The use of visual media as a tool for investigating animal behaviour

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Abstract

In this essay we outline how video-related technology can be used as a tool for studying animal behaviour. We review particular aspects of novel, innovative animal behaviour uploaded by the general public via video-based media on the internet (using YouTube™ as a specific example). The behaviour of animals, particularly the play behaviour focussed on here, is viewed by huge audiences. Within this essay we focussed on three different kinds of media clips: 1) interspecies play between dogs and a range of different species; 2) object play in horses; and 3) animal responses to stimuli presented on iPads, iPods and iPhones. We argue that the use of video is a good means of capturing uncommon or previously unknown behaviour, providing evidence that these behaviours occur. Furthermore, some of the behaviours featured on YouTube provide valuable insights for future directions in animal behaviour research. If we also take this opportunity to convey our knowledge to a public that seems to be fundamentally interested in animal behaviour, this is a good means of bridging the gap between knowledge amongst an academic few and the general public.

Keywords: citizen science, online resources, 'people power', crowdsourcing, internet, playback studies, preliminary testing, opportunistic observation, YouTube

Wildlife films and natural history documentaries are immensely popular with the general public. Entire distribution networks are dedicated to the broadcasting of wildlife programmes (Bousé 2000). Significantly, one of the main features of such programmes is the behaviour of other animals, which is evidently fascinating to humans. There is, however, a lack of engagement with wildlife in relation to research in animal behaviour. In contrast observational filmmaking may form an integral part of the interpretation and presentation of research findings within visual anthropology (MacDougall 1998, 2001, 2006 ; Grimshaw 2001; Fijn 2007, 2012). As animal behaviour-related content is viewed by vast numbers of people on the television, and increasingly on the internet, why have these visual media not been embraced more readily within animal behaviour as a discipline, and the sciences more generally?

Wildlife films occasionally capture animal behaviour that has not been filmed before. Within the popular 2011 Attenborough series *The Frozen Planet*, the BBC Natural History Unit filmed a rarely observed behaviour not just once, but on multiple occasions. The sequences show in unprecedented detail how orca (*Orcinus orca*) work together to create waves to wash seals off ice floes in order to capture them in the water (1, Table 1). Another instance of novel behaviour, captured for BBC Wildlife on One (Kea- smartest parrots? 2004), is that of kea (*Nestor notabilis*), a threatened species of mountain parrot renowned for its cognitive ability, opportunistically opening large wheelie bins (2, Table, 1). We know this sequence involved novel foraging behaviour in wild animals, as it was filmed by one of the authors (NF) and the learned behaviour was subsequently published (Gajdon et al. 2006).

Nevertheless, there are limitations in terms of the use of wildlife documentaries within the discipline of animal behaviour. A major setback with their use as a source of data is that elements can be introduced which are not chronologically or sequentially correct and have often been altered considerably through editing in postproduction (e.g., 3, Table, 1). Consequently, the only way such footage could be useful for research purposes is to obtain the original unedited material, or 'raw footage'. Post-production editing is perhaps one of the reasons why footage from wildlife films has not been used as a tool for interpretation and analysis within academia. We therefore chose to exclude wildlife documentaries from our analysis, and focus instead upon the relatively new medium of video-sharing on the internet. Unlike wildlife films, we suggest that footage uploaded by the public onto the internet is more amenable to analysis, primarily because it is easier to establish whether a situation is 'real' through the absence of professional postproduction editing.

We bring to this essay an interdisciplinary approach to the use of visual media, with combined backgrounds in animal behaviour, particularly visual cognition; human-animal studies; and visual anthropology. Video is now commonly used as a means of presentation in science, as key examples in lectures or conferences, but this is primarily as an illustrative tool, rather than as a means for exploring further research, or as an integral part of the presentation of results. In this essay we advocate the use of video beyond just an illustrative example and instead suggest that viewing raw footage posted on the internet can act as a springboard for further investigation.

Citizen science

Scientific projects have been developed to engage the public as participants in the collection of data through the use of 'crowdsourcing' methods - outsourcing a job to an undefined group of people. This 'citizen science' approach has been advocated for use by ecologists and could be of great use amongst animal behaviour researchers (Dickinson et al. 2010; for links to projects in ecology and evolution see Silvertown 2009). One such example of citizen science research is a project on the migration of the monarch butterfly, *Danaus plexippus*. Since 2005, the migration pattern of this species has been largely tracked by an ever-increasing number of participants in the Journey North program (Howard & Davis 2009, 2011; 4, Table 1).

Resources freely available on the internet are being increasingly used in behavioural studies. For example, Google Earth™ is now often used to pinpoint study sites and satellite imagery has been used to explore the use of magnetic cues for orientation by ruminants (Begall et al. 2008; Hert et al. 2011). Another example of the use of satellite maps is a National Geographic-sponsored blog site that encourages interested participants to scan maps for potential archaeological digs in Mongolia, thereby actively involving these citizen scientists in the scientific process. The archaeologists on the project target key sites that are tagged by multiple viewers and then visit these sites for assessment (5, Table 1; on 16 Oct 2012 the site stated that 21,181 people were 'online explorers' and 841,454 images/titles had been processed).

With cameras that can easily be held in the palm of the hand, video technology is now readily accessible. It is now possible to inexpensively obtain wearable high-definition waterproof cameras (such as those made by GoPro, Woodman Labs, USA), which are often used to film extreme sports such as snowboarding or base-jumping, from the point of view of the participant. People have found novel uses for these cameras, such as strapping them to the heads or bodies of animals (e.g., longhorn bull, 6, Table 1). Such footage taken from the point of view of the animal could provide a new perspective on social interactions. For example, the online clip "Beautiful Day at the Dog Park" (7, Table 1) depicts an edited sequence of the social interactions of dogs in a park. This example gives a good indication of how shots can be played in extreme slow motion to provide a new perspective on social interactions.

Using social media as a tool

Our premise for using YouTube™ as a tool for searching for animal behaviour is based on the notion that the probability of capturing any given behaviour is dramatically increased when the number of people obtaining the footage is not restricted to academics but is widened to citizen scientists. This form of recording animal behaviour involves anyone that has a video camera, still camera, or mobile phone, and is willing to post clips onto the internet. One of the goals of this essay is to offer ways in which we can observe and gather spontaneous examples of interesting, rare, or unusual behaviour in animals and utilize this for qualitative means. While these media clips do not adhere to a particular methodology, we can nevertheless consider this as opportunistic observation useful for preliminary hypothesis testing.

YouTube was launched in 2005 and has continued to grow at an immense rate ever since. As early as mid-2006, YouTube had made over 100 million videos available to the public, with a daily upload of 65,000 videos (8, Table 1). By 2012, hundreds of millions of users upload 48 h of video footage every day. We invite researchers in animal behaviour to use this immense database as a research tool.

We have focussed on YouTube, rather than other social media on the internet, as YouTube often features videos that have not been edited together into a sequence (examples in Appendices 1-3). Another video-sharing website, Vimeo™, generally has videos that contain sequences edited together as some form of narrative, as this site targets amateur and professional filmmakers, rather than the general public. Edited sequences from wildlife or natural history film productions, news media, or other documentary production companies that have subsequently been uploaded onto YouTube were excluded from our animal behaviour analyses, as the images are often manipulated in postproduction before distribution to the public.

We judged whether the behaviour on the video clips was 'real' or 'fake' by introducing parameters designed to exclude the manipulation of images in postproduction (the anthropologist Michael Wesch (2008, 2009) addresses the aspect of 'fakery', or in his words, the 'authenticity crisis' in relation to vlogs (video blogs) on YouTube). Most video clips uploaded to YouTube by the public consist of very few shots (often a single shot) of raw footage that has been minimally edited, if at all. In order to avoid elements of manipulation we excluded clips that had visibly altered images through the use of editing software. When we came across multiple independent instances of video segments featuring similar contexts, such as object play with balls by horses, we could be confident that this kind of play activity spontaneously occurs in horses.

