Demographics

#### 3.1 Geographical reach – postcode analysis

The 66 groups interviewed face-to-face (both those who attended Spooky Science activities as well as those who did not) at Butlins Minehead were asked their postcode.

The sample reflected a wide geographical spread across the UK. The postcodes revealed people had travelled to Minehead from as far north as Yorkshire, east as far as Essex as well as Margate in Kent and south to the tip of Cornwall.

There were some clusters of postcodes that were particularly frequent. There were eight respondents from the Bristol / Bath areas and seven respondents from Birmingham / West Midlands. Four respondents were from the Torbay area. Three respondents each gave their postcode as Plymouth, Leicester / East Midlands and Cornwall.

There does not seem to be any particular difference between the postcodes of those who did attend Spooky Science activities compared to those who did not (see Table 1).

**Table 1: Postcode of respondents**

<b>Attended</b>	BS3	CT9	DY3		GL16	LE19	NG6	PL6	RH2	SP11	TQ5	UB7	WN1
<b>Spooky</b>	BS7	CM1	DY6		GL50	LE67	NP19		RG10	SA12	TQ4		WV15
<b>Science</b>	BS22	CM13	DE12			LE11				S64	TR14		
<b>show</b>	B70	CV31	DT2			L33				SN11			
	B72												
	BH8												
	BR1												
	B75												
	B75												
	B78												
	BA13												
<b>Did not</b>	B98		DT4	EX8	GL52		NP22	PR7	RG	ST16	TQ1		WS3
<b>attend</b>	BS15		DT4	EX				PL	RG29	SP1	TR27		WS10
<b>Spooky</b>	BA21		DT2					PL7			TQ12		
<b>Science</b>	BS31										TR1		
<b>show</b>	BA2												
	B30												
	B31												

#### 3.2 Repeat visitors

There appears to be a very high level of repeat visitors at Butlins from the sample. 55 of the respondents who took part in Spooky Science activities and completed self-evaluation feedback forms had been to Butlins before (76%), and only 17 (23%) had not visited Butlins previously. One respondent (1%) did not answer the question.

### 3.3 Social grade analysis

The 66 groups interviewed face-to-face (again both those who attended Spooky Science as well as those who did not) at Butlins Minehead were asked what they did for a living (both male and female respondents). These occupations were used to determine social grade using the standard A, B, C1, C2, D, E classifications. The results are given in Table 2.

It seems from the data that more people who are described as middle class (ABC1) attended Spooky Science activities. More people who are working class (C2DE) did not attend the Spooky Science activities.

The difference was particularly noticeable in the number of middle class (B) people who attended (28%) compared with those who did not (12%) and the number of working class (D) people who did not attend Spooky Science (56%) compared with those who did (36%).

**Table 2: Social grade of respondents**

			Did attend Spooky Science		Did not attend Spooky Science		UK average <sup>4</sup>
<b>A</b>	Upper middle class	Higher managerial, administrative or professional	2	3%	1	2%	4%
<b>B</b>	Middle class	Intermediate managerial, administrative or professional	17	28%	5	12%	22%
<b>C1</b>	Lower middle class	Supervisory or clerical, junior managerial, administrative or professional	11	18%	6	14%	29%
<b>C2</b>	Skilled working class	Skilled manual workers	7	11%	5	12%	21%
<b>D</b>	Working class	Semi and unskilled manual workers	22	36%	24	56%	16%
<b>E</b>	Those at lowest level of subsistence	State pensioners or widows (no other earner), casual or lowest grade workers	2	3%	2	5%	8%
			<b>61</b>	<b>99%</b>	<b>43</b>	<b>101%</b>	<b>100%</b>

Science activities do, therefore seem to have greater appeal to people from higher social classes, but the sample size was relatively small and there was no benchmark data on the social class of general Butlins visitors provided to draw comparisons and validate the sample.

The data, when compared to the UK average percentage of people in different social classes, does suggest that Butlins attracts a significant percentage of working class people (D) – 46% of the sample as compared to 16% of the general population.

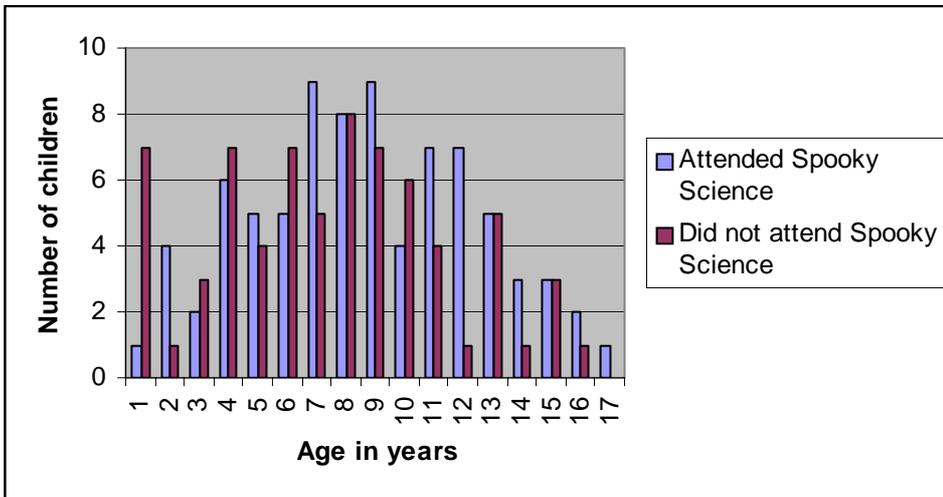
### 3.4 Age of children

From the data collected in the face-to-face interviews, children of age 7, 8 and 9 were most likely to attend Spooky Science activities. The next most likely age range was 11-12 year olds. However, children 13-17 year olds also participated in Spooky Science – albeit sometimes in mixed family groups with younger friends and siblings.

