



Using a Head-Mounted Video Camera to Understand Social Worlds and Experiences

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Introduction

1.1 This paper considers the use of digital video as a research method for qualitative researchers; specifically the head-mounted video (headcam) and the opportunities it offers for deepening our understanding of social life. Headcam is one of a range of recent technological innovations relating to video that provide researchers with new means of addressing methodological challenges. To date, little has been written about the use of digital video in relation to social research (Henley 1998; Pink 2007a). Even less has been written on the specifics of headcam video techniques and less still on its potential outwith a positivist framework. Our exploratory research on mountain bikers' and walkers' embodied, multi-sensory ways of knowing and experiencing landscapes demonstrates some of the possibilities that advancements in headcam technology can offer interpretative and reflexive approaches to social research.

1.2 Talk and text have dominated sociological theory and methodology. They have made an invaluable contribution to sociological understanding. However, there is a growing desire within the social sciences to capture, evoke or somehow convey social worlds beyond the linguistic, verbal and cognitive. Greater attention to the non-verbal, particularly the corporeal, embodied, sensory, emotional, habitual, pre-cognitive aspects of subjectivity, can further develop our understanding of the social. As Mason (2006: 104) argues, the dominance of talk and text in sociological theory and methodology is a 'one-dimensional... foray into, or construction of, what most would agree is a multi-dimensional, multi-sensory 'reality'.

1.3 Exploring the multi-dimensional, multi-sensory 'reality' of our social worlds requires methodological creativity and innovation. New tools and techniques are beginning to be developed which utilise new technologies and media forms, particularly in visual sociology. Visual methods are by no means new as they have a long history in anthropology and ethnography (see Harper 2006). New technologies do, however, extend the range of visual methods that researchers can employ. In sociology, the use of photography and photographs has dominated methodological extensions into the visual (Emmison and Smith 2000). Yet, visual methods and technologies, particularly video, are still under-utilised in social research (Banks 2001; Mason 2006; Harper 2006; Pink 2007a) and this is especially the case in relation to headcam video.

1.4 Within the academy there remains the requirement to disseminate research through written-word publications, hence the continued reliance on text. When visual ways of researching are used, data is still predominately presented as text. Tilley (2001: 286) argues for 'experimentation with other ways of telling... that can more adequately convey the synaesthetic qualities of things, in particular the use of imagery and film'. Our paper experiments with 'other ways of telling' by incorporating video clips with text in order to illustrate how the different and complimentary ways of 'telling' and 'seeing' can engender different ways of knowing and understanding. Indeed, by combining the audio-visual with our linguistic representation, our aim is to draw the reader/viewer's attention to the corporeal, multi-sensory and visceral aspects of experience and thus develop greater understanding of embodied experience and practice.

1.5 This paper seeks to discuss the opportunities, potential pitfalls and particular theoretical, practical and ethical considerations of adding headcam to our methodological toolbox. We will consider how it might aid our quest to capture multi-dimensional aspects of social life and reflect critically on how it (re)configures the research relationship.

Headcam as a Research Tool

Previous Use of Headcam Technology

2.1 To date, headcam technology has predominantly been used in the context of popular culture and

practice, rather than research. Professional filmmakers, and now amateurs, increasingly use headcam to film sporting action. Professional footage is shown in TV sports coverage of, for example, skiing and motor racing, to give the viewer an idea of how the sportsperson is experiencing the event or course. Indeed, the equipment is actively marketed as 'perfect for extreme sports'. A related use of similar technology is in recording 'fly-on-the-wall' surveillance style footage by hiding a camera on the body, not necessarily the head, as in the documentaries of Donal MacIntyre^[1].

2.2 Headcam has played a limited role as a research tool since the 1990s, principally in the realms of sports psychology and emergency response research and training (Omodei & McLennan 1994; Omodei et al 1998; Unsworth 2001; Miller 2004; Chauhan et al. 2004; Eccles et al. 2006). The central objective of these studies is usually to capture aspects of cognitive processes in dynamic settings, particularly in decision-making and reasoning. The purported utility of headcam in this approach is its ability to produce 'valid' and 'reliable' footage for use in knowledge elicitation techniques, usually to query participants about why they chose to take certain courses of action, and thereby to test competing psychological theories of human decision-making. A frequently cited justification for its use is increased accuracy and comprehensiveness cued by an 'own-point-of-view' replay, wherein the 'bias' and 'distortion' of retrospective self-reported protocols are avoided. For example, informants are prompted to discuss aspects of the video that they may have forgotten or which they may not have raised without being prompted by the footage.

2.3 Thus, headcam has principally been used in positivist approaches in which video recordings are treated as objective reality and visual fact. However, as Mason (2006) and others have warned, visual data should not be treated as a direct representation or reflection of 'reality' in any straightforward sense. Rose (2007: 2) emphasises that 'images are never transparent windows onto the world. They interpret the world; they display it in very particular ways' because 'both what is seen and how it is seen are culturally constructed'. We must consider the cultural significance, social practices and power relations within which visualities are embedded and through which unequal power relations are articulated (Haraway 1991). Therefore, it is vital to move beyond a realist approach if we are to develop headcam techniques that enable deeper understandings of social experiences, relationships, practices, decisions, memory and emotions.

