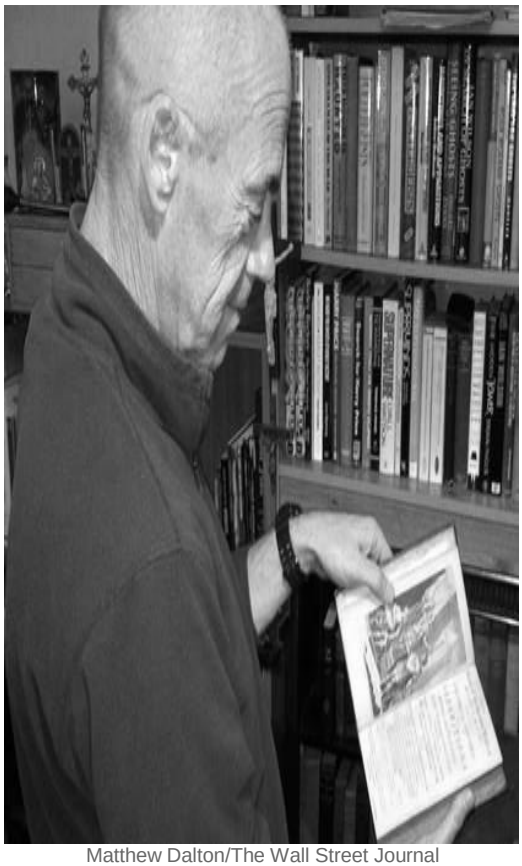

Matthew Dalton/The Wall Street Journal

Steve Parsons is one of the UK's most well regarded paranormal investigators and co-founder of Para.Science, one of the country's leading and most respected investigative groups.

While often associated with research and critique of ghost hunting gadgets, Steve has extensive knowledge on the history of psychical research and many an obscure or forgotten ghost story.

Also an active member of the SPR, Steve has presented at conferences including the SPR and Ghost Club, consulted on documentaries and been interviewed for various print and online sources.

OWNE thanks and welcomes….

Steve Parsons

OWNE: *You've been involved in the subject for many years. How have your personal perspectives, views or specific interests developed or changed to date?*

STEVE: If I think back to the very start of my interest in the weird and the paranormal as a child, back then things were much simpler, ghosts were real but elusive and fascinating. Although I have no real recollection my parents sometimes remind me of holiday trips to haunted places where I would demand to be taken to "look for the ghosts" – life for a 7 year old was much simpler!

There was little questioning the how or why just a desire to have the experience, to share the thrill of seeing a ghostly figure on the stairs or see objects being hurled around without obvious cause. Never a child interested in fiction, I was fortunate to grow up in the era of Apollo and Concorde and I don't think I missed an episode of Tomorrow's World on TV. I have always been addicted to gadgets and technology, so, when eventually, I joined the local paranormal investigation group on Merseyside I was keen to apply technology to the hunt. Ghost hunting was a great excuse to buy loads of tech! The contents of Maplin & Tandy quickly found its way into my ghost

hunting kit. After leaving school I initially trained to be an Instrument Technician, later as a Registered Nurse, so I have always been taught that there are standards that need to be met when measuring 'stuff' and that in order to be meaningful, measurements and observations must be properly undertaken. Looking back to those early days, I was probably convinced that technology held the key to solving the puzzle of ghosts. As we progressed from analogue to digital methods that belief was strengthened. However, deep down there was still that strong desire to have my own personal encounter with a ghost and to capture that experience on film or video as proof of my encounter.

The application of technology very quickly led to me becoming deeply dissatisfied with the manner in which the local team were carrying out their investigations. All too often upon reviewing the results of the various cameras or sound recorders we started to discover that the team members themselves were the cause (witting or unwitting) of the various paranormal events that were experienced and reported. Together with Ann Winsper, another member of that first group who shared the dissatisfaction and increasing despair as we realised that the group were little more than thrill seekers led by one or two who were fully prepared to commit fraud in order to bolster their ego and standing within the group, we regularly presented the footage from our cameras and recorders to the post investigation monthly meetings. Somewhat inevitably, they didn't take kindly to our increasingly frequent exposure of their actions and eventually we were 'asked' to leave!

Ann and I decided that if we were ever going to satisfy our desire for knowledge then there was really only one way we could do that. Both of us understood the need for critical thinking and the sensible application of scientific methods, and so in response we decided that we needed our own team. A team that would conduct its investigations using a measured and critical approach, drawing inspiration from many branches of science, forming conclusions from the evidence rather than belief.

Personally, I don't think my interest in studying the paranormal has been driven by a question of belief. Rather, a desire to try to answer the question; why do people see ghosts? Personally, there is no doubt that they do and that for the majority they are very real experiences that demand an explanation. Are they purely subjective, as some would have us believe or are some ghosts real apparitions of the living and the deceased as others maintain. There is compelling evidence for both cases. Technology has certainly benefitted the ghost hunter but in my case it has been the ability to be better able to measure the environment and provide an increased ability to detect and weed out mistaken and sometimes fraudulent claims rather than any ability to detect ghosts and spirits where its usefulness lies. Para.Science has always focused on the investigation of ghosts, apparitions and related phenomena and avoided getting side-tracked into areas of the paranormal such as UFO's – but we do draw extensively on associated relevant research as required and maintain a broad research base out of necessity. Personally, I have an abiding interest in Spiritualism and a fascination with work of the early Psychical Researchers with whom I can identify in their desire for greater understanding. I suppose with the passage of time I have to some extent become disillusioned with the way that paranormal research has developed. The scientific method and critical thinking of those early psychical researchers has largely been abandoned by the mainstream paranormal community and the scientific establishment remains unwilling to become involved in the study such phenomena.