We defined that the YouTube clip must: 1) Have no obvious postproduction manipulation of the image itself. Titles, subtitles, and music were acceptable, as these elements were unlikely to influence the interpretation of the image itself and could be ignored for our purposes; 2) Consist of one main scene with up to four shots per clip. Single shot clips were ideal, as this meant that the footage had not been edited together as a narrative-based sequence; 3) Be derived from the original source, not downloaded and appropriated from elsewhere; 4) Be independent; we ensured that a different animal was always observed by careful scrutiny of the animal's morphology and surroundings and any further details given by the person uploading the video, such as the pet's name; 5) Have minimal or no human manipulation of the animals' behaviour, nor any indication that the animal may have been trained to perform the behaviour. If there was any verbal encouragement from behind the camera, this was noted (see 'human influence' in Appendix 1).

We accepted that some form of human influence was inevitable within the YouTube clips, as it required a human to be filming from behind the camera. It is likely that animals would need to be habituated to human presence for behaviour to occur within reasonable proximity to a camera. Hence, we did not rule out instances when the person behind the camera spoke in a general manner, as most of the featured animals were zoo animals, domestic pets, or companion animals habituated to human vocalisations. In wildlife programmes behaviour is often caught using powerful telephoto lenses (although this distorts the image and can make it hard for the viewer to judge actual sizes or distances). Within the clips we reviewed, the only instances where the animals may have not perceived the presence of humans was when the video was shot from behind a window.

Novel or innovative play behaviour on the internet

Both authors have separately observed the notably playful kea (Diamond & Bond 2004) repeatedly sliding down the icy roof of a mountain hut, therefore, we thought it significant to find a Russian video of a crow sliding down an icy roof using a plastic lid as a tool (9, Table 1). Similarly, a member of the public filmed an adult kea rolling a snowball (10, Table 1); although we have independently observed similar innovative behaviour (stone rolling and tossing) while conducting fieldwork on kea, we have not witnessed the unusual behaviour of snowball rolling. The value of videos of this kind is straightforward: a single record captured on video is evidence that the behaviour does in fact occur.

Consequently, we focussed our online investigation on examples of 'play' behaviour because play is relatively understudied, often difficult to observe and thus quantify, and is inherently interesting to a large audience. This interest is clear based on the number of times some of these clips have been viewed. For example, the sliding crow clip (uploaded on 9 Jan 2012) had been viewed 670,884 times within six months. Additionally, multiple versions of this clip had been made, each reaching large numbers of viewers (e.g., one re-post, with an English title and keywords, had 761,225 viewings on 26 June 2012). Other instances of novel behaviour on YouTube include two clips of young foxes jumping on trampolines (11, Table 1). Consisting of a single shot with little background noise and no obvious intervention on the part of the person filming, this particular clip is a good example of what we have in mind and demonstrates not only its appeal to the public (viewed almost 12,000 times per day since it was uploaded), but the scope of footage featuring novel play behaviour on YouTube.

We narrowed our search to three kinds of clips in relation to play behaviour in non-human animals (for details, including links to the URLs, see Appendices 1-3): 1) Interspecies play in dogs (dogs playing with a wide variety of different species); 2) Object play, with a focus on horses playing with objects; and 3) Animal responses to iPads, iPods and iPhones (henceforth: "iPads"). We use the latter to illustrate how we can use YouTube to assess methodology by extrapolating important aspects of visual processing from the responses of different species to stimuli presented on iPads. These topics are discussed as inspiration for further research, and not as a definitive quantitative analysis of the subject area. In all cases, the sequence of clips we reviewed were the first search results presented (excluding further uploads made from the original source) in relation to the keywords chosen for the search topic.

Interspecies play behaviour

There have been many studies concerning dog-human interspecies play (Mitchell & Thompson 1990; Rooney et al. 2000, 2001; Rooney & Bradshaw 2002, 2006), but play between dogs and other species has been little examined. Play between dogs and species other than humans does occur and YouTube is excellent for revealing spontaneous instances of these play bouts. When it became clear that dogs featured particularly heavily in clips depicting animals engaged in interspecies interactions (e.g., 'parrot and play', 'foxes and play'), we searched for keywords amongst specific kinds of animals that featured in play with dogs (e.g., 'dog and deer', 'dog and racoon', 'dog and bear', see Appendix 1).

Bekoff and Allen (1997) avoid strict functional definitions of play behaviour, as they argue that such definitions are limiting to analysis, and propose instead to observe and analyse on the basis of an intuitive understanding of play relying on particular signal behaviours, such as the stereotyped 'play bow' in dogs (Bekoff 1977, 1995). The bow can be used both as a guide for the other play 'mate' (or the viewer of a video clip) that an individual is communicating "I want to play"; or that the dog wants to maintain play, in other words "I still want to play". Canids also use what Bekoff (2001) calls 'self-handicapping', where a play behaviour is used as a compromise, such as not forcefully biting a play mate, but instead mouthing softly. We used a similar approach to our analysis of dogs engaging in interspecies play within the video clips and relied on reciprocal gestures, and particularly the 'play bow', as signals that the two individuals were playing.

Humans are inevitably present in all of the clips, but one of our parameters was that the humans were not considerably influencing, manipulating or changing the animals' interactions. We noted whether the interaction was between 'domestic' or 'wild' animals, but found that most were in the domestic category, as they were often nurtured by and habituated to humans and therefore the dog would have spent time in close proximity with the other animal (see wild/domestic column in Appendix 1).

Play behaviour was inventive and variable across the different clips relating to interspecies play. It was evident that the type of play was dependent upon the animal species with which the dog engaged in play: with deer, the play was primarily oriented toward pawing, jumping, or chasing (e.g., 15, Table 1); with horses and cattle it was more oriented toward object play; with racoons, bears and foxes it tended to consist of mouthing and wrestling; while play with different species of parrot involved prodding and probing one another (see Appendix 1).

We noted that interspecies play between dogs and other species was often initiated by the dog. That dogs often tended to initiate play through the medium of objects suggests that the play may have been exhibited through the participants' mutual neophilia in relation to objects. Neophilia and object play are evidently related phenomena, and may also be related to an animal's propensity to engage in interspecies play. Cetaceans, for example, are known to engage in object play and a recent report based on opportunistic observations demonstrates that humpback whales (*Megaptera novaeangliae*) will engage in play with bottlenose dolphins (Deakos et al. 2010). This report is based on two observations off the coast of the Hawaiian islands, but this sample size could be increased with the engagement of citizen science and posts to YouTube as evidence.

A well-known cliché is that dogs are 'man's best friend'. From the remarkable range of species with whom dogs are spontaneously playing in online clips (involving ox, alpaca, racoon, cat, fox, horse, squirrel, duckling, pig, monkey, lion, tiger, dolphin, shark, deer and sheep and a number of species of corvid, parrot, and bear), one could conclude that dogs are not particularly anthropocentric or even canine-centric in relation to play bouts- they appear to play with any species that are willing to reciprocate.

Object play in horses

When it became clear which animals featured particularly heavily in clips of animals engaged in object play, we searched for keywords amongst specific kinds of animals and objects, in this case focussing on horses playing with balls (keyword search terms: 'horse and ball', 'horse playing and ball'), which were often, but not restricted to, inflated rubber balls (see Appendix 2).

Foals and young horses are known to engage in repeated bouts of object play and this could explain anecdotal accounts of tool-use by adult equids (see Crowell-Davis et al. 1987). There were two main kinds of object that initiated extended play bouts in horses within the YouTube clips: small, coloured balls with a handle that could be gripped by the teeth, and larger coloured balls with no handle, often used by humans for exercise purposes. The two kinds of ball resulted in quite different object play behaviour, as the small ball could be picked up, shaken and dropped or tossed on the ground, while the larger ball was large enough to lean on and horses often exhibited a 'resting rear': belly on top of the ball with fore and hind legs on opposite sides (Appendix 2).