2.4 The potential to tap into affective and pre-textual dimensions of social worlds whilst in-situ is beginning to be recognised for video techniques generally (Pink 2007b) and for headcam specifically (Miller 2004), yet work on the latter is underdeveloped and under-theorised. We believe that in order to explore the scope of headcam footage for understanding social worlds, we must start by treating it less in terms of being an objective or factual record of what people do, and more as a constructed audio-visual representation that may be used to *evoke* a sense of subjective positions and experiences. Moreover, to unlock further its potential as a social research tool, it is important that we understand that headcam methods are embedded in socially and culturally situated processes of knowledge production involving researchers, participants, technologies and materialities, as is the use of any video technology in research (Pink 2007a). This demands a reflexive approach involving an awareness of how headcam technology, and the sounds and images produced, become interwoven into the relationship between researcher and subject, as well as the range of academic and non-academic visual cultures through which knowledges are constructed.

Accessibility and Practicalities of Using Headcam Technology

2.5 It is only relatively recently that particular socio-technological circumstances have come together to make digital recording equipment in general (Shrum et al. 2005), and headcam in particular, tools that are both accessible and practical for qualitative research. High-quality equipment is now widely available and costs are falling as further technical improvements are made. The advent of digital formats allows for easy replication, editing, manipulation and storage of both sound and images. The size, weight and complexity of the equipment are much reduced, making it less cumbersome for research participants to assemble and wear. Current equipment is substantially less demanding in terms of the skills needed to record and edit video footage. Furthermore, certain types of video analysis are becoming easier and less time consuming with the availability of user-friendly coding packages, such as NVivo 8 and Mangold Interact, that work much in the same way as standard text coding packages.

2.6 The equipment used in our study is shown in Figure 1 and can be purchased for under £400. It comprises (clockwise): a headband to hold the lens barrel in place; cable for charging recorder from the USB port of a computer; protective pouch; hard disk recorder (with travel adaptor plugged in at the bottom to allow AV input from lens unit); bullet camera and connecting cable with built-in remote control and microphone complete with lapel clip. The bullet camera is a digital high-resolution Archos Mini-cam, and the hard disk recorder is an Archos 504 Multimedia Player with an internal chargeable battery and small, high-resolution screen (approx 6x12cm). The screen allows playback and review in the field if desired, and is crucial for checking the content and orientation of the 'view' of the lens during set-up. This is done by asking the participant to bring a certain feature (e.g. a car) to the centre of their attention, and making sure it is also central and level within the viewfinder.