People still claim to see ghosts and apparitions and I remain as interested as ever in trying to answer the question why? In some cases that may be due to environmental factors creating subtle experiences that people believe are paranormal and that has led to my interest in low frequency sound and infrasound as one potentially interesting line of enquiry. In other cases, it may actually be that ghosts and apparitions do in fact represent some surviving aspect of physical (bodily) death that appear from time to time to haunt the living. I still don't know. One thing that endures from childhood is still that desire to have that personal experience of encountering a ghost face to face!

OWNE: *Looking at amateur groups or more academic research over your time of involvement, how have you seen the "field" evolve (or devolve for that matter). What's been the most cause for concern and what's been the most cause for optimism?*

STEVE: Firstly, I would have to say that I would argue that there are no professional groups involved in paranormal research, so in effect we are all amateurs. Being an amateur should not necessarily be seen as a drawback however; amateurs have made a majority of great scientific discoveries. In fact I think that amateurs often have the advantage, as they are not so confined by the constraints of conventional academic necessities. Amateurs are generally much more enthusiastic and passionate about their interests and often willing to expend large amounts of time and personal money in their pursuits. Amateurs too can develop great expertise within their particular area of interest. Unfortunately, those great strengths that amateurs possess can sometimes be weaknesses too and they frequently ignore the research of others or worse, become blind to any point of view except their own. In more recent years we have seen an explosion of interest in the paranormal, driven by the likes of television and social media. Whereas in the past ghost hunting was considered to be a fringe activity undertaken by a few mildly eccentric individuals to something that anyone can now take part in. I don't think we have seen so much as an evolution, more of a revolution, taking place within paranormal study. There have been peaks of interest before in paranormal, for instance in the late Victorian era driven by an interest in Spiritualism and after both wars too as people sought to communicate with their lost relatives. Ghost hunting both has always been a popular genre within our culture and this was reflected in literature. The fictional tales of hauntings and haunted houses and the non-fictional accounts of ghost investigators have always been top sellers but it has only been in the current century that people have en-masse formed themselves into groups and gone hunting for ghosts. The spur for this is undoubtedly the TV and social media. Watching shows like Most Haunted showed that hunting for ghosts could be undertaken by anyone. I believe that this upsurge is in reality an expression of that same desire I have – to see a ghost, people love to be scared and being scared with your friends is even better! But and it's a big but, in the majority of cases the desire to have that personal experience and to be scared is greater than the desire to understand the phenomena being explored. It is easier (and frequently more desirable) to accept that the noises one heard were the result of a ghostly manifestation rather than some mundane and explainable cause.

Social media has allowed this new generation of ghost investigators to share and swap ideas and theories with ease bypassing and side-lining the more measured approach that tended to prevail in the past.

The academic researchers have for the most part failed to engage with this new level of interest in the subject, the majority tend to avoid the subject of ghosts altogether, the few that do examine the subject tend to approach ghosts and hauntings merely as a product of PSI instead of a potentially interesting area of study in its own right. The academic research also prefers to publish its findings in journals that are for the majority of those interested in the paranormal hard to access and often hard to read. Accordingly, the amateurs have been largely abandoned to their fate by the academics, often dismissed as gullible and mad. It is very much to the detriment of paranormal study that this situation has continued and developed. The amateurs, enthusiastic and often well-meaning are left without the information resource that academic support could provide, so inevitably they look to each other for support and encouragement – they develop ideas and theories that are inspired by the actions of TV ghost hunters who are in reality more concerned about making an entertaining programme than conducting a true investigation. The use of gadgets on the shows also leads to a propagation of strange ideas and notions about what technology is capable of doing. We are shown TV ghost hunters using EMF meters to detect the energetic emissions of ghosts or as devices for communicating with the dead. The use of such equipment is portrayed as factual and there is little attempt by the programme makers to provide an alternative explanation. Even in cases where a show uses an academic to provide an alternative perspective they are frequently shown using equipment in a way that is strongly suggestive of its usefulness as a ghost detecting device. Little wonder then that there are now companies set-up to exploit the niche market for ever more wondrous ghost hunting gadgetry, it seems that every week another new piece of equipment is launched – often with elaborate claims as to its efficacy as a tool for detecting the dead or assisting them to communicate.

But I don't think the situation is all gloom and I have no issue with groups of people who wish to share the thrill of hunting ghosts and enjoy a great social night with their friends and whilst ghost hunting has become to some an interactive scary movie or a money making opportunity there are many who have a genuine interest to understand and to seek to question their own experiences and those of others. They seek the understanding to make sense of their experiences. They question their methods and practises and develop the critical thinking and investigative skills. Within modern ghost hunting there exists many individuals who may provide a valuable contribution. What they need is the cooperation of the academic researchers who can assist them to develop and hone their skills and crucially to help them present their findings in a format and manner that is accessible and acceptable both to their peers and to the academics. Currently there are several publications that serve the paranormal community but in the main these are uncritical and lack any form of editorial or peer review of the claims and contents. We also have several journals that are peer reviewed but are either accessible only to academics or members of the various producing bodies. Their content going mostly unread by the majority of those involved in the paranormal field. Recently we have begun to see an attempt within the paranormal community to seek accreditation and regulation and also there have been set up websites that do go some way to direct paranormalists toward the more interesting lines of research. The situation is constantly evolving and I believe that there is increasingly hope that from the many chaotic lines will slowly emerge a consensus. I'm not talking about paranormal unity or paranormal friendship I'm referring to a consensus that recognises the need for proper standards to be applied to all paranormal research, amateur or academic and the developing of better lines of

cooperation and communication. In that way I believe that amateur research might, just might be capable of answering some of the many questions posed.