<sup>4</sup> Source: National Readership Survey, January-December 2006.  
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There were substantial differences in the ages of the children who did not visit compared to those who did (see Figure 1).

**Figure 1: Age of children**



Those who did not take part in Spooky Science activities were more likely to have children aged 1-4 years.

Children who completed the self-evaluation forms were also asked their age. The data in Table 3 shows again seven years is the most frequently reported age, but there was also a very high number of six year olds. There was also a significant number of 13 year olds taking part in Spooky Science.

**Table 3: Age of children completing self-evaluation feedback forms**

Age	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	1	2	6	16	18	11	11	6	9	1	7	1	1

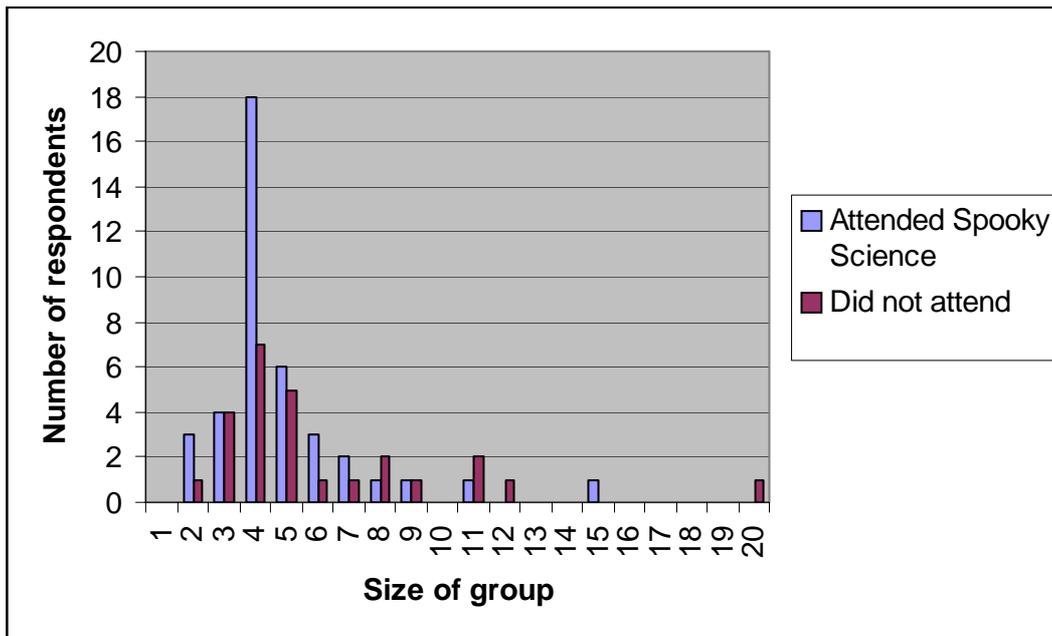
### 3.5 Size of group

Most of the people questioned in face-to-face interviews were in a group size of four (reflecting the nuclear family). 18 of the respondents who saw Spooky Science were in this category, and seven of those who did not see the show. The second most common group size was five (reflecting two adults and three children). However, there were some groups of six, which reflected extended families that included grandparents.

A couple of groups of between seven and nine people were typically two families holidaying together. A few very large groups (made up of 11, 12, 15 and 20 people) were multiple families holidaying together.

There are few differences between the sizes of groups that chose to go to Spooky Science (see Figure 2), except for the very large groups, which seem slightly less likely to go (this may reflect the ability of these groups to decide on set activities in advance).

**Figure 2: Size of group**



## 4. Results

The feedback from participants on all aspects of the Spooky Science activities was consistently extremely positive. There were very few negative comments, and only a few suggestions from Butlins visitors of areas where Spooky Science could be improved.

Spooky Science was a unanimous success from the perspective of visitors to Butlins as well as staff who had the opportunity to experience it.

### 4.1 Overall satisfaction

The praise for the Spooky Science activities was overwhelming. In the face-to-face interviews people said Spooky Science was:

- *'Fantastic.'*
- *'Excellent – superb.'*
- *'Loved it.'*
- *'Really good for the kids.'*
- *'Kids loved it.'*
- *'Cool.'*
- *'Just great.'*
- *'Good – quite informative as well as fun.'*
- *'Brilliant.'*
- *'Absolutely great.'*
- *'Very educating.'*
- *'Really good – funny but really educational.'*
- *'Children really enjoyed it.'*
- *'Fabulous. Very educational. Lovely to see something educational for a change.'*

As one respondent in Skegness summarised on the self-evaluation feedback form, *'I like all the shows where things are explained, such as this science show, or the magic show the same performer that we saw at Minehead in the summer'*.

For some respondents Spooky Science exceeded their expectations:

- *'Wasn't looking forward to it as the leaflet said it was only three things – it was much better than that!'*
- *'Very good, better than I expected.'*
- *'Felt at first – from brochure – it didn't do enough but it did. It was more than I expected.'*

The MLA Inspiring learning For All Framework – [www.inspiringlearningforall.gov.uk](http://www.inspiringlearningforall.gov.uk) (measuring generic learning outcomes relating to enjoyment, knowledge, attitudes, skills and progression) was used to ascertain whether people were more likely to report cognitive (understanding) or affective (attitudinal) changes towards science in general and physics in particular.