Using YouTube as a 'bench-test' for the analysis of object play in horses provided a clear indication that inflated balls elicit a wide range of play behaviour, as seen in object play with dogs (see above). We observed all of McDonnell and Poulin's (2002) categories of 'object play' across the video clips, such as: 'nibble', 'sniff/lick', 'mouth', 'chew', 'pick up', 'shake', 'carry', 'drop or toss', 'pull', 'paw', 'kick up', 'to and from', 'circle', and 'resting rear'. McDonnell and Poulin (2002) note that the frequency and the duration of play bouts are stimulated by novel stimuli, such as encounters with novel objects.

Of note is that both dogs (see above) and horses were prone to play with objects. This behaviour has been suggested as a possible reason why dogs have been successfully domesticated (Kaulfuß & Mills 2008). The examples of object play among young horses on YouTube suggest that engagement with novel objects may also have contributed to the facility with which these animals have become domesticated by humans. This leads to the more general hypothesis that some form of neophilia, playfulness, or capacity to play with objects may be traits that facilitate domestication or render animals amenable to training by humans. While this idea is speculation on our behalf, we suggest that these sorts of hypotheses can be explored in more detail with the aid of clips posted on YouTube, coupled with a survey of the literature, and of course, where possible, rigorous hypothesis-testing.

These types of searches may also provide researchers investigating applied animal behaviour and animal welfare with further ideas for environmental enrichment and may be relevant to research projects involving cognition, development, learning or problem solving in horses or other animals. When applied to wild animals, it is evident that play behaviour is rarely observed in close proximity, and as such difficult to investigate in a quantitative manner, resulting in the reliance of opportunistic observations to document its scope. Citizen scientists posting clips on YouTube are a good means of obtaining evidence of such rare behaviour.

Animal responses to iPads

Lizards (Ord et al. 2002; van Dyk et al. 2007; Nelson et al. 2010), some birds (Nelson et al. 2008; Smith et al. 2009), and jumping spiders (Harland & Jackson 2002), among others, are known to respond to video stimuli or to 3D computer animation in a similar manner to how they would respond to the equivalent real stimulus. These methods (particularly 3D animation) allow us, for example, to explore the relevance of temporal patterns (e.g. van Dyk et al. 2007), or the spatial structure of a display (e.g., Peters 2008), in eliciting different responses by receivers. On the other hand, several species fail to respond to video or animation (reviewed in Woo & Rieucau 2011), seemingly having visual systems incompatible with the presentation of video playback. A search through clips available on YouTube identifies those species for which methods using computer animation or video technology are likely to be more fruitful. We tabulated all instances of animals responding to iPads, iPods or iPhones, noting details of the behaviour of the animal (Appendix 3). Keyword searches were for "iPad", "iPhone" or "iPod" (generically referred to as 'iPad') and the animal in question (e.g., "cat").

As a consequence of their diversity, the visual systems of some animals may have characteristics that enable their bearers to be perceptually 'fooled' by stimuli presented on monitors or screens; for example, evoking clear predatory or play responses, while little response is evoked in other groups. While it is beyond the scope of this essay to provide a detailed description of the visual systems of the animals featured in YouTube clips (primates, cats, dogs, parrots, chameleons, dragon lizards, toads and geckos), some general information is described below, and is summarised and referenced in Table 2.

Humans have very good spatial acuity, but even our ability to extract detailed information from a scene is outdone by some birds and primates (Table 2). Nevertheless, animals for which visual acuity is poor compared to our own, such as cats and possibly toads and lizards were highly responsive to stimuli on iPads. However, frog and toad vision is adapted to detect moving prey, rather than for sampling with high spatial acuity (Ewert 2004), and the importance of motion vision is also apparent in lizards (Ord et al. 2002; Nelson et al. 2010).

An animal's temporal resolution can be determined by measuring the highest frequency at which a flickering light source is seen as continuous (critical flicker fusion frequency, CFF). Human CFF is 60 Hz (Woodhouse & Barlow 1985), and it is on this basis that monitor 'refresh rates' are based. Animals with higher CFF might therefore perceive video presented on a conventional monitor (e.g., cathode ray tubes) as a strobe-like sequence of images. Previous studies had difficulty in eliciting realistic responses to televised images in hens (e.g., D'Eath & Dawkins 1996; Patterson-Kane et al. 1997), but the CFF of chickens is higher than our own (Lisney et al. 2011) so these methods may have been unsuitable. Modern LCD monitors flicker at high rates (120-240 Hz) and chickens respond well to video stimuli when presented in high definition and on LCD screens (e.g., Nelson et al. 2008; Smith et al. 2009; see also Watanabe & Troje 2006).

Despite having acuity comparable to cats, dogs appeared unresponsive to the visual element of the stimuli (Appendix 3). To some extent, their relatively high CFF (Table 2) helps explain their traditional lack of response to TV monitors (Pongrácz et al. 2003). Apparent stimulus size may also play a role, although audio was also used in examples using realistically sized stimuli, and 'real' stimuli always elicited the best responses (Pongrácz et al. 2003; Faragó et al. 2010). In contrast, a cat may lap 'milk' from an image of a real-size cup of milk presented on an iPad (12, Table 1).

The responses observed here showed clear-cut differences, with cats and reptiles being considerably more responsive to the stimuli presented on iPads than the other animals featured on YouTube. This fact is now exploited by developers of 'apps', with dozens of iPad applications specifically designed for felines. All of these involve a stimulus likely to elicit play and/or predatory behaviour (usually a moving 'fish', 'mouse', or even 'laser' dots). Games designed to encourage cats to 'fish' for goldfish moving in a pond are clearly related to real world situations. Cats, for example, have been filmed skidding on frozen ponds as they attempt to 'fish' for live fish swimming below the surface (13 & 14, Table 1).

The most responsive species featured on YouTube suggest that high resolving power is not necessary to elicit responses to stimuli on iPads, yet these species tend to have a CFF similar to our own. Advances in LCD technology may widen the number of species for which video playback is tractable. While the potential inability to perceive depth cues from a screen (Zeil 2000) may account for the lack of response in some species, there was no evidence that different mechanisms of depth perception were affecting responses, suggesting that multiple mechanisms of depth judgements (Table 2) are reliably 'fooled' by stimuli on two-dimensional screens.

"Humans, including human experimenters, "see" (and probably hear and feel) logical relations within stimuli that are not necessarily "there" for other species" (Lea et al. 2006, p. 254). This also applies the other way around. Even when other species have a sensory world not dissimilar to our own, it does not follow that we share the same experience, because we do not necessarily operate using the same 'logic', or because the salient features that make objects discernable varies between species (e.g., Nelson & Jackson 2012). Conversely, it is noteworthy how often the features we 'attend' to are the same ones that animals - as different to us as jumping spiders - 'attend' to (Nelson & Jackson 2006b). Indeed, from our analysis of animals responding to iPads, it is surprising how 'plastic' different perceptions and visual systems can be when interpreting these images.

The potential difficulties that arise regarding the use of playback technology as an experimental tool may lead to considerable time designing experiments which may often fail simply because the animals do not respond. This is where searches within YouTube can be helpful, as it allows us, using a large sample size that increases daily, to make preliminary assessments of what type of animal might be tractable for work using video stimuli.

Assessing the popularity of animal behaviour clips on YouTube

When the material in clips does not engage with the audience, they do not feature heavily on YouTube, being seldom viewed, if at all. Conversely, if the public engages with the material, clips rapidly 'go viral' and are viewed by millions of people (e.g., 16, Table 1). Based on this knowledge, we searched the keywords "true crime full episodes" to determine public engagement with a completely different but undoubtedly popular topic, based on the television airtime featuring this genre (Jermyn 2007). We looked at how often the first 30 listings that appeared on the search were viewed (only considering clips that were > 40 min in length). Similarly, we used the keyword search "wildlife documentaries full length" (also > 40 min) as a comparison with crime, and with the three different kinds of 'play' searches we conducted.