OWNE: *As an active member of the SPR, what do you see as the current focus of research of its members? To an outsider at least, it seems more research is geared toward Psi phenomena than haunt or ghost type experiences. If that's accurate do you think this is merely a by-product of a preference for more lab based academic research, or do you think research into haunt or ghost type phenomena has been in some way tainted by the vociferous attention of some sections of the popular media?*

STEVE: I think your assertion that to an outsider the SPR may be seen as focussed on PSI phenomena rather than haunt or a ghost experience is entirely accurate. The SPR has become largely the domain of parapsychologists and their hunting ground is the laboratory. At its inception in 1882 the SPR formed numerous committees to examine the various aspects of psychical phenomena; these included one tasked with investigating Apparitions and Haunted Houses. Its early members included men and women from many areas of science. Physics and Chemistry were well represented together with philosophy, religion and even politics. Over the years the society has included amongst its members many notable ghost hunters; Harry Price of course, Maurice Grosse, Tony Cornell and Alan Gauld have all been or remain as society members. However, in more recent years academic psychical research has largely become the domain of psychology and psychologists so it is really no real surprise that the SPR now has a majority of members drawn from this branch of science and no surprise that much of its focus has shifted toward parapsychology and studies of psi to the relative exclusion of ghosts and apparitions. Most of the conferences I have attended and presented at have been heavily biased toward psychology and parapsychology and presented research aimed towards ghosts and hauntings are a comparative rarity these days.

Parapsychologists rarely concern themselves with the investigation of ghosts and I think that by nature academics tend to be a conservative bunch or possibly they are afraid of the dark? In fact I have noticed a general trend away from even using the term parapsychologist and parapsychology in many universities in favour of the term anomalistic psychology, which might be argued better, reflects the nature of the psi experience but equally might be seen as indicative of a general move away from an active interest in ghosts. There are a number of notable psychologists who one may even consider as being deeply sceptical of ghosts and hauntings and who prefer to conduct experiments aimed at demonstrating that such experiences are purely the result of human misperception or psychology. The SPR does have a Spontaneous Cases Committee of which I am a member, established to examine and consider cases of ghosts, apparitions and haunted houses and it continues to support such research. In 2008, Ann Winsper and I presented a conference paper to the SPR entitled “Have The Lunatics Taken Over The (haunted) Asylum?” in which we argued for increased cooperation between academic researchers and non-professional investigators including the suggestion that parapsychologists should consider leaving their labs and taking a more active role in haunted house investigations and supporting those who do so. In reality, we are still waiting but can we really blame them for distancing themselves from such studies. It is far easier to gain funding for psi studies under controlled conditions in the lab and there would undoubtedly be questions and

concerns about associating academic research with some of the wild claims being made by some paranormal investigators. I believe that in part academic research (parapsychology) has largely abandoned ghost hunting to its fate and instead of providing much needed guidance and direction to non-professional investigators it prefers instead to hold them at arms length at best or in some instances peer down and mock them.

OWNE: *One of the research areas you're most associated with is infrasound. Here at OWNE Towers, we're not very bright but we can lift heavy weights. So please can you give a layman's guide to what it is, why it's been a particular research interest for you and what associations, if any, your research suggests infrasound has in relation to anomalous experiences?*

STEVE: Lifting heavy weights is an excellent attribution for modern ghost hunting given the excessive amount of equipment and flight cases we are expected to carry these days.

In reality infrasound is really simple to understand, it is just like any other type of sound except we can't hear it very well. Sound is just waves of increased or decreased air pressure which as they pass our ears cause them to vibrate and allow us to hear the changing pressure waves as sounds. Our ears have the ability to respond to a wide range of pressure variations which is generally described in terms of the number of waves that strike the ear per second; this is called the sound frequency and is measured in units of Hertz (something to do with car rental apparently). I'm sure most people are familiar with the idea of the dog whistle, we blow it and apparently nothing happens unless you're a dog. A dog whistle produces sound waves that strike the ear more than 20,000 times per second or 20 kilo Hertz (kHz). Dogs have the ability to hear these sounds that we can't and so a dog whistle produces sound that is above the range of normal human hearing, this is called ultrasound. Infrasound is basically the same idea except that the sound waves are below the range that we can normally hear. This is generally around 20Hz. In reality a sound wave is sound wave regardless of whether or not it is within our ability to hear it. Sound can have powerful and quite profound effects on people think of how our emotions are manipulated when we hear a certain piece of music for instance. However, the fact that we cannot directly hear a sound because it might be too high or too low in frequency does not necessarily mean that we are also not affected by it. In the 1970's it was suggested by one researcher that infrasound might be responsible for the feelings of unease or foreboding that some people get before earthquakes, the infrasound being generated by seismic activity ahead of the main earthquake causing some to 'sense' the impending event. From the 1960's NASA and other organisations had studied these low frequency sound waves and their effects upon human performance, they were particularly interested in infrasound as space rockets and military aircraft tend to produce large amounts of infrasound.