**Figure 3: The five generic learning outcomes (GLOs)**



**Enjoyment, inspiration, creativity**

Having fun,  
Being surprised  
Innovative thoughts,  
Creativity  
Exploration, experimentation and making.  
Being inspired

**Knowledge and Understanding**

Knowing what or about something  
Learning facts or information  
Making sense of something  
Deepening understanding  
Making links and relationships between things

**Attitudes and Values**

Feelings, perceptions  
Opinions about ourselves (eg self esteem)  
Opinions or attitudes towards other people  
Increased motivation  
Attitudes towards an  
Positive and negative attitudes in relation to an experience

**Skills**

Knowing how to do something  
Being able to do new things  
Intellectual skills  
Information management skills  
Social skills  
Communication skills  
Physical skills

**Activity, behaviour, progression**

What people do  
What people intend to do  
What people have done  
Reported or observed actions  
A change in the way that people manage their lives

## 4.2 Enjoyment

On the self-evaluation feedback forms, all of the adult respondents said they themselves enjoyed the Spooky Science activities. Children were asked to rate the activities: bad, OK, good or very good. 65 (76%) said Spooky Science was very good, 17 (20%) said it was good and four (5%) said it was OK. No-one rated Spooky Science as bad.

Nearly all adults also said that their children enjoyed Spooky Science. *'Really interested in the experiments, they made them fun for the children.'*

The two adult respondents who said that their children did not enjoy Spooky Science said:

- *'One was too young. The other loved it.'*
- *'Scared but only when the noise was ghostly.'*

From the face-to-face interview the positive aspects of Spooky Science were said to be:

- *'Interaction.'*
- *'Science explaining.'*
- *'Explanations of science.'*
- *'Humour mixed in with facts.'*

Statistically, the spinning spiral and the way it makes a person's head appear to grow was mentioned more than twice as often as any other feature of the show in the face-to-face interviews. 19 respondents cited the spiral as their favourite part of the show. The second most popular feature was the fire vortex (eight respondents). The ghost in the mirror, Van de Graaff generator, photo luminescent shadow wall and the vacuum pump were all mentioned by between four and six respondents.

The Shepard's tone (which people called 'pitch'), bed of nails and UV light demonstrations were not mentioned at all as favourites in the face-to-face interviews, although a couple of respondents mentioned that they were areas where they had learned something new.

Elements that connected with peoples' previous (especially relatively recent) experiences seemed especially successful. The only two people who commented on the mirascope both said that they seen one before, a grandmother saying she bought one for her family last Christmas. Another family said that, *'photo luminescent was explained well. Got some glow stars just last week'*.

The self-evaluation feedback forms revealed a wide range of different 'best bits' and 'worst bits' as different things clearly appeal to different people. Quite often people said *'it was all good'* and *'nothing'* was the worst, except perhaps, *'waiting for it to start'* and *'it is over very fast'*.

The spinning spiral was again one of the most frequently mentioned best bits. So also were:

- *'Audience participation.'*
- *'Best bit of show seeing my son take part.'*
- *'Informative bits.'*
- *'Watching experiments and explanations.'*
- *'Emily on stage.'*
- *'I enjoyed seeing how the science worked in the show.'*
- *'All of it was very good, especially luminescent shadows.'*
- *'Very well explained.'*
- *'Everything was very educational and interesting.'*
- *'Presenters.'*

A few worse bits included:

- *'Sometimes a tad too loud.'*
- *'Ultra violet light – couldn't see it.'*
- *'Too scary.'*
- *'The scientist's pants.'*
- *'Some of the props did not work.'*
- *'Should have been more interaction with kids.'*
- *'The rat was boring (no offence).'*
- *'The rat/bed of nails.'*
- *'Hair didn't stand on end.'*

#### **4.3 Knowledge and understanding**

The question 'did you find out anything new?' through the Spooky Science activities met with polarised answers. Some people said everything was new to them, and others said nothing was new! Many adults were familiar with the general concepts covered and so said:

- *'Not that I didn't already know.'*
- *'I remember it from physics – the Van de Graaff generator.'*
- *'Similar to something at school.'*
- *'Not new, but reminded me of school.'*

Others said they had learned new things:

- *'Just about everything was new to me.'*
- *'Yes definitely.'*
- *'Yes – most of the science I wasn't clear about.'*
- *'Most of it.'*
- *'A few things – incandescent.'*
- *'Yes, didn't know about eye muscles.'*
- *'About how the brain hears the sound.'*

It was often men who said they learnt nothing new, *'I knew it all'*, and women who said that they did! One woman did however say that it had made her realise *'that I am more intelligent than I thought'*.

Some respondents who said they didn't learn anything new explained:

- *'I am an engineer.'*
- *'But then I'm a Chemistry teacher.'*
- *'An electronics engineer with a degree in physics.'*

Most adults thought that their children had definitely learned new things. One boy himself said, *'It learned me a lot because I didn't know any of that stuff. I don't really like science.'* Some of the elements were however already familiar especially to older children who said they had *'seen hair stand on end at school'*.