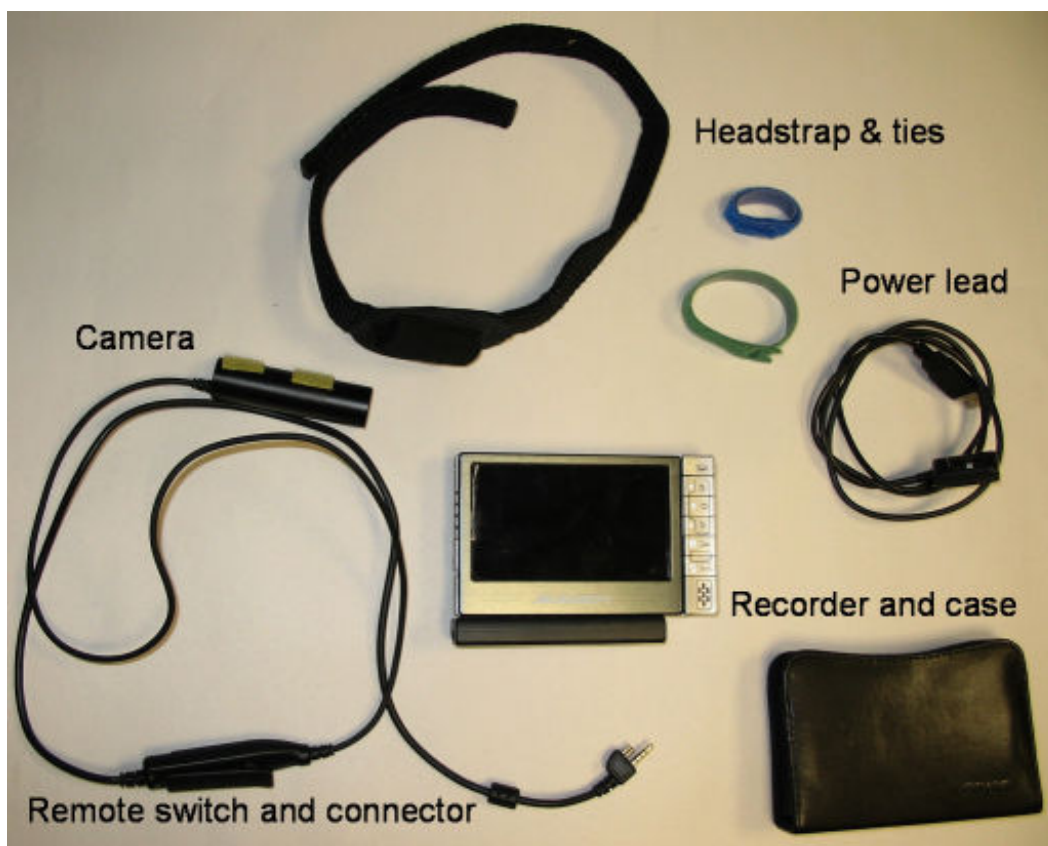


Figure 1

2.7 Headcam equipment digitally records both a scene from a point on the wearer's head or headwear, and synchronous audio sound from a microphone situated on the cable that connects the lens to the hard disk recorder. The resulting footage is a novel form of audio-visual representation. The recorder's memory can store up to 14 hours of video footage, while the internal battery lasts for approximately 4 hrs between charges when recording continuously. There is now a newer version of the Archos 504 which may be improved in these respects. In common with all video data, generous storage space is required to back up the files; our recordings averaged 1.5GB per outing.

2.8 It is important to ensure smooth operation of the equipment, so as not to waste the time and good will of the research participants. This can be challenging for a number of reasons. There is the possibility of cables becoming disconnected or the bullet camera unit sliding out of position. The camera can fail to record if the device is not activated properly, or can stop recording if the keypad is not locked. There is also the risk of rain and impacts damaging the equipment. We found that these problems can be minimised if the following points are adhered to. It is important to demonstrate clearly how to operate the technology and provide simple written instructions that can be easily and quickly referred to, especially for participants who are not accompanied by a researcher. During the activity it is important to intermittently check the status of the headcam to ensure it has not stopped recording. Although the bullet camera unit is specifically designed for action sports, the recorder is not. Therefore, connection points should be taped in place with electrical or duct tape. It is also advisable to protect the recorder unit from water by placing in a waterproof bag: and from jerky movements and sudden jolts by rolling it up in an item of clothing, or similar, rather than leaving it loose in a rucksack.

Methodology

3.1 In our study, we wanted to gain a greater appreciation of the experiences of different recreationists (initially walkers and mountain bikers) as they accessed the countryside. We also wanted to explore any further scope that headcam might add to existing in-situ methods for understanding particular aspects of practice and mobility. Headcam recordings were made of 24 recreational outings in Aberdeenshire and the Cairngorms National Park, which the participants were intending to do regardless of their involvement in the research. For all the outings, the headcam was positioned upon the participant's head or helmet and the recording unit was placed in a large pocket or rucksack. Half of the recordings were entirely self-conducted by the participant. A researcher was present for the other half as a participant observer and, where possible, in a 'go-along' capacity. We wanted to explore how developments in video methods (Pink 2007a) could be used in conjunction with mobile ethnographies, particularly 'walking and talking with' practices (see Kusenbach 2003; Anderson 2004 & Lee & Ingold 2006) and the cycle-based ethnography of Fincham (2006) and Spinney (2008).

3.2 One of our aims was to consider how headcam becomes an active part of the performance of social activities and interactions. We wanted to grasp how both the recreational experience, and the representations of it, are catalysed and co-produced by the headcam, researcher, researched, other people, and various materialities. This inquiry extended to how the creation and interpretation of headcam footage might be combined with more established interview techniques, and how further layers of representation might shape, add to, complement, contradict or duplicate the visual representation. Thus, the headcam recordings of recreational outings were executed in various combinations with a pre-outing

interview and post-outing review interview in which the headcam footage was used as a prompt.

3.3 The review interviews proved to be highly valuable in making sense of the recreational experiences represented by headcam by allowing the wearer to explain how they experienced, made sense of and attached meaning to their activities. In the review interview we asked participants to elaborate on what they were thinking, doing and feeling during the experience and to reflect on thoughts and feelings evoked whilst watching the film. Indeed, we found that this was essential in order to attend to how 'agents connect representations to practices as they engage in social conduct' (Birnacki 2000: 302, cited in Kidder 2005: 348). Preliminary interviews allowed contextualisation of the recreational activity in relation to the participant's wider social lives, along with their general motivations and values regarding outdoor recreation, prior to engagement with the practical experience. The review interview created conceptual space for an active negotiation between the various interpretations of the researcher and participant, which enabled us to come to a more comprehensive understanding of the experience and the activity.

Ethics

4.1 The medium of video can be a powerful vehicle through which to represent, reproduce and promote understandings of the world that are alternative to dominant representations, such as those of policymakers and the mainstream media (Lunch & Lunch 2006; Pink 2007a, Pink 2007b). It has been suggested that using video is a participatory and empowering form of research (Holliday 2000; Pink 2001). However, this is not a given feature of video methods as this depends on the nature and scope of the research participants' input and control of the various stages of the research process (Pink 2007a). We must therefore reflect critically on the specific characteristics of headcam techniques and the power relations underpinning its use.