In the 1990's a British researcher Vic Tandy, noticed the similarities between the effects of humans exposed to infrasound and reports from some haunted locations and suggested that there may be a link between infrasound and the reported ghostly experiences. He devised some simple experiments that did seem to suggest just such a connection – and in particular he pointed to one frequency just below the threshold of

normal human hearing – 19Hz as being critical in production of these experiences in some people.

Sadly Tandy passed away before he could develop his ideas fully but nonetheless his suggestion rapidly caught on and in a short time had become an accepted fact. Infrasound, and in particular infrasound having a frequency of close to 19Hz was responsible for making some people believe they were seeing or experiencing ghosts. One of the reasons it caught on was that modern psychology loved the idea that ghosts could be so easily explained and many parapsychologists have repeated the infrasound causes people to have ghostly experiences theory as an accepted fact. The non-professional ghost hunters and the media have also picked this up too and now it has become universally accepted. However, when I was reading through Tandy's first paper (The Ghost in the Machine) and his subsequent paper (Something in the Cellar) I noticed that things were not quite so cut and dried. The nerd in me noticed that his assertion of a 19Hz sound was made not by measurement but were assumed from calculations of the room in which he made his observations, also that his subsequent measurements may not have been made correctly leading him to an erroneous conclusion. I was at that time commencing a PhD which was planned to look at temperature changes and their links to reported paranormal phenomena but having some knowledge of sound too I thought that the infrasound question was perhaps more interesting to me personally and so I changed the PhD research question to one that instead examined the role of infrasound and reported paranormal experiences. My most recent paper, published in the July 2012 Journal of the Society for Psychical Research suggests that to a degree Tandy was in fact correct in his assumption of a link between infrasound and reported paranormal experiences but that his belief that a specific frequency of 19Hz was in error. The paper is available in full on the Para.Science website for those who wish to read it http://www.parascience.org.uk/articles/INFRASND.pdf but the results of my research seem to strongly suggest that infrasound may be in some limited instances be connected to reported paranormal experiences but that infrasound on its own is unlikely to cause any unusual experiences being attributed to the paranormal. It requires additional factors to be present, such as prior belief; expectation and even the visual impact of a location are all significant. In addition, infrasound seems to only affect around 1/3rd of the population. Generally, the role of infrasound is much exaggerated within parapsychology and paranormal investigation but it does play a role in some cases and with some people and that makes it an important subject for continued and further study.

OWNE: *Are there any factors in your research or investigations that you've found in any way reliable or suggestive correlations with anomalous reports or experiences?*

STEVE: In a word NO… although I would add that there are good reasons for paranormal investigators to examine certain factors such as temperature closely. From the late Victorian era investigators observed that there were instances in which properly measured temperature within séances and haunted locations varied in an unexpected fashion and appeared to be linked to reports of paranormal experiences and phenomena taking place. Temperature changes have been a regularly reported feature of paranormal encounters for centuries and indeed unusual temperature changes have been accurately measured by researchers in situations that have been associated with reports of paranormal experiences, or having a significant correlation

to other activity during séances. In cases of alleged hauntings, large numbers of seemingly trustworthy witnesses consistently report experiencing unusual phenomena, including sudden changes in temperature. Sitters at séances, have, since the earliest days of spiritualism also reported apparent falls in temperature. Temperature drops seem to be a commonly reported experience; temperature increases seem to be a much less common experience. This is shown in a Para.Science survey from 2005 of 813 people who had reported seeing a ghost. 36.6 per cent of the respondents said that they experienced a temperature drop coincident with the sighting; while 4.2 per cent reported that the temperature increased. Anomalous temperature changes are characteristically sudden with a short duration. In one case, a sharp rise in temperature of 10 degrees Fahrenheit over a few seconds was measured before falling back and remaining constant for the rest of the investigation.

Recognition of temperature is a critical element of sensory perception, allowing the individual to evaluate their environment. Most people can discriminate discrete changes in ambient temperature. However, some researchers report anecdotal instances suggesting that some people may not accurately estimate or describe temperature changes associated with having an anomalous experience, e.g. "As they entered the house, they were met by a blast of cold air – they might describe it "like walking into a refrigerator". In some instances, researchers have observed that percipients report a sensation of coldness when no measured change in the ambient temperature has occurred. In other cases, participants reported large temperature decreases when the measured ambient temperature has increased by a small amount. Witnesses, even experienced investigators, therefore are generally poor at judging temperature changes and even when temperature changes are experienced they will frequently misreport or exaggerate their perception of the amount or the rate of any temperature change so it is unwise for any investigator to place great store on witness reports alone as a basis for documenting temperature changes during the investigation process. The correct selection of the type of thermometer and its correct use is of great importance to the correct measuring of temperature during an investigation, but it has been shown that temperature measurement is an important factor in many investigations of claimed paranormal activity and it is an area that ghost hunters should pay particular attention.

OWNE: *One of the reasons for asking you on is to talk to someone who has researched directly the many pieces of equipment that many groups feel are standard "tools" and the basis of their use. So the next two questions relate to your research and thoughts on a couple of specific items;*

Can you talk about the work you've done with FLIR (Forward Looking Infrared) and other thermal imaging equipment? What are the common pitfalls in terms of interpreting data from these which groups (or TV shows!) make when suggesting a paranormal causation?