Other children said they learned:

- *'Evrythink [sic].'*
- *'Lots of new things.'*
- *'Yes – loads.'*
- *'Reflected glass.'*

- *'Bottle trick when on an aeroplane.'*
- *'Spiral and bottle crush.'*
- *'The vacuum [sic] releasing and taking air.'*
- *'It was all new.'*
- *'Compressed air.'*
- *'The fire and glow in the dark.'*
- *'Fire and the spinning head.'*
- *'How we make thunder cans.'*
- *'A bit more about science.'*
- *'That ghosts don't like noise and the balloons attract the ghost to go away.'*
- *'Electric shock.'*
- *'Fire tube tornado aeroplane.'*
- *'When his head went big.'*
- *'Your head get bigger behind a spiral.'*
- *'How eye muscles work.'*
- *'That something can contain air inside a vacuum.'*
- *'Yes - the eyeball reflections.'*
- *'Yes the fire thing.'*
- *'Yes that no air makes things expand.'*
- *'Stone sound getting lower.'*
- *'Photo/light sensitive paper.'*
- *'That when you look in the spiral and things go bigger.'*
- *'Brain combines what you see through each eye into one object.'*

The spinning spiral was new to many people and perhaps partly why it was so appealing. The other areas that seemed to be new knowledge included the rat and the shaving foam, the bottle on an aeroplane and the bed of nails. One respondent said she learned, *'That it is possible to lie on nails'*. Interestingly, these were also sometimes given as the worst bits.

The electric shock was also a very popular element – especially as it really hurt the presenters! As one respondent said, she was *'nearly crying [with laughter] with shock'* at that point. So also were the flying balloons at the end. Children drew assumptions from the experiments such as *'that ghosts don't like noise and the balloons attract the ghost to go away'*<sup>6</sup>.

The content level was almost unanimously felt to be about right *'all things they would have known about'* except for some science professionals and younger children:

- *'Child [3] was a bit young.'*
- *'5 year old didn't get it all but liked seeing it.'*
- *'Too simplified [an engineer with a physics degree].'*

It was also commented that it was content that engaged adults as well as children, *'good for him and not boring for adults'*. Although people recognised the science elements in the show, relatively few spontaneously commented on them as *'physics'*.

#### 4.4 Attitudes

There was a mixture of attitudinal responses among the participants to science in general. One respondent asked if they were interested in science said *'No, not really – there is nothing worse than boring science but this makes it exciting'*. Another said *'not really – but that made it better'*.

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<sup>5</sup> It is possible some children may go away with a misconception that the show validated the scientific existence of ghosts!

Many adults felt an obligation to have an interest in, and understanding of, science for their children, *'terrible when you can't answer his questions'*.

Many people referred to negative school experiences of science, *'school was all boring'*. As one person said on the online survey, *'I had no idea that something so seemingly daunting as physics (I have bad memories from my school days) could be approached in such a fun way'*.

Overall, people were generally positive about other informal science related activities, with over two thirds of the sample who participated in Spooky Science having previously visited a science centre, although this is not an indication that they are regular attendees at science centres or other science related activities.

When asked if they go to other science activities as a family, such as visiting a science centre, of those completing self-evaluation feedback forms 48 (68%) said yes and 23 (32%) said no. One respondent said they have visited *'quite a few science centres'* and another *'We are members of Think Tank in Birmingham'*. One person said that they sometimes visit *'measeam'* [sic] and another included *'books'* as family science activities.

The places they have visited included:

- The Science Museum London, (9 responses)
- Think Tank, Birmingham (2 responses)
- At-Bristol (2 responses)
- Techniquest, Cardiff
- Eureka
- Discovery Centre, Bracknell
- Winchester Science Centre
- Leicester Space Centre
- Sensation in Dundee
- Magna
- Glasgow Science Centre
- Pushes and pulls - Legoland

However, there were some differences in the level of science interest as well as qualifications in science between those participating in Spooky Science activities and those who did not (see section 5. Factors affecting Participation).

#### **4.5 Skills**

The question relating to skills – did you and/or your children learn any new ways of doing things – was intended to evaluate the make and take activities. As so few of the respondents to the face-to-face questionnaire had taken part in the make and take activities (see also section 4.8, and they were not running at all on the first day of interviewing) the question was omitted from the survey. However, one person commented that it was *'a good idea to make the things first to join in the show'*.

From the self-evaluation feedback forms completed by children, there did not seem to be any preference expressed between enjoying making the cackling cups, ghostly balloons or thunder can best. Different things appealed to different people. However, it is not clear from the responses whether the 'making' in the question means the children actually made the props, or whether they made noises with ready-made ones they were given during the show.

## 4.6 Progression

Spooky Science activities did prompt people to want to know more. All of the children except one who completed self-evaluation feedback forms said that it made them want to know more about science.

Responses from adults were more varied; they were more likely to want their children to find out more rather than themselves personally. Although as one respondent said, *'there are always new things to find out about science'*. And another said that they *'will try the plane'*. One respondent said that *'when they next do a physics project at school we will do the spiral'*.

One obvious expression of people's desire to know more is linked to their interest in the Spooky Science website at [www.physics.org](http://www.physics.org). When asked at Butlins Minehead, 37 of the 41 respondents said they would look at the website. *'Will get logging on to website out of curiosity.'* Of the three who said they would not two did not have computers and internet access (one retired couple and one carer with an elderly mother) and one other respondent said that they might access the site.

However in practice less than a third of the sample contacted as a follow up to their stay in Butlins had actually visited the site (see section 4.8 Response to online survey).