An overview of the number of "views" of both crime and wildlife documentaries testifies to the notion that the audience viewing these programs is very large indeed (Table 3). Of note is that while the minimum number of views for crime shows, and particularly for wildlife documentaries, is considerably larger than YouTube 'play' clips, the maximum number of views for our play searches was often orders of magnitude higher (Table 3). One might expect that horses playing with objects, or animals playing with iPads, would engage with a much more restricted audience than highly publicised, big budget wildlife or crime series, but they are in fact viewed by larger numbers of people and gain a similar (or greater) number of 'likes' (Table 3). This suggests that the content of our searches was more affective to the YouTube audience than big budget wildlife and crime documentaries. These large viewing numbers also demonstrate that displaying behaviour using YouTube as a visual medium is an excellent avenue to report or illustrate findings in the field of animal behaviour, in addition to its potential for further observation and research.

Conclusion

Many academic disciplines use anecdotes to develop research projects that ultimately produce reliable data (Bekoff 2000, 2006). As Bekoff (2006, p. 50) points out "…anecdotes are central to the study of behavior as they are to much of science. As we accumulate more and more stories about behavior we develop a solid database that can be used to stimulate further empirical research, and yes, additional stories. The plural of anecdote is data". With a video camera capturing an event, or multiple independent instances, the visual evidence immediately adds more weight than a textual account of the behaviour in question. With the increased availability of 'ready to capture' video acquisition tools across the general public, the possibility of capturing evidence of rare animal behaviour has increased manifold, and if the video is then uploaded onto the internet, viewing of the behaviour is readily accessible.

White (2006, p. 3) aptly describes the material on YouTube as "scraps, detritus, driftwood: but some of it is also treasure". With a change of thinking within the sciences we can make the most of this new phenomenon and extract the occasional rare gem in the form of a behavioural event that is captured on camera. YouTube presents a vast resource, which can be explored for useful preliminary information, and provides large sample sizes, adding validity to observed responses. For example, based on 117 clips of animals interacting with iPads, we could rapidly determine the differences in responses between the different groups, with some, such as cats and reptiles, emerging as clear candidates for video playback studies. Others, such as dogs and primates, seem less tractable for video playback studies, as their responses often seemed to be primarily based on contrast changes or sound (Appendix 3). In addition to finding that some animals are much more likely to respond to 2D visual stimuli than others, by determining the type of response we could also hazard an educated guess as to the actual aspect of the stimulus that is being responded to (Appendix 3).

It should be noted that the use of YouTube as data should be treated with caution, as images and sounds can readily be manipulated in postproduction, much as wildlife films are manipulated for a popular audience. Thus the line between reality and fakery, documentary and drama, and science and populism can become blurred. We advise searching on YouTube according to the parameters we have suggested, particularly focussing on raw footage that is comprised of a single shot with minimal levels of postproduction manipulation, and excluding those that have been considerably altered.

Video has the potential to be used to a far greater extent in the observation of behaviour beyond that of more structured experimental settings. The aim is to use YouTube as a means of observation, in other words toward qualitative, rather than more quantitative aspects of research. The results of such research could be presented according to filmmaking techniques used in observational-style filmmaking (Fijn 2012), or integrated into a project involving the active inclusion of citizen scientists (e.g., Silvertown 2009; Cooper et al. 2010).

The use of video as a research tool, followed by subsequent posts onto the internet, has the capacity to genuinely engage the public in science, and particularly in the study of animal behaviour. This online involvement in the communication of animal play inevitably raises public awareness of such behaviour. The public themselves become the researchers and the communicators. Furthermore, the notion that, as academics, we can benefit from uploads posted by the general public makes this a watershed for two-way benefits between science and the public. Greater rapport between an academic few and the wider public should be a good thing.

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Table 1. YouTube links to clips referred to in the text.

Clip number	Link	Date accessed
1	http://www.youtube.com/watch?v=hPge_0lea3o	3 Oct 2012
2	http://www.youtube.com/watch?v=bxoCuRuHlt8	3 Oct 2012
3	http://www.youtube.com/watch?v=dZxepRApAhg	30 Nov 2012
4	http://www.learner.org/jnorth/	27 June 2012
5	http://exploration.nationalgeographic.com/	27 June 2012
6	http://www.youtube.com/watch?v=_hB8LHS6j30&feature=player_embedded	29 June 2012
7	http://www.youtube.com/watch?v=rxBS1E0KZQU	29 June 2012
8	https://www.youtube.com/t/press_timeline	29 June 2012
9	http://www.youtube.com/watch?v=6uXiAe7Oc-I	16 Feb 2012
10	http://www.youtube.com/watch?v=gil4q7FVRC8	27 Feb 2012
11	http://www.youtube.com/watch?v=c8xJtH6UcQY&feature=related	26 June 2012
12	http://www.youtube.com/watch?v=3QQVpddOalo,	12 April 2012
13	http://www.youtube.com/watch?v=M819-9E6kyU&feature=endscreen&NR	26 June 2012

14	http://www.youtube.com/watch?v=0JyOHplzUNo	26 June 2012
15	http://www.youtube.com/watch?v=GnZSTkycovg	2 April 2012
16	http://www.youtube.com/watch?v=6FWUjJF1ai0	28 Feb 2012

Table 2. Summary information on the visual systems of the different groups featured in YouTube clips 'playing' with iPads.

Group	Spatial acuity (cycles/degree)	Colour vision	CFF (Hz) Rod/cone	Depth judgement	References
Humans	30-60	Trichromatic	18/60	Stereoscopic	Woodhouse & Barlow 1985
Other primates	Varied	Varied	20/90	Stereoscopic	Shumake et al. 1968; Jacobs 2009; Veilleux & Kirk 2009
Dogs	5-11	Dichromatic	50/90	Stereoscopic	Coile et al. 1989; Neitz et al. 1989; Miller & Murphy 1995; Pretterer et al. 2004
Cats	6-8	Trichromatic	20/60	Stereoscopic at close distances	Ringo et al. 1977; Blake 1988
Toads	Possibly 3	Dichromatic (possibly trichromatic)	6/Unknown	Stereoscopic	Nowak & Green 1983; House 1989; Aho 1997; Ewert 2004
Chameleons	Unknown	Possibly tetrachromatic	Unknown	Accommodation	Ott et al. 1998; Collin 1999; Bowmaker et al. 2005
Lizards (dragons)	Unknown	Trichromatic (possibly tetrachromatic)	Unknown	Accommodation	Barbour et al. 2002; Ott et al. 2004; Woo et al. 2009
Parrots	10	Tetrachromatic	40/70	Stereoscopic at close distances	Jones et al. 2007; Mullen & Pohland 2008; Demery et al. 2011; Lisney et al. 2011; Lind & Kelber 2011

Table 3. Descriptive statistics of the number of views and 'likes' per month on YouTube for each of the five assessed categories.

	Descriptive statistics	iPad	Horse object play	Interspecies play	True crime documentaries	Wildlife documentaries
Number of views	Minimum	8.1	0.3	4.1	213.0	334.7
	25% Percentile	62.92	27.15	421.2	689.2	2,980
	Median	222.2	251.0	2,976	1,469	4,383
	75% Percentile	2,784	1,176	10,952	3,151	8,067
	Maximum	2,042,939	41,725	136,025	8,165	61,028
	N	116	29	41	30	20
Number of "likes"	Minimum	0.0	0.0	0.0	0.0004	0.0019
	25% Percentile	0.0016	0.0013	0.0019	0.0012	0.0036
	Median	0.0034	0.0022	0.0028	0.0016	0.0062
	75% Percentile	0.0066	0.0042	0.0054	0.0024	0.0088
	Maximum	0.1667	0.0407	0.0779	0.0070	0.0135

Appendices

Appendix 1. Instances of interspecies play behaviour with dogs on YouTube.