4.2 Arguments concerning the potential dangers of realism in video methods, whereby images are taken to stand for the 'real' and the posed appears unposed, are well rehearsed (see Holliday 2000; Rose 2007). An additional seduction of headcam footage is that it appears to be self-reported and from the participant's 'own point of view', when the research encounter may actually be tightly bound by the researcher. Even compared to hand-held footage of a participant's actions from their 'own point of view', headcam footage tends to appear less obviously 'filmed', making it easier to forget that you are not 'seeing the world as they see it' in any straightforward way.

4.3 Headcam also offers an additional way to collect video footage without the presence or prompting of the researcher, which can render the latter invisible in what the audience sees of the research encounter. Such non-presence of the researcher's role in the filmmaking is illusionary (Shrum et al. 2005) and the absence of 'obvious 'delving' on the part of a researcher' (Holliday 2000: 518) can conceal the workings of power within the research relationship. Therefore, as highlighted by Henley (1998), the researcher has a responsibility to be aware of, and where necessary make visible, their role and agency at each of the different stages of the research and decision making process. Interestingly, when the headcam is worn by a participant as part of a 'go-along' interview, the researcher is brought into view much more than is typical with video methods, and can indeed be the sole human subject of the footage. This feature could be used to advantage in making sure the authorship of the encounter is not glossed over.

4.4 In our study, the headcam footage was not solely the participant's own production of audio-visual knowledge as we controlled the conceptual framing of the research and, to some degree, the space and time of the recording. We bounded the research in the following ways: the focus was on embodied experiences of countryside recreation, landscape and access; the time period in which the fieldwork was conducted span from 2006 to 2008; the geographical scope was the north-east of Scotland; and we chose who to recruit. We also specified that participants record a recreational outing, as opposed to the preparation and packing of their kit at home, or getting a good night's sleep, or having a post-outing pub meal, or any other related aspects.

4.5 At a macro level the participants exerted control over what was recorded in terms of the precise location, route, duration, the rhythms of the outing and by doing something they intended to do anyway. In a micro sense they had control of the camera as it paralleled the movements of their head and body. They could, thus, influence who appeared in the frame, depending on whether they chose to walk or ride beside, behind or in front of people and whether they turned to look at them during a verbal exchange. By having this command over the technology as well as the encounter, the participants became active co-authors in the creation of the audio-visual representation.

4.6 Due to the nature of our research objectives, the participants in our study were not involved with the analysis, editing or dissemination. Thus, the researchers retained ultimate authorial control over the treatment and selection of the audio-visual and textual material. Nevertheless, there is no reason why these stages of the research could not be carried out in more participatory ways, empowering the participant by giving them greater editorial control over the material, if the research objectives and resources allow it.

4.7 Whilst visual researchers invariably address the ethical considerations that arise in their own work, a consensus on ethical standards in visual research has yet to be agreed (Prosser 2008). This is in part due to the range of different technologies that are used and applied in a multitude of ways. Ethical standards for social research more generally, such as informed consent, can be applied to visual research, but the specific dilemmas that different visual methods create in relation to these general principles need addressing.

4.8 Ensuring confidentiality when using headcam can be challenging. Anonymity can be difficult to protect, although it is perhaps easier than for other video methods that record images 'of' rather than 'from' the participant. The participant's face does not appear on film and other parts of their body only occasionally

enter the frame, yet their voices are present. In accordance with the Statement of Ethical Practice for the British Sociological Association – Visual Sociology Group (2006), the possible uses of the footage at conferences, in journal articles, with policymakers and stakeholders, was discussed with the research participants and we explained that pseudonyms would be used. To date, all have consented to this use of the data. However, if they did not want their voice to be on the film when presenting it to wider audiences, it would be possible to show the footage with no sound or technologically alter their voice beyond recognition. It was also explained to the research participants that they could withdraw their consent at any point in the research process and that all or part of the data they co-produced could be withdrawn at their request.

4.9 When research participants were walking or biking in a group, with friends or a club, an additional consideration was gaining consent from other members of the group. We contacted those who appeared in the videos and offered not use to sections of the video they appeared in when disseminating the research, or to technologically alter their faces and voices. However, to date, no-one has requested that their identity be altered or expressed concern about appearing or being recognised in the video.

4.10 There are also ethical issues that must be considered in relation to footage of other people who are not actively consenting to participate in the research. In the ebb and flow of lived practice, social encounters are not always planned and pre-meditated. Securing the consent of everyone entering the milieu of the headcam would be both difficult and potentially highly disruptive to the recreational activity and the research process. Furthermore, a researcher is not always present to undertake this task. We decided that to protect anonymity the preferred option was to blur the faces of any 'incidental' participants who became the central focus of the camera's frame.