Adults were asked if they would like more similar activities, and if so what. Most respondents in the face-to-face interviews said they would like to take part in other activities. However, there were relatively few examples of other types of activities given other than:

- *'More kids interaction, a chance for them to get involved.'*
- *'Sex education, drug advice, bullying.'*
- *'Under 5 years stuff. Touch and feel.'*
- *'Anything free.'*
- *'Anything with physical displays. Chemistry, colours, magnesium.'*
- *'Dr Bunhead chemistry stuff.'*
- *'Likes gory things.'*
- *'Yes with light entertainment.'*
- *'Interested to know if this visits schools.'*

When asked if they were interested in more activities like Spooky Science, 64 of those completing self-evaluation feedback forms said yes (94%) and just four said no (6%). The kinds of activities they were interested in included:

- *'Anything and everything – it was great!!!!'*
- *'Biology/Chemistry.'*
- *'School visits?'*
- *'Any science based stuff.'*
- *'Space and aircraft.'*
- *'Anything scientific.'*
- *'Optical illusion.'*
- *'Physics.'*
- *'All sciences – chemistry.'*
- *'Helium.'*
- *'Explosions.'*
- *'Anything weird and interesting.'*
- *'More interesting facts.'*
- *'All sciences.'*

Four respondents also said that they would be interested in *'history'*.

#### 4.7 Comparison with other Butlins events

Respondents in the face-to-face interviews were asked how Spooky Science activities compared with other Butlins events. *'Very well'* and *'better'* were two of the comments. The responses rate Spooky Science very highly. Spooky Science was seen as something: *'Quite unique – different entity'* which complements other Butlins activities. It was seen as a good alternative to the more typical singing and dancing shows. It was especially appealing to adults with children aged 7-11 who were too old for the Bob the Builder and Barney shows but too young for the more independent activities. *'7-8-9s are hard to cater for – older boys don't like cartoon characters.'*

The educational aspect of Spooky Science – combined with the entertainment – was very much appreciated. *'Fabulous. Very educational. Lovely to see something educational for a change not just wasting money.'*

Spooky Science was described as:

- *'The best one [event] so far.'*
- *'Different – nice to do something.'*
- *'Best thing we have done so far.'*
- *'Very favourably. Balance of education and engagement.'*
- *'Much preferred it actually – not so spooey, not just slapstick.'*
- *'Good experience for the kids.'*
- *'It was different, unusual, enjoyable, we loved it.'*
- *'Something new, liked it. It is different - we had been in May and a lot of it is the same.'*
- *'Really good – bit different from usual.'*
- *'Different – fun but educational.'*
- *'On a par – bit different.'*
- *'More educational, rest is just singing and dancing.'*
- *'Similar shows, that was a bit different.'*
- *'More educational. Good fun and learning as well.'*
- *'Haven't seen many. It is a bit different – more educational really.'*
- *'Brilliant – "funner".'*
- *'Haven't seen much – good for kids. All seemed interested.'*

It is clear that the presenters contribute significantly to the show's success:

- *'The presenters were the best thing.'*
- *'Really well presented.'*
- *'Presenters made it.'*
- *'Citrus brothers – the presenters/compères.'*

#### 4.8 Response to online survey

The 35 respondents who gave email and telephone contact details were contacted to see if they had developed their interest in science since the Spooky Science activities at Butlins. This offers a further link to the concept of progression in section 4.6 above.

In response to the question; 'Have you and your family talked about Spooky Science since Butlins?' 17 respondents said yes (68%) and eight said no (32%).

The follow up question 'If yes, which bits in particular?' prompted the following 16 responses:

1. Yes she told her teacher about it at school.
2. Generally about the show and what was in it.
3. Spinning spiral (brilliant!). Vacuum chamber, spinning flame.
4. The shadows on the wall.

5. The floating eye and the Van de Graaff generator.
6. Bed of nails air pressure.
7. The swirly face.
8. All of it. We loved all of the experiments.
9. The photo paper which gave funny shadows The flame in the tube so when the tube turned it made the increase in height.
10. We have looked at a diagram of a Van de Graaff generator in one of my Physics books.
11. Fire flame and the hole in the hand!
12. Watch the spinning wheel then look at the head and the rat with the shaving foam.
13. The spin wheel/growing head.
14. My kids enjoyed watching the man's head getting bigger after focusing on the spinning wheel [sic] they talked about it on the journey home.
15. Website, and the everlasting tone predominantly!
16. Watching the swirling picture then looking at your hand.

The question 'Has anyone visited the Spooky Science web pages on [www.physics.org](http://www.physics.org) since seeing the show?' was met with nine respondents saying yes (36%) and 16 respondents saying no (64%).

Of the nine respondents who had visited the website, six (66.7%) had visited both themselves with the children together, two (22.2%) said the children had visited alone and one (11.1%) said that they had visited the site themselves.

The best bits of the Spooky Science web pages were given by the eight people who responded as:

1. Reproduction of the experiments of the show and some of the links were useful as well.
2. It acted as a reminder of the show and stimulated questions.
3. Looks a good fun website and have saved to favourites to view with the children.
4. The game where it showed you how to make everything.
5. Easy to use and fun.
6. Milo - physics to do at home.
7. Have viewed videos of various currently like piercing a balloon with skewer and stabbing a potato with a straw. On Spooky science have revisited a number of the phenomena shown.
8. Ghost in the mirror.

The main reasons given for not visiting the website were no time – seven (46.7%), not knowing the website address – six (40.0%) and not interested – two (13.3%).