Descriptor and animal	Views/ month	Likes/ month	Dislikes / month	no. of shots	Wild/ domestic	Human influence	URL
Interspecies, object play, crow and dog fetch ball	30,975.69	162.81	0.57	1	D	Y	http://www.youtube.com/watch?v=QqLU-o7N7Kw&feature=related
Interspecies, object play, dog pulls magpie by object	4.11	0.00	0.00	2	D	Y	http://www.youtube.com/watch?NR=1&feature=endscreen&v=GMwrDefioMU
Interspecies, object play, parrot offering dog food	1,239.05	2.71	0.07	1	D	N	http://www.youtube.com/watch?v=Fv9fxFzDOw0&feature=related
Interspecies, object play, parrot and dog chewing paper	2,975.71	3.25	0.16	1	D	N	http://www.youtube.com/watch?v=PZ1rm4sGOz8&feature=related
Interspecies, object play, dog and macaw grasping	15,277.50	79.40	0.90	1	D	N	http://www.youtube.com/watch?v=xjzX1puYq-4

stick							
Interspecies, object play, ox and dog wrestle hose	23.50	0.25	0.00	1	D	N	http://www.youtube.com/watch?v=fq6ZHg3ndzU
Interspecies, object play, horse chasing dog to get object	14,701.43	69.24	0.90	1	D	Y	http://www.youtube.com/watch?NR=1&feature=fvwp&v=UlsJHKLshVk
Interspecies, object play, dog and horse grasping object	3,312.00	18.63	0.19	1	D	N	http://www.youtube.com/watch?v=UWGz5k80_XY&feature=related
Interspecies, object play, horse chasing dog from ball	23,753.20	163.93	0.87	1	D	N	http://www.youtube.com/watch?v=fgVPVWXuEoU&feature=related
Interspecies, object play, dog and deer pawing and wrestling	95,400.43	180.25	8.64	1	D	Y	http://www.youtube.com/watch?v=GnZSTkycovg
Interspecies play, dog play bows, crow jumping	53.62	0.35	0.00	1	D	N	http://www.youtube.com/watch?v=Ex80PLOuTIM

Interspecies play, dog nuzzling duckling, while duckling probes	136,025.07	374.93	11.33	1	D	N	http://www.youtube.com/watch?v=ficwZQYmRLE
Interspecies play, parrot probing dog, dog jumps, play bows	205.26	0.68	0.00	1	D	Y	http://www.youtube.com/watch?v=-oCkPOTRY5A
Interspecies play, dog nipping, lorikeet probing with bill	944.65	2.00	0.00	1	D	Y	http://www.youtube.com/watch?v=b7OsL_mixnA&feature=related
Interspecies play, parrot probes while dog licks	2,229.12	10.12	0.12	1	D	N	http://www.youtube.com/watch?v=okgMrl08fJI&feature=related
Interspecies play, parrot probes dog in play	704.14	2.79	0.00	1	D	Y	http://www.youtube.com/watch?v=yRzQuW2sshk&feature=related
Interspecies play, alpaca chasing dog in circles	175.29	0.39	0.00	1	D	N	http://www.youtube.com/watch?v=eVXoaj3niU8&feature=related
Interspecies play, dog play bows, chases, deer running	860.83	1.26	0.00	1	D/W?	Y	http://www.youtube.com/watch?v=N57CPl9LArs

in circle							
Interspecies play, deer pawing and dog wrestling	6,345.43	10.83	0.73	1	D	N	http://www.youtube.com/watch?feature=endscreen&NR=1&v=vxABe1PaLtU
Interspecies play, deer jumping at dog	6,105.59	10.21	0.41	1	D	Y	http://www.youtube.com/watch?v=5K-CTyvNE04&feature=related
Interspecies play, racoon and dog mouthing	517.88	1.45	0.05	1	D	Y	http://www.youtube.com/watch?v=M_ucrSDeuLI&feature=results_main&playnext=1&list=PL0FFBADBA8A21F519
Interspecies play, racoon exploring dog while dog sitting	1,806.67	8.60	0.07	1	D	N	http://www.youtube.com/watch?v=dz_L9z09_s8&feature=related
Interspecies play, racoon and dog mouthing	1,2917.61	32.34	1.41	1	D	N	http://www.youtube.com/watch?v=eXcHKNtiz8M&feature=related
Interspecies play, racoon and dog mouthing, dog play bow	6,160.96	15.79	0.31	1	D	Y	http://www.youtube.com/watch?v=75hSke3ujt0&feature=related
Interspecies play, dog and	6,228.47	9.40	0.20	1	D (zoo)	Y	http://www.youtube.com/watch?v=rqLkd5

bear cub wrestle							Vs0aY&feature=relmfu
Interspecies play, bear and dog mouthing, chasing	2,174.60	8.64	0.08	1	D (institute)	N.	http://www.youtube.com/watch?v=z02650om8U4
Interspecies play, bear and dog mouthing	5,807.22	16.56	0.22	4	D/W	N	http://www.youtube.com/watch?v=R8tZJPCedB8
Interspecies play, polar bear jumping up at dog	271.00	2.00	0.00	1	D/W (zoo)	Y	http://www.youtube.com/watch?v=Yko3h_3l3ic
Interspecies play, dog and foxes wrestle	11,397.77	67.19	0.75	1	D/W	N	http://www.youtube.com/watch?v=tcn5haJpKAQ&feature=related
Interspecies play, dog and fox wrestle	626.41	5.05	0.00	1	D	N	http://www.youtube.com/watch?v=JCqAXhQqZXE
Interspecies play, lion pounces on dog	165.00	1.00	0.00	1	D/W (zoo)	Y	http://www.youtube.com/watch?v=OlCGdcO7PiM&feature=relmfu
Interspecies play, dogs wrestling tiger	93,743.64	203.71	13.00	1	D	N	http://www.youtube.com/watch?feature=endscreen&NR=1&v=igQRWZJklIo
Interspecies play, cat pawing, dog play bows	43.50	0.25	0.00	1	D	Y	http://www.youtube.com/watch?v=3cNtzgTflnQ&feature=related

Interspecies play, macaque grasping at dog	1,023.71	1.00	0.06	3	D	N	http://www.youtube.com/watch?v=-FrNwh_7F5w
Interspecies play, monkey leaping, biting, dog mouthing	3,978.23	9.69	0.00	1	D	N	http://www.youtube.com/watch?v=jVpcx8UMD0Y&feature=related
Interspecies play, dog chasing dolphins	13,550.33	26.76	1.52	1	D/W	Y	http://www.youtube.com/watch?v=FB8lTiqwlw0&feature=related
Interspecies play, dogs chasing shark	324.50	0.25	0.13	1	D/W	Y	http://www.youtube.com/watch?v=-ydMWxwXSG4
Interspecies play, dog chasing, jumping at squirrel in tree	5,408.40	13.00	0.10	3	D/W	N	http://www.youtube.com/watch?v=22xigDZ9Qao
Interspecies play, piglet butts dog, dog play bows	4,433.22	8.13	0.00	1	D	Y	http://www.youtube.com/watch?v=HNVOAxRwH04
Interspecies play, rabbit jumping around dog, dog paws and mouths	10,507.15	38.45	1.55	1	D	N	http://www.youtube.com/watch?v=dhWpq__G-6o&feature=related

Interspecies play, sheep circling, dog jumping	154.00	12.00	0.00	3	D	Y	http://www.youtube.com/watch?v=7A_k8Sa1CD0&feature=g-all-u

Appendix 2. Instances of novel object play behaviour by horses found on YouTube.