Benefits of Using Headcam in Qualitative Social Research

5.1 Our study suggests that headcam can play a valuable role in illuminating certain aspects of human experience and lived practice as it unfolds. We found that the audio-visualities created by using headcam provided fresh perspectives on the complex and diverse ways in which social worlds are produced and (re)ordered through action, movement and practice. Furthermore, certain aspects of experience, such as emotions, senses and kinaesthesia, which can be difficult to (re)convey in words alone, and which hand-held video might struggle to capture in certain situations, became more 'visible' and can be 'seen' in new ways through using headcam. The footage, along with data from the interviews, greatly aided our understanding of the complex emotional, sensory and physical interconnections between people, locations, knowledges and technologies. In this section we consider these benefits in more detail.

Creating First-Person, 'Hands-Free' Audio-Visualities of Mobility and Movement through Landscape

5.2 Headcam techniques are particularly suited to the study of practices and situations that are difficult for the researcher to access or experience in any other way, for example, those involving the holding of equipment or dynamic, highly mobile, fast, dangerous, spatially constrictive or skilled practices. In our study, many participants would not have been able to film the same activity with a hand held camera because they had to use their hands to hold onto walking poles or handlebars. Furthermore, a headcam positioned on the head of a participant enables us as researchers to examine practices we (or our institutions) perceive to be too risky to take part in ourselves, and to develop understanding of the acquisition, practice and embodiment of expertise in circumstances where the opportunities, resources, competencies and confidence of the researcher in some way prohibit participation. The resulting representation of the experience is also available to wider audiences.

5.3 With respect to handheld camera based participant observation, Buscher (2005) laments the difficulties in achieving simultaneity between recording an activity and an analytic engagement with it. Yet with headcam, the researcher can ease the tensions and trade-offs between filming and participation. It also addresses some of the challenges of 'anticipatory following' described by Buscher (2005), when the researcher attempts to maintain synchronicity between the attention of the camera and the practices and subjects of interest. Thus, as with other forms of filming, headcam can capture aspects of social situations that are difficult for the researcher to notice or record at the time because 'the real-time production of social life happens faster than any note-taker could document, often quicker and with greater complexity than a human observer can consciously perceive, let alone memorize' (Buscher 2005: 5.1). However, headcam is much more than some kind of audio-visual note-taker as we will demonstrate below.

5.4 Different technologies have different 'views of the world' and ways of seeing associated with them (Rose 2007). Headcam footage captures moving images and sounds of specific experiences in-situ, in real-time, from a particular yet mobile, 'point of view'. This creates a different 'seeing from' research dynamic to hand or tripod mounted video. The headcam wearer does not need to actively film 'their' perspectives, experiences or events as they would with a hand-held or tripod mounted camera. Once headcam is set recording it will 'follow' the journey of the wearer's social life as it unfolds during the assigned period of time. This adds an important and original element to this technique. The participant's role as film director becomes blurred with the life roles they are performing in the film, as there is no need to make conscious decisions about where to position and point the camera, or when to start and stop recording.

5.5 A recognised benefit of existing in-situ research techniques, such as participant observation and 'go-along' interviews, is that we can better access the immediacy and embeddedness of the particular time and space in which events unfold (Pink 2007a). Indeed, we found that the headcam allowed attentiveness to a variety of rhythms expressed in particular time-spaces; rhythms which are thought to be central to the unfolding of everyday life (Lefebvre 2004). We could follow the patterning and co-ordination of actions, and the pace, routes, regularities, flows and interruptions of the research participants' corporeal movements as they negotiated particular terrains. The carefully judged sequence of motions of a walker negotiating a

boulder (Click here to launch video 1: negotiating rocks) can be contrasted with the quick-fire, reactions, reflexes and improvisations of a mountain biker struggling to maintain control on off-camber tree roots (Click here to launch video 2: mountain biker in woods). Such footage helps attend to the need that Binnie et al. (2007) identify for developing a deeper understanding of how different mobilities are produced. This is important as it is 'through mundane mobilities that order is produced and power exercised' (Binnie et al. 2007: 170).

5.6 Indeed, headcam proved valuable in detecting particular norms of conduct and how they constrained and enabled particular practices in particular places. The verbal explanations, recorded in-situ or given in interviews, illuminated how norms of conduct are reproduced, resisted and policed through particular performances, and how these were justified by particular discourses (Click here to launch video 3: Dog poo).

5.7 By viewing the headcam footage together with the participant, it is possible to explore the intended or improvisory nature of various actions, such as negotiating obstacles or the micro and macro practices of route finding. For example, we noted interesting contrasts between the more provisional and ad hoc route finding of casual walkers and mountain bikers with the highly planned navigation of the serious hillwalker (Click here to launch video 4: Map Reading). (Click here to launch video 5: Ad Hoc Bike Route).