STEVE: The Thermal camera is not a new invention. In the late 1920's Television pioneer John Logie-Baird demonstrated a working IR television system, which he called the Noctovisor. This used a modified television tube and is perhaps better described as an early thermal imaging camera. Logie-Baird demonstrated the device to Sir Oliver Lodge who was at the time a Council member of the SPR and I have

always wondered why Lodge never appreciated or realised the usefulness of the Noctovisor in psychical research, particularly within the séance room. It was however in 1965 that the first commercial thermal imaging camera appeared, designed for high voltage power line inspection.

The thermal camera works by recording emissions within the infrared spectrum, which it converts into a visible image. Infrared radiation is between the visible and the microwave portions of the electromagnetic spectrum. The main source of infrared energy is heat or thermal radiation. Every object that has a temperature above absolute zero Kelvin (-273.15 Celsius) emits IR energy. The camera detects the IR emissions, which are focussed by specially coated optics onto the IR detector. Like the visible light spectra hitting the imaging sensor in a digital camera the IR emissions are converted into a visible image, which can be viewed on the viewfinder and stored for later use. Thermal cameras are primarily designed for industrial, surveillance, military and medical use and range from basic models costing around £1,000 to advanced versions costing hundreds of £1,000's. There are several manufacturers of thermal cameras but perhaps the best known is FLIR Systems. The name derives from the acronym 'Forward Looking Infra Red' the term, which is used for military airborne thermal imaging systems. FLIR Systems. The company was formed in 1978 following the merger of European and US thermal image camera manufacturers. At the consumer end of the product line the FLIR i-series is the most affordable and therefore the most likely to be found in flight cases of the most affluent ghost investigators. The range comprises the i3 i5 and i7 models. Ghost hunters also use other models such as the more advanced Infracam and Infracam SD. The specifications for these cameras are quite basic though perfectly useable with a resolution of between 3,600 & 19,600 pixels - compare that to a basic digital camera with a resolution of 8 or more mega pixels (8,000,000). Thermal sensitivity, the camera's ability to detect changes in the emitted temperature of an object is typically 0.1 degree Celsius with a stated accuracy of around +/- 2 Celsius. All models allow the user to record still images to either an internal memory or a plug-in memory card. The pictures can be easily transferred to a PC using either a USB cable or a memory card reader. Once placed onto a computer the images can be analysed with supplied software that permits quite detailed thermal information to be obtained from the information stored within the image.

The thermal camera has become one of the most sought after gadgets for modern ghost hunters after their use of TV programmes such as Most Haunted and Ghost Hunters and perhaps one of the most misunderstood in terms of its capabilities. But in order to interpret the thermal images correctly the user needs to know how different materials and conditions can influence temperature readings from the thermal camera. These are thermal conductivity and emissivity.

Thermal conductivity. Different materials have differing thermal properties; some warm slowly or cool quickly. Brick and stone for instance will heat up slowly but once warmed, they can store heat for several hours whilst most metals heat up comparatively quickly but cool down equally rapidly. This difference in thermal conductivity can sometimes lead to large temperature differences under some circumstances.

Emissivity. In order to correctly read the temperature, the emissivity of a material needs to be taken in account. Emissivity is the efficiency with which an object emits IR radiation. It is important and necessary that the correct emissivity is set on the camera or the subsequent measurements will be erroneous.

A further factor that needs to be considered is **thermal reflection**. Much like a mirror reflects visible light many materials reflect thermal energy. Such reflections can lead to a misinterpretation of the thermal image. Often, the reflection of the user might lead to the unexpected appearance of a figure within a picture where no one was standing. If the object has a low emissivity and there is a large temperature difference between the object and the ambient temperature the reflection of the ambient temperature will also influence the performance of the thermal camera resulting in further erroneous readings and unexpected anomalies within the image. Modern thermal cameras have adjustments for emissivity and ambient temperature compensation that must be correctly set before the camera can be properly used and the images correctly interpreted. Moreover, these settings must be constantly adjusted as the user moves around a location and encounters different materials, construction and conditions. The camera manufacturers normally provide comprehensive instructions for making these adjustments and it is important that the instructions are fully read, understood and applied correctly. This is a common failure of many paranormal investigators who use thermal cameras and failure to make these constant adjustments will inevitably result in erroneous information and greatly increase the possibility of the image being misinterpreted by the investigator. FLIR Systems and some of the other manufacturers recommend and provide courses for users of thermal cameras; the courses are normally offered at a discount to new purchasers. Unfortunately, having scraped together the funds to buy their thermal camera few groups or individuals consider it worthwhile investing an extra £100 or so on the appropriate training – after all, they have seen them used on TV so how difficult can it be? But the information they provide is invaluable and like any piece of equipment, the key to obtaining useful information is correct use and understanding of what the equipment is telling you.

The low resolution of the thermal camera is also a potential problem. Models such as the FLIR i3 and i5 offer 60x60 (3,600 total) pixels. This means that detail within the captured image is correspondingly low. Fine or even moderate levels of detail within the images are absent and overall thermal cameras compare badly to even the most basic digital cameras, for example a basic webcam typically has more than 800,000 total pixels. Accordingly, it is simply not possible to discern subtle details within a thermal image. A thermal image is a synthetic or false image, constructed within the software of the camera. The colours or scales of grey are used to represent the temperature range of the subject. The colour palette and grey scale range is limited and this inevitably leads to the same object appearing as a variable range of colours as the camera adjusts its calibration. Thus an object might suddenly appear to change its apparent temperature. As with any camera, the dynamic range (thermal exposure) of the image will affect the overall image and thus an object that appears warm (red) against a cool (blue) background will appear as cool (blue) against a hot (red) background. Most thermal cameras have an automatic calibration mode, which permits it to produce a good overall image but can and does cause colours and therefore apparent temperature to suddenly change. The same effect is also seen in

grey scale images with sudden changes occurring within the shades of grey being used to represent the temperature. The manual thermal exposure mode can provide greater clarity and cause less colour changing, some basic models do not have a manual mode, for those that do; the mode needs to be used correctly for proper results to be obtained.