Animal	Descriptor	Views/ month	Likes/ month	Dislikes/ month	No. of shots	URL
Horse (young)	Object (large ball) play: resting rear, circle, mouth, push, kick up	41,725.00	230.30	5.75	1	http://www.youtube.com/watch?v=emxI-nRGWBE&feature=related
Foal	Object (large ball) play: mouth, push	362.54	0.62	0.00	1	http://www.youtube.com/watch?v=kVns0WDgAmU&feature=related
Foal	Object (large ball) play: resting rear, push, kick	531.24	0.76	0.02	1	http://www.youtube.com/watch?feature=endscreen&NR=1&v=hCCauSjaBx0
Horse (young)	Object (large ball) play: circle, push, resting rear	1,405.24	1.78	0.00	2	http://www.youtube.com/watch?v=15G2iCYSWP8&feature=related

Horse (3 y)	Object (large ball) play: paw, resting rear, push, pick up, drop	1,312.10	2.82	0.00	1	http://www.youtube.com/watch?NR=1&feature=endscreen&v=DPHOJngWZhg
Horse (young)	Object (large ball) play: mouth, push, kick, paw, circle	889.80	5.80	0.04	1	http://www.youtube.com/watch?v=xDzG7ueQfWQ&feature=related
Foal	Object (large ball) play: resting rear, kneel, push, gallops away	251.00	0.58	0.00	1	http://www.youtube.com/watch?v=2HemYttpjBI&feature=related
Horse, dog	Object (small hoop) play, interspecies play: pick up, shake	690.21	3.18	0.03	2	http://www.youtube.com/watch?v=LbU30xiYyhg&feature=fvwrel
Horse (stallion colt)	Object (large ball) play: pick up, rear, toss	2,189.15	6.05	0.05	1	http://www.youtube.com/watch?v=tuFSeh07RzI&feature=watch_response_rev

Horse (3 mo)	Object (large ball) play: push, circle, gallops away	1,039.42	0.00	0.00	1	http://www.youtube.com/watch?v=2HCu_qeYJr8&feature=related
Horse	Object (marker cone and balls) play: rear, toss, push	335.67	2.73	0.02	1	http://www.youtube.com/watch?v=mhOxhGYNq0Y&feature=related
Horse (pony)	Object (small ball) play: pick up, toss, shake, carry, drop, to and from, circle	3,059.41	5.59	0.12	1	http://www.youtube.com/watch?v=52UxyjnBQTI
Horse	Object (small ball) play: roll, pick up, shake	0.28	0.00	0.00	1	http://www.youtube.com/watch?v=cvq9PicoTrs
Donkey, horse	Object (small ball) play, interspecies play: pick up, rear, kick up	45.45	0.36	0.00	1	http://www.youtube.com/watch?v=dKflVqS1buM

Horse	Object (small deflated ball and bucket) play: picks up, push, rear, shake, to and from, toss	3.92	0.00	0.00	2	http://www.youtube.com/watch?v=cKwzC0azM4Y
Horse	Object (large ball) play: push, circle, mouth, kick up	16.14	0.06	0.00	1	http://www.youtube.com/watch?v=iZ5ZnEW2H-Y
Foal	Object (large ball) play: resting rear, push, mouth,	2,393.97	4.41	0.03	1	http://www.youtube.com/watch?v=gD6avPKhIro
Horse	Object (large ball) play: mouth, push, circle	44.63	0.08	0.00	2	http://www.youtube.com/watch?v=3PwryWAC4E0
Horse	Object (small ball) play: mouth, push	1.07	0.00	0.00	1	http://www.youtube.com/watch?v=wBsMTfZJh90
Foal	Object (large and	3,526.83	5.17	0.21	1	http://www.youtube.com/watch?v=qrm16UNvSmE

	smaller ball) play: pick up, shake, gallops away, resting rear					
Horse	Object (bucket) play: mouth, push, circle, resting rear	231.68	0.56	0.03	2	http://www.youtube.com/watch?v=Zn7QiYSEcK4
Horse (young)	Object (large ball) play: mouth, push, kicks up, circle, pick up	115.50	0.19	0.00	1	http://www.youtube.com/watch?v=0EVmhqyCNfk
Foal	Object (large ball) play: resting rear, push, circle, pick up	299.60	1.05	0.00	2	http://www.youtube.com/watch?v=3fdTgxmAg00
Horse	Object (small ball) play: pick up, shake, carry, drop/toss,	23.09	0.36	0.00	1	http://www.youtube.com/watch?v=tGdfhxSVgmQ

	kicks up					
Horse	Object (large ball) play: push, rear, to and from	77.79	0.17	0.00	1	http://www.youtube.com/watch?v=VQa3w-6NbXs
Horse (small)	Object (small ball) play: mouth, push, kick up, circle	31.21	0.10	0.00	1	http://www.youtube.com/watch?v=TTfNrR6S_xk
Horse	Object (large ball) play: push	4.83	0.00	0.00	1	http://www.youtube.com/watch?v=L-6f585jsCs
Horse	Object (small ball) play: rear, pick up, circle, shake, drops, kicks up	7.64	0.00	0.00	1	http://www.youtube.com/watch?v=UXvLpXnuN30
Horse	Object (small ball) play: pick up, shake, drop, push	36.83	1.50	0.00	3	http://www.youtube.com/watch?v=HowWTA6bhCg

Appendix 3. Use of iPads, iPods and iPhones by animals on YouTube.

Animal	Descriptor	Views/ month	Likes/ month	Dislikes /month	No. of shots	URL
Dog	Stepping, biting; response to contrast, movement or sound	2,651.58	10.16	0.16	1	http://www.youtube.com/watch?v= AumpOK6TgHE
Dog	Scratching; response to movement and contrast	218.75	0.50	0.00	2	http://www.youtube.com/watch?v= PPp4M3GoWUA
Dog	Wary; response to contrast change, possible reflection	108,538.91	274.32	23.91	1	http://www.youtube.com/watch?v= H3xdcx2WUcU
Dog	Wary; response to contrast, movement or sound	40.05	0.16	0.00	1	http://www.youtube.com/watch?v= PwU9E5AZPa8
Dog	Nosing; response to movement and contrast	8,365.00	13.48	3.19	1	http://www.youtube.com/watch?v= Ke-yiGYjzzY
Dog	Scratching; response to movement and contrast	97.88	0.88	0.00	1	http://www.youtube.com/watch?v= jLffqYF_jGM
Dog	Watching; response to movement,	265.62	1.14	0.00	1	http://www.youtube.com/watch?v=

	possible reflection					WaSllP2CsKg
Dog	Scratching; response to bright toy, not necessarily iPad	101.05	0.24	0.00	1	http://www.youtube.com/watch?v=LRI6j53Zr_0
Dog	Drinking; response to sound, reflectance of "water" (luminance)	56.90	0.14	0.00	1	http://www.youtube.com/watch?v=XGk8Nu2KGoo
Dog	Licking; not really responding to iPad, but simply to smooth surface	423.88	2.41	0.06	1	http://www.youtube.com/watch?v=tsuP6PRpntY
Dog	Stepping on iPad but to command; response to command	146.95	0.43	0.00	1	http://www.youtube.com/watch?v=jnNle0iKK1c
Dog	Scratching; response to movement and contrast	2,605.00	5.43	0.00	1	http://www.youtube.com/watch?v=45C8XYQTpFQ
Dog	Barking; responding to sound	16.20	0.00	0.07	1	http://www.youtube.com/watch?v=SQGybLtdJds
Dog	Scratching; response to movement and contrast	112.00	3.00	0.00	1	http://www.youtube.com/watch?v=QjIg8ZGatxk
Dog	Scratching; response to movement and contrast	19.63	0.00	0.00	1	http://www.youtube.com/watch?v=iGtB8nX58PU