Other comments made in the online survey about Spooky Science in general were:

1. Everything is good there – we have booked again to go in October.
2. Gave the web address to the school – they were interested – don't know if they have actually looked at it. Butlins needs more like that for the older primary age group (10 years old) – Bob the Builder and a lot of things are aimed at younger children. The workshops needed plugging more – we didn't know about that, only a few people had made things.
3. Will go on the internet but have been having problems with internet connection Thought the show was really good.
4. My 7yr old son thoroughly enjoyed the show. This sort of thing is right up his street.
5. The show was great and my son and I would love to see more it in the future.
6. Great, the more kids you can get interested in science the better, and a themed show for them to watch during a holiday seems a good way of doing it.
7. It was a great laugh.
8. We would consider going to more shows if they made science as exciting as this. We all loved it.
9. We all loved it. You can never introduce science to children too early and making it fun and putting it into the real world makes it a better thing.
10. It was interesting and what made it good was that they made it funny to be more enjoyable.
11. My youngest had no real interest in the science part but found the show amusing, this was good for families with children of differing ages.

12. Excellent to see a science based show at Butlins – I would like to see it as a continual programme. Very enjoyable and interesting.
13. Will be looking on the web soon. Fantastic show.
14. The home experiments have proved to be a great success...for both me & my 7-year old son. I had no idea that something so seemingly daunting as physics (I have bad memories from my school days) could be approached in such a fun way.

#### **4.8 Make and take versus the show?**

People were asked if they preferred the make and take activities or the show. The responses show that many people only attended the Spooky Science show, not the make and take activity session.

- *'Only went to show, wasn't aware of the workshop.'*
- *'Missed the make and take – unfortunately. Show was brill.'*
- *'Didn't know about the workshop.'*
- *'Didn't go to 'make and take' – wondered whether kids (6 + 2) too young.'*

This is in part due to the advertising and to the timing. In Minehead, for example, the make and take sessions were timetabled on the evening before the day of the shows. As all shows were on Tuesdays and Saturdays, the make and take sessions were on people's days of arrival. The timing at 6pm clashed with other meet and greet activities or meant that people had not had time to read the What's On guide and plan their itineraries (see also section 5. Factors affecting participation).

Again, in Minehead, the make and take sessions and the shows were also not linked through the advertising. The make and take sessions were listed under the 'Fun for kids' section on the day and time they were running and the shows were listed in a special advert that variously appeared on different days. The special advert did not make any reference to the make and take sessions.

Because the majority of the show participants had not taken part in the make and take activities, ready-made props were issued on arrival. The impact of the sound effects was therefore diminished, as people had not had a chance to explore the sounds before the show.

When people did attend the make and take sessions they were very positive in their comments. When asked whether they preferred the make and take session or the show, those who attended both liked both equally.

- *'Both, good idea to make things first to join in the show.'*
- *'Loved both, will check out ww.x.'*
- *'Both of them equally.'*

Very few people were seen carrying props into the shows, except for one woman seen pushing a buggy laden with two thunder cans, two cackling witch cups and two ghostly balloons – all beautifully decorated with colours and sequins!

#### **5. Factors affecting participation**

The interviews with people who had not attended Spooky Science activities did not reveal any particular barriers relating to science that prevented people attending, except for one man who said *'I couldn't stand science at school. I hated the teacher and the teacher hated me'*.

Of the 26 groups questioned, 11 said they had seen it advertised but 15 said they had not. They had mixed feelings from the title what to expect from Spooky Science.

- *'Could be anything.'*
- *'Haven't a clue.'*

- *'Ghosts and Halloween.'*
- *'Potions and stuff.'*

The reasons they gave for not participating were:

- *'Didn't see advert.'*
- *'Too spooky for 6 year old – she hates everything to do with Halloween.'*
- *'My son is too young [16 months].'*
- *'Haven't looked in the brochure yet – only arrived yesterday.'*
- *'Only just got here yesterday.'*
- *'Still deciding.'*

Of those who did not participate in Spooky Science activities but who responded to face-to-face interviews, 20 (57%) said that they were interested in science and 15 (43%) said that they were not. 14 of these respondents (54%) had some science qualifications in science (mainly GCSEs) and 12 (46%) did not.

This compares with 34 (77%) of those who took part in Spooky Science saying they were interested in science activities and 10 (23%) saying they were not. 23 (61%) of those who participated in Spooky Science had qualifications in science (some at degree and Masters level) and 15 (39%) had no science qualifications at all.

It therefore seems that science activities to some extent attract those already predisposed to science and with generally higher levels of science qualifications (beyond basic GCSEs).

## **6. Feedback from Butlins staff**

Butlins staff interviewed at Minehead were all extremely enthusiastic about Spooky Science and all would be keen to do something similar again. They also thought that the visitors enjoyed it, *'seeing kids faces of wonderment during the experiments'*. One Redcoat said it was certainly *'popular judging by the numbers turned away'* from some of the sessions. Another said that the audience *'react just as they are supposed to'*.

Their impression was that the science was *'easily explained and done in a fun humorous way not boring'*. They thought that the title of Spooky Science was clear, and that it appealed to people with an interest in science. The approach of explaining the unexplained was a successful one.

Redcoats had heard people talking about Spooky Science afterwards – saying how brilliant it was as they left the show, and one Redcoat asked people when he was compèring evening shows if they had been to Spooky Science and what they thought of it. One presenter said he had heard visitors saying it is nice to have something other than singing and dancing. As he said, *'edutainment'* is good.

The only criticisms Butlins staff made were that it was not really aimed at very little children, *'a bit scary for little kids'*. One parent had said that her 6 year old was *'still scared of ghosts after last night's people dressed in black'*. Butlins staff thought the ideal target age was 6+. They also suggested more ways of offering interaction, for example, by allowing the audience to come up and see the experiments close hand after the performances (however, the presenters pointed out there was little time to reset the props between shows).