Thermal imaging or thermography can be a useful asset for the ghost hunter but perhaps not in the way that many imagine or indeed use these expensive gadgets for. Used correctly, they can permit the investigator to obtain a lot of useful thermal data to be obtained from a location. The thermal camera can also be useful in the detection of fraud, as it permits images to be obtained in total darkness without introducing any additional lighting. Even a night vision camera requires additional infrared lighting which although very dim, can be discerned by the human eye and therefore can alert others to the fact that a camera is in use. The thermal camera is totally passive and with its screen turned off (some models permit this) or covered it is not possible to detect the camera is being used. On a number of occasions I have recorded instances of mal-practice and fraud during an investigation using this technique. One particularly false assumption is that a thermal camera can see ghosts, a claim that many investigators have repeated. It is not necessary to go further than to state that as yet there is no device that can demonstrate the existence or otherwise of ghosts or even that ghosts exist at all. To claim that ghosts can therefore be detected using a thermal camera is thus erroneous.

One further claim that is frequently seen on some TV shows and in investigation reports is that their thermal camera detected a cold spot. This is simply not possible. The camera relies upon emitted infra red energy and it cannot see the air; in fact FLIR Systems actually design their cameras to include filters that prevent the temperature of the ambient air from interfering with the correct production of the thermal image. FLIR Systems note this in their training for operators:

"Instrument designers do this by designing the instruments to be sensitive to wavelengths of IR where gases are highly transparent and do not emit IR well. This allows the radiation of surfaces that are of interest (like building surfaces) to suffer minimum attenuation as they travel through the atmosphere on the way to the IR camera.

To view gases, a different camera design approach is desired. We want to view gases at wavelengths where they emit and absorb well. This is precisely what is done with the FLIR ‘GasFind IR’ cameras.

Infrared Training Centre, FLIR Systems"

Perhaps the greatest drawback to the use of a thermal camera is that the users are simply not familiar with the unusually coloured low-resolution images that these cameras produce. As such, it is commonplace that normal artefacts within the image are highly likely to be misunderstood or misinterpreted as being anomalous or even paranormal. Used with care the thermal camera can be a genuine asset in many

investigations but used without training and a proper understanding of how the camera operates and what the resulting images show then the thermal camera can become an easy way to confuse the investigator and mislead the investigation results.

OWNE: *What of le sujet du jour - full-spectrum photography? A distraction from an original report or experience, or potentially fruitful avenue of research?*

STEVE: So called "Full Spectrum (FS) photography and video has in recent years become a popular technique for ghost hunting and general paranormal investigation. In this context however, 'Full Spectrum' actually seems to refer to cameras and video cameras that have been modified in such a fashion that removes much of the visible light spectrum. Several companies and individuals are offering various modified cameras for sale. In addition there are websites that offer instructions and advice to those wishing to modify their own camera or provide a modification service for a fee.

The majority of the commercial sites selling 'Full Spectrum' cameras provide little information about the actual modifications they undertake. Instead they make vague claims about the technical prowess of their particular modification and the camera's ability to obtain pictures of ghosts, spirits, UFO's and various otherworldly subjects. Currently, the modified FS models available sell for around $200-400 and are sold via Internet stores and eBay. Many of these adapted cameras start life as low-specification solid-state video cameras; usually unbranded and retailing without modification for under $75. There are also one or two modified consumer camcorders available, normally based on an entry-level Sony model that has the Nightshot IR mode. The sales pitch for these modified FS cameras is impressive and the various modifiers and sellers are unsurprisingly competitive and in addition to their own vague claims they often include some form of warning to the buyer to avoid others offering similarly modified cameras. This warning seems to be somewhat at odds with the reality as the specifications (such as are provided) and advertising pictures of the cameras demonstrate that most sellers are using the same unmodified donor cameras as their starting point. Further at odds with these warnings is that in a number of cases the same individual on behalf of a number of sellers is carrying out the actual modification. The actual modifications themselves to the various cameras are in many cases not described, but it might be imagined that when some indication of invisible light performance is provided the user would be able to determine which camera / modification would best suit their needs. Unsurprisingly, this also proves not to be the case. In one instance, three Internet stores clearly offer the same camera model and it is also clear that the same person undertook the modifications. One site claims the camera has a UV capability down to 100nm, second site claims 200-250nm, whilst the third states it to be 'around' 300nm. Such claims are actually way beyond the capability of the electronic sensors themselves and no mention of the IR performance is even provided. The various sellers provide sample images and / or video that promote the capability of their modified cameras; some may also provide pictures taken with unmodified models to demonstrate why their camera is superior.