Dog	Nosing; response to movement	8.11	0.06	0.00	1	http://www.youtube.com/watch?v=U0u-s6rhEMo
Dog	Watching; response to sound	13.82	0.18	0.00	2	http://www.youtube.com/watch?v=0UqAT3VBEFA
Dog	Licking; response to movement and contrast	14.00	0.00	0.00	1	http://www.youtube.com/watch?v=TzEFfokLipM
Dog	Scratching; response to movement and contrast	44.43	0.14	0.00	1	http://www.youtube.com/watch?v=lksQdnh1DwM
Dog	Scratching; response to movement and contrast	86.77	1.00	0.00	1	http://www.youtube.com/watch?v=cUoDk-YasMk
Dog	Barking; responding to actual image	19.57	0.00	0.00	1	http://www.youtube.com/watch?v=9qZoSC_ACz4
Dog	Head wagging; response to sound	83.00	1.00	0.00	1	http://www.youtube.com/watch?v=vHNTjI9b8Ho
Dog	Scratching; response to brightness	23.50	0.00	0.00	1	http://www.youtube.com/watch?v=c4YNFmacCQA
Dog	Scratching; response to movement and	17.50	0.50	0.00	1	http://www.youtube.com/watch?v=

	contrast					6IOZi_kFM3s
Dog	Scratching; response to movement and contrast	223.00	8.00	0.11	1	http://www.youtube.com/watch?v= mGnLZRXp-U0
Dog	Scratching; response to brightness and contrast	124.50	0.50	0.00	1	http://www.youtube.com/watch?v= 2MY5qCy__mM
Dog	Scratching; response to movement and contrast	47.11	0.22	0.11	1	http://www.youtube.com/watch?v= SLE2VYURU1E
Dog	Biting; response to movement and contrast	68.75	0.25	0.00	1	http://www.youtube.com/watch?v= Nf4cysyiobo
Dog	Barking; response to sound	51.57	0.57	0.00	1	http://www.youtube.com/watch?v= ZbYSAesn6UA
Dog	Scratching; response to movement and contrast	1,935.00	30.00	0.00	1	http://www.youtube.com/watch?v= zefkFB5Uq0U
Dragon	Predatory behaviour toward stimuli	33,169.00	90.50	1.50	1	http://www.youtube.com/watch?v= w09ZBiuE-78
Dragon	Predatory behaviour toward stimuli	134.05	0.67	0.00	1	http://www.youtube.com/watch?v= OflpX1CwStI

Dragon	Predatory behaviour toward stimuli	363.00	1.00	0.00	1	http://www.youtube.com/watch?v=PUWBWt-rAU0
Dragon	Predatory behaviour toward stimuli	1,213.00	2.00	0.00	1	http://www.youtube.com/watch?v=dClfcMas6FY
Dragon	Predatory behaviour toward stimuli	367.00	1.00	0.00	1	http://www.youtube.com/watch?v=pnP-0Axrk_M
Dragon	Predatory behaviour toward stimuli	556.00	2.50	0.00	1	http://www.youtube.com/watch?v=Y2ZyqLA4OBo
Dragon	Predatory behaviour toward stimuli	1,241.00	0.00	0.00	1	http://www.youtube.com/watch?v=SbfxQt3XIts
Dragon	Predatory behaviour toward stimuli	1,701.50	18.00	0.00	1	http://www.youtube.com/watch?v=VudH5AYewGI
Dragon	Predatory behaviour toward stimuli	83.00	0.00	0.00	1	http://www.youtube.com/watch?v=rjmT47E_0oA
Gecko	Predatory behaviour toward stimuli	250.22	1.61	0.00	1	http://www.youtube.com/watch?v=75zqD_SvX2E
Chameleon	Aggression, possibly toward reflection	2,042,939.30	6,790.40	1,042.50	1	http://www.youtube.com/watch?v=

						6FWUjJF1ai0
Toad	Predatory behaviour toward stimuli	94,654.00	576.00	4.50	1	http://www.youtube.com/watch?v=MrYqba6Jj10
Bonobo	Tactile exploratory behaviour	3,454.69	6.31	0.06	1	http://www.youtube.com/watch?v=4frWWPuvmWE
Chimp	Watching; possibly curious of self image	275.67	1.33	0.00	1	http://www.youtube.com/watch?v=SLWyUBvCv7M
Monkey	Tactile exploratory behaviour	26,083.29	41.29	8.29	1	http://www.youtube.com/watch?v=_xQNp8iMUqk
Monkey	Tactile exploratory behaviour	51,923.86	57.14	4.57	1	http://www.youtube.com/watch?v=2Rn-rHQfVEM
Parrot (African grey)	Biting; response to movement and contrast	133.00	0.67	0.00	1	http://www.youtube.com/watch?v=Q_xeezIGbsg
Parrot (African grey)	Licking; tactile exploratory behaviour	12.92	0.15	0.00	1	http://www.youtube.com/watch?v=oi_00wdXGGE

Parrot (budgerigar)	Biting; response to contrast; exploratory behaviour	146.95	0.30	0.05	1	http://www.youtube.com/watch?v=dSNUn4f1c5k
Parrot (budgerigar)	Watching; exploratory behaviour toward movement and contrast	29.57	0.14	0.07	2	http://www.youtube.com/watch?v=mUHD852z5kU&feature=related
Parrot (cockatiel))	Pecking; response to contrast change, possibly sound and reflection	29.60	0.27	0.00	1	http://www.youtube.com/watch?v=Pu7bF72qja8&feature=related
Parrot (cockatoo)	Licking; exploratory behaviour	92.50	0.50	0.00	1	http://www.youtube.com/watch?v=kF6O5jzoojo
Parrot (cockatoo)	Licking and pecking; exploratory behaviour	99.00	0.00	0.00	1	http://www.youtube.com/watch?v=CYq9MR73HOI
Cat	Directed visual tracking and pawing (predatory/play behaviour)	406,212.09	1603.57	26.30	1	http://www.youtube.com/watch?v=Q9NP-AeKX40
Cat	Directed visual tracking and pawing (predatory/play behaviour)	529,874.00	2237.00	26.33	1	http://www.youtube.com/watch?v=CdEBgZ5Y46U
Cat	Directed visual tracking and pawing (predatory/play behaviour)	30,985.13	85.53	0.87	1	http://www.youtube.com/watch?v=36Jb3VhwK00
Cat	Directed visual tracking and pawing	8,863.09	5.30	1.52	1	http://www.youtube.com/watch?v=

	(predatory/play behaviour)					T9NYPAEbvEo
Cat	Directed visual tracking and pawing (predatory/play behaviour)	4,477.82	6.73	0.50	1	http://www.youtube.com/watch?v=KTY9ugvTZo4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	157.88	2.25	0.00	1	http://www.youtube.com/watch?v=p7OwRQ4ANAA
Cat	Directed visual tracking and pawing (predatory/play behaviour)	44,510.71	60.71	0.86	1	http://www.youtube.com/watch?v=bSnmnqLaoQg
Cat	Directed visual tracking and pawing (predatory/play behaviour)	27,613.83	47.57	11.61	1	http://www.youtube.com/watch?v=tyO-KiYIDm0
Cat	Directed visual tracking and pawing (predatory/play behaviour)	7,101.00	117.75	2.75	1	http://www.youtube.com/watch?v=8CDPxc647GQ
Cat	Directed visual tracking and pawing (predatory/play behaviour)	459.14	0.68	0.05	1	http://www.youtube.com/watch?v=fGZqcgHRG78
Cat	Directed visual tracking and pawing (predatory/play behaviour)	255.08	1.23	0.00	1	http://www.youtube.com/watch?v=ehhTGTmYPQs
Cat	Directed visual tracking and pawing (predatory/play behaviour)	648.60	1.00	0.00	1	http://www.youtube.com/watch?v=6BfaL8xhsGM