Suggestions to improve Spooky Science type activities in the future included:

1. A professional sign outside the venue advertising the show times.
2. A compère to introduce the show, like other Butlins events.

3. Microphones to help the Redcoats be heard when they are explaining the sound effects. One Redcoat could then explain the techniques to produce the sound while the other demonstrated.
4. The 10am show was felt to be too early in the day (and therefore on some days attracted a smaller audience).
5. The make and take activities could be in the same room and just before the shows in order to create a more direct link between the activities and the presentation.

The Redcoats and the presenters in fact thought that the *'sound effects were not essential'*. The actual sound made by the props was relatively quiet, and so the Redcoats encouraged people to stamp their feet, clap their hands and made spooky vocal sounds. These, and the noise of the show itself, drowned out the more subtle sound effects made by the props.

The chance for staff to be involved in Spooky Science was also a challenging but positive experience for the specialist roles of special effects and presenters.

The member of staff at Butlins responsible for the sound and lighting said he was *'well into it'*. Although he didn't know initially what to expect, and was *'busy with all the cues'* and had the *'jitters'* in the first show after only one day of rehearsal, he felt that *'it got slicker with time'*. He was *'really enjoying doing the sound and lighting'*.

The show presenters were similarly enjoying their roles, although they had found the science challenging *'understanding the physics'*, and *'to learn new things and then simplify it'*.

As they said, *'some aspects of the science were easier to explain than others'*. Shepard's tone was one element that they felt was particularly difficult as it is not visual, and relies purely on the explanation. As one of the presenters said *'I still don't understand it'*.

One of the presenters felt you could put more in to the show, the other thought it would work better if you took some things out. They were least pleased with the bed of nails. They said it was not well introduced simply by knocking it over, and it lacked the 'wow' and more visual aspects of some of the other elements. In fact, one of the presenters felt you could make a show just with the vacuum, Van de Graaff generator, photo luminescent shadows and the spiral – and have the opportunity to do more on each of these.

The presenters clearly found the schedule of delivering shows across three venues demanding and suggested changing the number and length of the shows (perhaps just an 11am and 2pm performance which each lasts longer) as well as varying the days and timings across the venues. They also commented that the marketing should be better (and more consistent) across the venues. Minehead was thought to be more successful than the other two Butlins venues because the marketing was more obvious (although still with certain mistakes relating to days and timings). The venue at Minehead was also preferable to the other sites as it was an enclosed space where numbers could be controlled and families could sit together. The venue capacity of about 50-70 was ideal from the presenters' perspectives.

Other topics of interest to Butlins staff included the paranormal, magic, skills, explosives and *'biology would be good – dissection – gross for older kids'*. One of the presenters was keen to develop a science show without a theme running from Easter through the summer, *'with all the fun but without the dryness of science'*. He felt that the Halloween theme was actually rather limiting.

## 7. Recommendations

Many of the recommendations come from Butlins staff and the evaluator, not from visitors who were mostly very satisfied with Spooky Science as it was offered.

Specific recommendations are:

1. To create a similar show around broader themes (or no theme at all). The Halloween theme was, for some participants, too scary and for the presenters limiting.
2. To improve the publicity and marketing and list it consistently and correctly in the What's On brochure against times of day like other events as well as in the form of a special advert.
3. To advertise the target age range clearly (6-16).
4. To adopt features of Butlins shows – compères, signage, microphones etc. as standard.
5. To market the relationship between the make and take activities and the show more explicitly.
6. To ensure the make and take sessions take place immediately before the show.
7. To consider offering the show without make and take activities (which would reduce costs and resources).
8. To review the need for the sound effects, or the most appropriate sound effects.
9. To look at other forms of audience participation (eg more onstage volunteers, verbal interaction, voting, quizzes, Q&As).
10. To offer other opportunities to interact with the experiments firsthand eg after the show people could look closely at the mirascope.
11. To offer a science show as a regular feature in Butlins – perhaps with seasonal variations.
12. To *'Do something for younger ages'*.
13. To vary the times of day and days of the week at each venue so that it falls at different points in the visit cycle.
14. To create different products that carry the web address – perhaps things that people are more likely to use such as pens and pencils.
15. To evaluate the use of the website in more detail<sup>6</sup> and judge its cost / benefit. A simpler website that can be easily accessed by a wider range of users (and changed/updated by staff in response to user feedback) may be desirable.
16. To use self-evaluation feedback forms as a regular part of the programming to ensure ongoing feedback.
17. To collect quantitative data systematically across all venues to measure participation.

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<sup>6</sup> More detailed user data could be obtained using, for example, Google Analytics [www.google.com/analytics](http://www.google.com/analytics).

## 8. Conclusion

The evaluation shows that there is clearly an appetite for more science activities like Spooky Science at Butlins.

Both Butlins staff and visitors who participated in the Spooky Science events share this view.

One visitor with a 6 year old and a 15 year old doing science GCSEs summed up with it *'it is the best thing we have done so far. Entertaining and it made it easy across all ages. It should be a regular thing here – not just Spooky Science, for example could have Christmas special'*.

Participants in Spooky Science activities reported both cognitive (understanding) and affective (attitudinal) changes in relation to science in general and, to a lesser extent, physics in particular. The project therefore fully met its objectives.

Many of the recommendations and areas for improvement relate to practicalities. There is however, a question over the need for the make and take activities. Removing this element would make the programme less resource intensive and more sustainable longer-term. The science show concept is the most successful element and could stand-alone.