What is interesting is that in every case the video or photographs that are provided are all taken under direct sunlight, bright artificial lighting or using one of their own (for sale) 'Full Spectrum' lights. This is unsurprising given the physics of invisible light and the nature of the actual modifications. Simply put, in order to take a photograph or shoot video it is necessary to have a suitable light source. This may be visible light

such as daylight or artificial illumination or it may be 'invisible' light from the same general sources. As already mentioned Sony use a built-in LED IR illumination source on those cameras, which have the Nightshot mode. Although the sellers are reluctant to reveal the nature of their camera modifications the sample images do provide some clues as to what has been done to alter the cameras light response. Many of the pictures have an overall pink hue. This overall pink hue is the natural response of the sensor due to its inherent sensitivity to IR wavelengths of light and results in the unnatural colour cast. Digital camera makers use an IR blocking filter (sometimes known as a Hot-Mirror) placed directly in front of the image sensor which is necessary to control the amount of IR light reaching the sensor and improve the colour response of the sensor in the visible wavelengths, providing images which are more realistic and acceptable to the typical user. The hot mirror filter in most equipment is directly attached to the electronic sensor and forms part of the physical protection for the device. The pink cast of the sample images clearly demonstrate that the hot mirror filter has been removed from in front of the sensor. No additional modification is required to be carried out to increase UV sensitivity in these budget cameras as the lens usually has a poor UV blocking filter coating applied and the seller also relies upon the fact that sensor has an inherent sensitivity in the top end of the UV spectrum - to around 380nm (which anyway lies within the range or human vision). In this configuration the sensor allows all light between about 380nm to about 1100nm to be visualised. A note of caution is needed here, the colour cast of sample images may be misleading; many sellers appear to have 'improved' the picture by using Photoshop or similar software and appear on websites as either monochrome images or exhibiting a range of colourful hues.

A number of sellers of FS cameras clearly have made an additional modification, which may be determined by simply looking at photographs of the actual cameras; the addition of a visible light-blocking filter to the front of the camera lens. Although it is rarely stated what exactly this filter is, that it is a visible light blocking filter of some sort is given away by its appearance as a black opaque disc. By default this filter MUST be either a IR pass filter such as a R72 or similar or in rare cases a Wood's filter, both appear black and opaque to the in visible light and to the human eye. The simple addition of this filter removes most of the visible light spectrum but unless the camera's exposure system is also modified the photographs or videos will be greatly underexposed. This modification is generally extremely unsatisfactory, as the camera's exposure system has been designed to provide sufficient amounts of ambient visible light to ensure that electronic noise artefacts are well controlled. Reducing the amount of light reaching the sensor means that the output from the sensor must be amplified to an even greater extent, which will result in an increase in the amount of noise and results in an increase in aberrations in the finished shots. Budget cameras tend to have very small sensors and lenses - similar to those found in mobile phone cameras. The small optics generally pass less light than their physically larger counterparts found in higher quality cameras and rely on increased amplification of the sensor output signal in order to produce an acceptable image. It is therefore hardly surprising that the sellers of these FS cameras show only samples taken under bright visible light and frequently stress the need for the user to purchase their accessory 'Full Spectrum' lights. These lights generally consist of a mixed array of white, UV and IR LED's and in some cases other colours too - green being common. They fail to mention that simply turning on the normal room lighting or using a standard white video light will generally provide adequate illumination at all

wavelengths for these cameras to function without the need to add a disco-like bank of colourful LED lighting.

Having considered some of the many technological problems associated with FS photography and video I feel I should point out that for those investigators who wish to use the techniques of FS and indeed thermal imaging they need to consider another important question. Is the use of such equipment justified at all in hunt for ghosts and apparitions? By definition any investigation seeks to answer questions relating to human experience. After all, someone generally has to have reported seeing a ghost or apparition for a location to be of interest to the investigator. With one or two rare medical exceptions humans generally do not have the ability to see in the infrared spectrum and not at all in the ultraviolet range. Thus any ghost or apparition that has been seen and reported must have been within the visible light spectra. The purpose of any investigation is surely to test the voracity of the original witness claims and so to be meaningful and valid any photography or video seeking to test that claim can only truly be effective if it is undertaken in similar – some would argue identical circumstances therefore there exists a strong argument against the need or value of either FS photography or thermal imaging at all.

OWNE: *I shall refrain from mentioning the "O" word! But a question about another topic potentially as volatile - psychics. I know some of your research has involved self-reported psychics or mediums. How have you approached this aspect of investigating in an objective and meaningful way? How do you feel about psychics on investigations generally?*

STEVE: I feel somewhat relieved that the "O" word was not mentioned but nonetheless they still represent a serious distraction to the modern paranormal investigator. There are still very many who cling to the belief that such phenomena are paranormal but most groups now almost grudgingly acknowledge that a mundane explanation exists usually by offering the suggestion that whilst 99% (or so) of "O's" are explainable there remains 1or 2% that are not – these are usually the ones they have taken and present on their websites and social media pages!

But onto Psychics…. I seem to have gained a reputation for being harsh on these poor misguided fools, which is actually far from the case. I think that paranormal investigation must consider objectively the possibility that some ghosts and apparitions may represent an intelligent remnant or shade of the deceased. And an objective investigator must consider too the possibility that some individuals might have an ability to perceive or communicate with these post-death intelligences. There is within the annals of psychical research some substantial evidence that this might indeed be the case such as with Medium Eileen Garrett and her séance communications from the crew of the crashed airship the R101 in which information that was at the time unknown to the medium and the sitters and considered to be highly classified was passed from the deceased crew members of the doomed airship.

Mediums who traditionally confined themselves to conducting their activities within the séance room and Spiritualist churches have now moved extensively into ghost investigations, This move out of the séance room and into haunted houses seems to have taken off following the use of mediums on TV ghost hunting shows. Let's face it ghost hunting is a pretty dull activity and for TV viewers would be rather uninspiring.