5.8 Headcam filming can make it easier to follow certain social practices in continuous real-time, providing better access to temporal dimensions of embodied experience, for instance, through certain micro and macro rhythms and sequences of particular modes of movement. In the case of walking, it captures the repetitive left-right foot beats as the camera registers its impact on the ground, and how its sheer relentlessness evokes the meditative state of the lone walker (Click here to launch video 6: Meditative Walking). However, it could not capture the equivalent pedalling rhythm of the mountain biker, as their circular pedal strokes do not create this impact on the camera. What headcam easily conveys are the macro stop-start temporal patterns of mountain biking, where the session becomes punctuated by moments of re-grouping prompted by the terrain and the ease with which they negotiate it (Click here to launch video 7: Regroup). For both activities, the viewer can perceive how fundamental body rhythms of breathing, eating, drinking, and going to the toilet intersect with particular experiences.

Evoking Embodied, Sensory, Kinaesthetic and Emotional Knowledge and Experience

5.9 Headcam footage can help convey and evoke the ways in which embodied, emotional, sensory and kinaesthetic knowledges and experiences are produced through social practice. As previous research has found, participants often find these difficult to verbalise (Smears 2006; Dilley 2007) as they are not necessarily conscious and reflective but are instead embodied in the flesh (Nettleton and Watson 1998; Shilling 2003; Howson 2005). Their embodied and often pre-cognitive nature means that it is necessary for the researcher to move beyond a purely linguistic engagement in order to explore the multi-dimensional, multi-sensory aspects of lifeworlds. Here headcam has the advantage of not forcing us to reduce to words the immediacy, force, subtleties and vicissitudes of embodied multi-sensory qualities of experience and knowledge.

5.10 Being an audio-visual representation, one expects headcam footage to favour senses of sight and sound. Certainly, headcam can provide an impression of what the subject sees and hears to a degree of intimacy that would be hard to perceive as a participant observer and, depending on the social practices under scrutiny, may be difficult to achieve with a handheld camera (Click here to launch video 8: Approaching Stream). As such, it gives us an idea of the social and environmental aspects they are attending to (or not) at different spatial and temporal junctures. Reviewing footage with the subject can bring us closer to learning how to see and hear as a particular walker or mountain biker does, as Grasseni (2004) did for her participants. Yet we found that the visual and aural representations of headcam moved beyond this and could also communicate and invoke understanding of experiences relating to taste, touch, emotions and physicality.

5.11 For us, a comparative methodological strength of headcam was that it created a vivid impression of the sheer physicality and visceral experience of recreational activities. The punctuation of experiences with persistent, rhythmical breathing was particularly striking, for example, the evocative sound of laboured inhalations and exhalations (Click here to launch video 9: Heavy Breathing). Although a far cry from the actual sensations of lungs burning and heart beating through the skull associated with strenuous breathing, the footage prompts greater or at least more immediate empathy for the experience than language alone could.

5.12 Headcam can be used to illuminate how embodied skills, competencies and tacit knowledges are acquired and deployed. The footage can facilitate discussion by prompting the participant's consciousness of competencies that are embodied to such a degree that they 'just do' them. Similarly, headcam can illuminate well where such competencies are lacking, and the sometimes painful processes through which learning advances or otherwise. Examples include the relentless repetitions of purposive practice, the breakthroughs and losses in confidence, and the role of others in shaping these processes (Click here to launch video 10: Try Again).

5.13 We found headcam particularly useful in exploring the role of pain in recreational experience. Yelps, squeals, cries and spatial bodily comportment gave rich depictions of the aches and soreness of sudden impacts or chronic injuries (Click here to launch video 11: Minor Crash). Indeed, in-situ narratives conveying past landscapes of pain and injury became a recurring theme, especially with mountain bikers.

5.14 Furthermore, headcam can help develop understanding of touch and kinaesthetic 'feel', and their role in social practice. A walker's hand seeking the 'right' grip on a rock or tree to aid their passage, or a mountain biker squeezing their tyres to gauge the appropriateness of their pressure for the terrain are

indicative of how experience is shaped by particular types of touch and the embodied knowledges that underpin them. (Click here to launch video 12: Letting Out Air). Similarly, a sense of the texture of the ground underfoot (or 'under-wheel') can be conveyed to a certain extent by the bodily-induced moving images and by the sounds made by feet and tyres on the ground, such as the crunch of gravel (Click here to launch video 13: Crunch Under Foot). Moreover, we can gain an appreciation of how such visceral and kinaesthetic feelings generated by a particular movement relates to the emotional feelings associated with that action.

5.15 Taste and smell are perhaps the hardest senses for headcam to 'capture'. Nevertheless, an indirect appreciation of these sensory experiences may be gained. For example, the utterances, intonations or (dis)approving sounds made by participants could be accompanied by visual cues suggesting the taste of raspberries picked on a walk or mountain bike trail or the smell of pine needles in a forest.

5.16 Headcam was found to be useful for exploring idioms of emotional experience. A range of sounds and vocalisations powerfully conveyed the affective highs and lows of particular practices. For instance, the negotiation of a tricky section of terrain might be accompanied by squeaks and whoops of elation, grunts of frustration, or whimpers and screams of fear (Click here to launch video 14: Oh No). Moreover, the presence of such noises throws particular absences into sharp relief. Headcam is particularly good at enabling sounds and silences that would be meaningless out of context (i.e. in an audio-only recording) to become enlightening as situated aural expressions of affect.