The lessons learned through Spooky Science, especially relating to the timing and marketing of activities, can be applied to the continuation of similar partnership activities between the Institute of Physics and Butlins in the future.

## Appendix 1

Semi-structured interview with participants after workshop and show (questions asked and answers written down by interviewer).

What did you think of Spooky Science?

Did the name of the workshop give you a good idea of what to expect?

### **GLO<sup>7</sup> – Enjoyment, inspiration and creativity**

What were the best parts of the workshop and the show?

### **GLO – Knowledge and understanding**

Did you and/or your children find out anything new? What?

Was anything too difficult or complicated?

### **GLO – Skills**

Did you and/or your children learn any new ways of doing things?

### **GLO – Attitudes and values**

Did Spooky Science make you and your children more interested in science/ physics and the ways things work?

### **GLO – Action, behaviour, progression**

Would you like to find out more about anything you did or saw?

Did your family talk about Spooky Science after the event?

Do you think you will visit the website?

Yes / No / Maybe

How did Spooky Science compare with other Butlins events?

Are you interested in science? In physics?

Do you think the workshop and show were about physics? Did they explain the science well?

Do you have any qualifications in science? (School GCSEs, A levels, diplomas, degree etc...)

How many people are in your group?

How old are your children?

Can you tell me what you do for a living?

What is the first part of your postcode? (eg BS20, TA11)

Would you give me an email or phone number to contact you again in a week or two?

---

**Thank you for your time – enjoy the rest of your holiday!**

<sup>7</sup> GLO – generic learning outcome, part of the framework developed by MLA see [www.inspiringlearningforall.gov.uk](http://www.inspiringlearningforall.gov.uk).

## Appendix 2

Semi-structured interview with people who did not attend workshop and show (questions asked and answers written down by interviewer).

Did you see or hear about the Spooky Science events?

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What did the name make you think it would be?

---

Why didn't you go?

Prompt if necessary: Was it running at an inconvenient time?

Was the marketing material not clear/exciting?

---

What type of activities do you go to?

---

What do your children enjoy doing?

---

Are you interested in science centres, science TV programmes or other science activities?

---

Do you have any qualifications in science? (School GCSEs, A levels, diplomas, degree etc...)

---

How many people are in your group?

---

How old are your children?

---

Can you tell me what you do for a living?

---

What is the first part of your postcode? (eg BS20, TA11)

---

**Thank you for your time – enjoy the rest of your holiday!**

## Appendix 3



### Self-evaluation – for adults

***Please spend a few minutes telling us what you thought of Spooky Science:***

Did you enjoy the Spooky Science activities? Yes / No  
If not – why not?

---

Did the children with you enjoy the Spooky Science activities? Yes / No  
If not – why not?

---

Did you prefer the 'make and take' workshop or the show?

---

What was the best bit?

---

What was the worst?

---

Did you find out anything new? If so, what?

---

Do you do other science activities as a family, such as visiting a science centre? Yes / No  
If yes, what?

---

Would you like other activities like this? Yes / No  
If yes, what topics would you be interested in?

---

Have you been to Butlins before? Yes / No

**Thank you for your time – enjoy the rest of your holiday!**

Please leave your email address and/or phone number if you are happy for us to contact you again:

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*Data Protection: Your details will only be used in connection with Spooky Science and will not be passed to any third party.*



**Self-evaluation – for children**

Put a circle around your answer

**Was Spooky Science:**

**bad**



**OK**



**good**



**very good**



**What did you like making best?**

Cackling cups

Ghostly balloons

Thunder can

**Which part of the show did you like best?**

---

**Did you find out anything new? What?**

---

**Did anything surprise you?**

---

**Did Spooky Science make you want to know more about science?**

**Yes**



**or**

**No**



**How old are you?**

years old

**Thank you – enjoy the rest of your holiday!**

**Appendix 4**

Semi-structured questionnaire with staff involved in performing/facilitating the workshop activities and show.

**Did you enjoy doing Spooky Science?**

If no – why not?

---

**Do you think the visitors enjoyed it?**

If no – why not?

---

**Were any bits difficult for you?**

---

**Were any bits difficult for the visitors?**

---

**Do you think anything put people off attending – was the title clear and encouraging?**

---

**How would you improve Spooky Science?**

---

**Did you hear people talking about it afterwards? What were they saying?**

---

**Would you like to do something similar again?**

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**What topics would interest you?**

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**Appendix 5**  
**Email and online follow up survey**

Hello

I hope you enjoyed Spooky Science at Butlins!

Thank you for talking to me and giving me your email address.

Please can you answer a couple of further questions on this link:

[http://www.surveymonkey.com/s.aspx?sm=zrWCBOW5V38aToyuAtALMw\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=zrWCBOW5V38aToyuAtALMw_3d_3d)

It will only take a few minutes and your answers will help us develop more exciting science activities in the future.

Thank you!

Katherine

Dr Katherine Hann  
on behalf of The Institute of Physics

The questions on the Survey Monkey link were:

1. Have you and your family talked about Spooky Science since Butlins?

a) Yes

b) No

If yes, which bits in particular?

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2. Has anyone visited the Spooky Science web pages on [www.physics.org](http://www.physics.org) since seeing the show?

a) Yes

b) No

If yes, who visited the web pages?

a) yourself on your own

b) the children

c) both yourself and the children together

What are the best bits of the Spooky Science web pages?

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If no, why didn't you visit the website?

a) Didn't know the web address

b) Not interested

c) No time

Thank you!

I hope you enjoy future trips to Butlins and more exciting Science Shows!