The programme makers need something to happen (they have adverts to sell). In simple terms if you can get someone to point off into a dark corner whilst yelling "He's a Badun Ivvie" and leaping on other members of the team you're onto a winner! Suitably impressed most paranormal groups now have a resident psychic or medium within their ranks or are in many cases led by a medium, also many within a group claim to be developing sensitive's or mediums too.

As I have said, we must consider the information from all potential sources when we are conducting an investigation but we should not fall into the trap of assigning any degree of additional credibility to anyone simply because they might claim to be psychic. I am happy to take on board the information that they can provide and document it along with the experiences, thoughts and perceptions of every witness and investigation team member but that information is but one strand of the unfolding investigation and is not given any additional weight or credibility simply because the provider is making claims of special abilities.

OWNE: *You're now a resident of South Wales. It's an area of the country not short of a few tales of myths and mystery, from ghosts, UFOs, the odd sea monster and more. Which are some of your favourite stories or locations you've come across in your time there?*

STEVE: To be accurate Pembrokeshire is West Wales – in fact it's so far west I live nearer to Ireland than Bristol but you're right it's a region steeped in stories of myth, mystery, ghosts and aliens. You can throw in fairies, mermaids, big cats and dragons too, just for good measure! I think that such a wealth of paranormal and supernatural stories is to be expected in the remoter parts of the UK and one generally finds that to be the case in Cornwall, Scotland and parts of the East coast too. Historically all these areas have always been rich in such folklore.

Perhaps the best known of all our local haunted locations is Carew castle a couple of miles from where I live and well known for its ghostly ape. Not too far away lies the Stackpole estate, which has an early documented case, which today we would label as a poltergeist, recorded in the 12th century. Numerous accounts and books were written in the 19th century and even earlier that relate to haunted locations and paranormal phenomena, but what I do find interesting is that some locations now have ghosts attached to them which were unrecorded until a few years ago. One such location is Pembroke castle, which was not considered to be haunted until a group of ghost hunters and a TV crew visited in 2006. Apart from a single instance of a staff member catching a fleeting glimpse of a figure and dismissing it some years before nobody thought it to be haunted. Following that initial visit by the TV ghost hunters several teams also visited and overnight ghost hunts were permitted. The number of ghosts and hauntings within the castle increased quickly as the various teams spent time in the location – we have the claims from their resident mediums and EVP recorders as proof of this!

I can't mention Pembrokeshire without mentioning UFO's as the small seaside village of Broadhaven was the focus of one of the UK's biggest UFO flaps in the 1970's. One only has to type in 'Broadhaven UFO' into Google to appreciate the magnitude of this series of events, which at its peak was producing UFO sightings on a daily basis with hundreds of witnesses spread throughout the county. Even today Pembrokeshire is

considered to be of the top UFO hotspots in the country, indeed the World. The general lack of light pollution does make for some great nights star gazing but I these days I leave UFO's to others, I remain first and foremost a ghost hunter.

OWNE: *Ok, it's not quite Desert Island Discs - but if all your books on paranormal topics were to be taken away from you with the exception of three of them, which three would you keep and why?*

STEVE: That is such an unfair question and a choice I would hate to have to make.. It has taken years to build up my library of the paranormal. There are several ways in which I could answer this question: For instance on a purely practical level I might grab the three most valuable, in order that they could be sold to fund at least a partial replacement of the library or I could answer it terms of using the answer the showcase some of the rare books I have been fortunate enough to obtain (bragging rights?) but I think after due consideration of the question and several lingering and nervous looks toward the bookshelves I think my first choice would be The Most Haunted House in England by Harry Price, not only is this a landmark of British ghost hunting but it is also Harry's own personal annotated copy and contains information added in his own hand that relates to additional material for the un-written second edition of the book and his uncompleted third book about Borley Rectory (bragging rights?).

Next would probably have to be the Report on Spiritualism by The Committee of The London Dialectical Society, which represents one of the first formal attempts by science to understand the nature and meaning of the phenomena of Spiritualism which was sweeping Europe at that time – Oh, and I shouldn't forget the bragging rights of mine being a privately published Society first edition ☺.

I think the third book to save would be "The Secrets of the Invisible World Disclosed or an Universal History of Apparitions Sacred and Profane; Under all Denominations; whether Angelic, Diabolical, or Human Souls departed. With a greater variety of surprising and diverting examples, never published before. Also showing how we may distinguish between the apparitions of good and evil spirits and how we ought to behave to them". Not only does it have the best title and possibly the longest title of any book about the paranormal but it was written in 1727 by Daniel Defoe and is a surprisingly relevant and modern in many of its considerations of ghosts and the paranormal. Of course mine is a 1727 first edition, but you probably knew I was going to say that …..

OWNE: *Thanks again for your time Steve. What have you got lined up for yourself or Para.Science that you can tell us about? Any last words?*

STEVE: Para.Science continues to explore and investigate claims of ghosts and apparitions and I imagine will continue to do so for some years yet although these days a lot of our time is also focussed on the more academic research and sneaking about on Facebook keeping abreast of current trends in ghost hunting. We have some documentary filming lined up for July with on overseas TV network who are filming a documentary looking at the way science focussed investigation of haunted houses is carried out.

Personally, I am looking forward to a new child later in the summer then a busy autumn with nappies and sleepless nights interspersed with attending and speaking at the SPR and ASSAP conferences and a trip to Boston, Mass; in September to demonise the K2 meter and the Orb – Damn I said the “O” word…..

Thank you for having me ☺