5.17 Although extremes of emotion were the most immediately apparent, the headcam footage also enabled us to explore a much wider range of moods and feelings, such as contentment and boredom. In popular culture, mountain biking is often portrayed as 'extreme' (Wheaton 2004), yet the headcam showed the pervasiveness of the mundane practices involved and juxtaposed these with the relatively rare and short-lived 'extreme' or 'peak' experiences. It was clear that emotional highs cannot be understood without the lows and, moreover, the downright moderate and ordinary. Headcam constituted a useful tool for exploring the interweavings of such affective relationships (Click here to launch video 15: Extreme) (Click here to launch video 16: Mundane).

5.18 Indeed, one of the main benefits of headcam is its capacity to record comprehensive, real-time activities, which capture the dramatic alongside the mundane without privileging either. Although hand-held video also records in real-time, it can be tricky or even uncomfortable to hold a camera in position long enough to capture the activity in question. In contrast to participant-directed video research, headcam places less reliance on the participants' choice of what they see to be 'worth' recording. No prior assumptions are made about which 'episodes' are more noteworthy than others, thus greater space is made for the taken-for-granted and the ordinary, and the perhaps unexpected ways in which they might be of significance to the participant. As Buscher (2005) found for video more generally, headcam allows the familiar to become strange, through video's 'real-time' and 'time travel' facilities, and the strange familiar, by dissection and repeated viewing of a new perspective. Headcam therefore, has much potential to enlighten the relationship between the extraordinary and the mundane.

Considerations and Limitations

6.1 With respect to many emotional, sensory and cognitive dimensions of experience, the headcam footage is most useful as a prompt for participants' memories of it, and explanations of the embodied knowledges that iteratively shaped the actions, thoughts and feelings involved. We found the more alien an experience was to the researcher, the more important it was to have the participant convey how they made sense of it. We should therefore, be cautious of presenting headcam footage to wider audiences without the accompanying reflections of the participant (Pink 2007b). Nevertheless, allowing others, such as co-participants, to review headcam footage may have utility in that it can generate new insights into collective and normative discourse about certain practices, representations and behaviours.

6.2 There will always be limits to headcam's ability to convey more nuanced kinaesthetic experience. For instance, it is difficult to communicate the complex signals picked up by the soles of a walker's feet or the impacts from turns, bumps and drops when mountain biking. Headcam also struggles to convey many micro movements, such as nuances of the participant's comportment or facial expressions.

6.3 A fundamental challenge in studying the experiences and performances of others, and to a certain degree, our own performances, is that the 'doing' of the research can eclipse the very 'doing' of the practice or activity under investigation. The possibility of intruding upon or precluding the experience is a concern not because we want to safeguard some kind of 'objectivity' as documented in some video methods (e.g. Unsworth 2001), but rather in terms of interfering with an activity to the extent that they are no longer meaningful to the participant *as those practices*.

6.4 We must be aware that participants may be physically or psychologically uncomfortable with some aspects of headcam recording. A small number mentioned the physical discomfort of wearing the headband 'holster' and with the older cameras the weight on the head was raised as an issue. Some also found that the sensation of motion when watching the footage made them feel uneasy, although they became used to it after a few minutes. Participants' psychological discomforts associated with using the headcam included frustration with their lack of technical expertise, anxieties about how to go to the toilet without revealing all and worries about safety should they fall on the camera^[2].

6.5 Although all participants readily accepted the task of wearing the headcam for their recreational outing despite never having worn one before, some found it easier than others to incorporate into their social worlds. This underlines the need to consider the ways the visualities of headcam are, or indeed are not, embedded in particular cultures (Williams 1976) and associated with particular genres of visual image (Rose 2007). Participants more often reported feeling 'strange' or 'out of place' wearing a headcam in a peri-

urban park than in more remote areas where there were fewer people.

6.6 Furthermore, mountain bikers were generally more comfortable using headcam than walkers. This is possibly due to the year-round wearing of headgear and the fact that headcam video is more established in the socio-technological context of mountain biking, such as in commercial mountain biking DVDs. Indeed, we were alert to the possibility that particular types of behaviours might be 'encouraged or discouraged in the videoactive context' (Shrum et al. 2005: 12). We were aware that mountain bikers might, consciously or subconsciously, appropriate the headcam recording process to established narratives, identities and practices of mountain bike films that celebrate speed, adrenalin, stunts and machismo. However, thus far we have found that whilst participants acknowledged such cultural reference points, they did not appear to enact them. Participants were often apologetic for there not being more 'action' in their footage, thus acknowledging the cultural expectation of the visual spectacle, whilst noting how mundane their footage seemed in comparison. Nevertheless, they often indicated that it did not *feel* mundane at the time, as they were lost in their thoughts and practices.

6.7 Awareness of the seductiveness of visual technologies, to both researcher and participant, is vital. There are many reasons why it is misleading to assume that the participant sees what the headcam (and in turn what the viewer) 'sees', or that there is some straightforward relationship between them. Even from a realist perspective, headcam does not 'view' the world in the same sophisticated way as the human eye and cannot tell us how this interconnects with other sensory experiences, emotions and cognitive processes. Therefore, it does not fully convey the qualities, intensities and multiplicities of embodied experience. Beyond the most obvious macro and meso situation directionalities and timings of the moving scene, headcam footage conveys little else about the participant's visual experience, such as their precise field of vision and focal points within a scene. Nor can it tell us whether the participant is glancing, gazing, scanning, or whether it is a vacant look. It cannot tell us of their peripheral awareness. In short, the video recording represents a particular 'way of seeing' (Berger 1972), a headcam 'way of seeing', and as such, we must be alert to the presences and absences which underpin such particularity.

6.8 Care must be taken not to merely replace a privileging of the linguistic with a privileging of the visual and, to a lesser extent, audio^[3] elements of experience, at the expense of other senses and sensations. Headcam provides an important opportunity to move beyond this position to a more nuanced understanding of how lived, multisensory experiences are entwined with the discursive and textual. Another similar danger of using headcam techniques is that the mass of rich data produced makes it easy to overlook temporal, spatial, corporeal and sensorial aspects of the participant's experience that are *not* represented. The only period recorded with headcam in our study was the recreational outing itself, when earlier preparatory or later reflective moments relating to 'the experience' may have been just as important. Since it is not practical for the participant to wear the headcam at all periods of interest, we must consider the selectivity our bounding engenders, and use complementary techniques, such as interviewing or other ethnographic methods, to address neglected dimensions that are not recorded. Ultimately, care must be taken to ensure that the research design remains ontologically and empirically led rather than technologically driven (Mason 2006). The researcher must think about the kinds of knowledges headcam can be used to explore and represent. It may be that the most appropriate means of addressing particular research questions do not include headcam techniques at all.

Conclusion

7.1 By evoking a dynamic, in-situ, 'inside' perspective, headcam brings a new dimension to exploring how bodies, senses, technologies, thoughts and feelings become entangled in the experiences of places, spaces, landscapes and environments. Our fieldwork suggests that headcam video techniques have tremendous untapped potential for generating greater understandings of social worlds as they are practiced, performed and experienced. It is particularly well suited to investigating highly mobile, fast, risky, spatially constrictive, expert or equipment-laden practices. We suspect that there are also many other, unexplored settings in which the use of headcam methodologies will be appropriate and highly productive.

7.2 We found that headcam footage brought us closer to capturing and evoking the affective, multi-sensual, and often taken-for-granted, realms of human experience, and the rhythms, moments and improvisations of practice that are beyond text or not easy to observe, recall, verbalise, or otherwise express. Headcam techniques allow the researcher to trace the connections between a wide range of experiential, practical and representational phenomena and explore how they relate to specific meanings, identities, relationships, skills and knowledges.

7.3 A crucial distinguishing feature of the use of headcam technology as a research tool is its ability to record a continuous, real-time, 'hands-free' audio-visual account of in-situ, social practices that invites understanding of experience from the perspective of wearer. This allows both participant and researcher a certain freedom to focus on practices other than audio or video recording, knowing that the camera will 'follow'. However, the footage produced by headcam can never equate to walking in the shoes (or sitting in the saddle) of others or seeing from their 'point of view'. It does not give us direct access to what it feels like to do a particular activity or be a particular person. It is crucial to be aware of the particular seductions of headcam footage, which suggest the viewer is seeing the participant's 'own' perspective or 'view' of the world, and which add to the well-acknowledged seductiveness of the moving image as 'realistic'. One way of contextualising headcam footage is by using it as a prompt for research participants in review interviews. This technique enables an interweaving of narratives of meaning, experience and representation with the footage. We recommend that headcam recordings are not used in isolation but are enrolled in a methodology that draws upon other methods, such as in-depth interviewing, photo-elicitation and participant observation.

7.4 Nevertheless, headcam techniques do provide a novel perspective on how social practices, roles and

relations unfold, which aids the development of our understanding of them. Our research therefore contributes to a growing body of work which is engaging creatively with new technologies, seeking to 'transform sociological participation, drawing the audience 'inside': engaging us, as embodied, sensual beings in the living details of the thing we seek to understand' (Halford & Knowles 2005: 1.9).

Notes

¹Donal MacIntyre is an investigative journalist specialising in undercover TV documentaries, such as those exposing the lives of drug dealers, football hooligans and elderly care home residents, in which the aim is to 'show' rather than 'tell' the audience how the world is.

²We ultimately decided to recommend that mountain-biking participants attach the camera to the helmet with velcro rather than have it fixed in place with a headband as suggested by the manufacturers.

³The audio realm can only be recorded within a certain range of the headcam microphone. For our model, the audio-range was 1-2m; therefore, the recording represented the sounds and speech of the participant to a large extent, but hardly picked up the speech of other people, wind in trees, bird calls etc.

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