Cat	Directed visual tracking and pawing (predatory/play behaviour)	122.47	0.73	0.00	1	http://www.youtube.com/watch?v=6R3djChWqQo
Cat	Directed visual tracking and pawing (predatory/play behaviour)	4,009.65	11.13	0.48	2	http://www.youtube.com/watch?v=w64XRIYvBGk
Cat	Directed visual tracking and pawing (predatory/play behaviour)	293.33	3.33	0.67	1	http://www.youtube.com/watch?v=7NDWH5b-1iA
Cat	Directed visual tracking and pawing (predatory/play behaviour)	396.20	3.10	0.10	1	http://www.youtube.com/watch?v=9-K9WSQKGMQ
Cat	Directed visual tracking and pawing (predatory/play behaviour)	2,828.47	6.93	0.13	1	http://www.youtube.com/watch?v=YKr33bXOPns
Cat	Directed visual tracking and pawing (predatory/play behaviour)	17,752.10	50.40	0.20	1	http://www.youtube.com/watch?v=8mGpL2LNo4s
Cat	Directed visual tracking and pawing (predatory/play behaviour)	3,654.93	5.47	0.13	1	http://www.youtube.com/watch?v=2Y78Xq3-nMQ
Cat	Directed visual tracking and pawing (predatory/play behaviour)	208.67	0.27	0.00	1	http://www.youtube.com/watch?v=B0iMQXiP-H8
Cat	Directed visual tracking and pawing	178.80	0.90	0.00	1	http://www.youtube.com/watch?v=

	(predatory/play behaviour)					eIYRG-6IPVo
Cat	Directed visual tracking and pawing (predatory/play behaviour)	26,940.87	24.13	1.93	1	http://www.youtube.com/watch?v=_iC2kf_1qnM
Cat	Directed visual tracking and pawing (predatory/play behaviour)	59.86	0.57	0.00	1	http://www.youtube.com/watch?v=OJ9Lty4ZBA4
Cat	Scratching; response to apparent movement	40,746.89	148.63	1.84	1	http://www.youtube.com/watch?v=iNzNjTR8O74
Cat	Directed visual tracking and pawing (predatory/play behaviour)	1,399.47	1.00	0.47	1	http://www.youtube.com/watch?v=SN19TYZdYBE
Cat	Directed visual tracking and pawing (predatory/play behaviour)	76.40	0.07	0.00	1	http://www.youtube.com/watch?v=e8h8VK7cvJY
Cat	Directed visual tracking and pawing (predatory/play behaviour)	4,621.59	8.91	0.18	3	http://www.youtube.com/watch?v=vHlflwpBgnU
Cat	Directed visual tracking and pawing (predatory/play behaviour)	753.20	2.60	0.10	1	http://www.youtube.com/watch?v=wUOkde_lsLY
Cat	Directed visual tracking and pawing (predatory/play behaviour)	1,670.22	1.78	4.56	2	http://www.youtube.com/watch?v=9wck3dsp8iQ

Cat	Directed visual tracking and pawing (predatory/play behaviour)	59.43	0.57	0.00	1	http://www.youtube.com/watch?v= MUfeEElBvkA
Cat	Directed visual tracking and pawing (predatory/play behaviour)	533,377.67	2242.00	26.67	1	http://www.youtube.com/watch?v= CdEBgZ5Y46U&feature=fvst
Cat	Directed visual tracking (predatory/play behaviour)	4,408.50	4.67	3.17	1	http://www.youtube.com/watch?v= PMO4Yc8vslg
Cat	Directed visual tracking and pawing (predatory/play behaviour)	62.33	0.13	0.00	1	http://www.youtube.com/watch?v= bTxtx4eT9lI
Cat	Directed visual tracking and pawing (predatory/play behaviour)	516.89	3.00	0.11	3	http://www.youtube.com/watch?v= srblsSYFOR4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	2,526.59	3.06	0.18	1	http://www.youtube.com/watch?v= 3QVqtmT0tdM
Cat	Directed visual tracking and pawing (predatory/play behaviour)	4,734.50	4.36	0.09	1	http://www.youtube.com/watch?v= bvNxF0sge88
Cat	Directed visual tracking and pawing (predatory/play behaviour)	7,392.00	1.10	0.10	1	http://www.youtube.com/watch?v= pkJ5vIIunzk
Cat	Directed visual tracking and pawing	372.80	0.40	0.07	1	http://www.youtube.com/watch?v=

	(predatory/play behaviour)					FbbB2SvvNu4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	197.60	1.33	0.00	1	http://www.youtube.com/watch?v=UMQqvpYC4oA
Cat	Directed visual tracking and pawing (predatory/play behaviour)	200.90	0.30	0.00	2	http://www.youtube.com/watch?v=zWqRX-EtXzg
Cat	Directed visual tracking and pawing (predatory/play behaviour)	1,011.17	2.43	0.04	1	http://www.youtube.com/watch?v=XSJg4DYLxb0
Cat	Directed visual tracking and pawing (predatory/play behaviour)	282.43	0.86	0.43	1	http://www.youtube.com/watch?v=DQ4JcDexzTo
Cat	Directed visual tracking and pawing (predatory/play behaviour)	75.35	0.40	0.00	1	http://www.youtube.com/watch?v=Mhvv_mcwO0A
Cat	Directed visual tracking and pawing (predatory/play behaviour)	221.46	0.85	0.00	1	http://www.youtube.com/watch?v=ltGDLgj2jo4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	167.41	0.32	0.00	2	http://www.youtube.com/watch?v=yqgWaD3cy6M
Cat	Directed visual tracking and pawing (predatory/play behaviour)	26.36	0.07	0.00	1	http://www.youtube.com/watch?v=2ewheCIEeVg

Cat	Directed visual tracking and pawing (predatory/play behaviour)	56.63	0.38	0.00	1	http://www.youtube.com/watch?v= FfLABjvYIvY
Cat	Directed visual tracking and pawing (predatory/play behaviour)	64.67	0.13	0.00	1	http://www.youtube.com/watch?v= x4f5ECiGQW4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	10.91	0.09	0.00	1	http://www.youtube.com/watch?v= _-0piDqnMao
Cat	Directed visual tracking and pawing (predatory/play behaviour)	12.00	2.00	0.00	1	http://www.youtube.com/watch?v= XMPhA33Y3cg
Cat	Directed visual tracking and pawing (predatory/play behaviour)	6,015.00	84.75	1.75	1	http://www.youtube.com/watch?v= Bq7yC2g5Hfs
Cat	Directed visual tracking and pawing (predatory/play behaviour)	58.40	0.30	0.00	3	http://www.youtube.com/watch?v= now9RAQ2NXo
Cat	Directed visual tracking and pawing (predatory/play behaviour)	59.14	0.21	0.00	1	http://www.youtube.com/watch?v= YKc6gAq7-io
Cat	Directed visual tracking and pawing (predatory/play behaviour)	142.50	0.79	0.07	1	http://www.youtube.com/watch?v= SIfMRb9IDz0
Cat	Directed visual tracking and pawing	183.83	1.50	0.17	1	http://www.youtube.com/watch?v=

	(predatory/play behaviour)					XRuvs7CXpjY
Cat	Directed visual tracking and pawing (predatory/play behaviour)	4,658.36	8.91	0.18	3	http://www.youtube.com/watch?v=vHlflwpBgnU
Cat	Directed visual tracking and pawing (predatory/play behaviour)	110.90	0.00	0.00	1	http://www.youtube.com/watch?v=bzyO2hOqCFg
Cat	Directed visual tracking and pawing (predatory/play behaviour)	49.10	0.10	0.00	1	http://www.youtube.com/watch?v=V53yolQaBig
Cat	Directed visual tracking and pawing (predatory/play behaviour)	37.00	1.00	0.00	1	http://www.youtube.com/watch?v=TQfk2z2xhHQ
Cat	Directed visual tracking and pawing (predatory behaviour)	53.00	1.00	0.00	1	http://www.youtube.com/watch?v=s-Yl9Ycy-WQ
Cat	Directed visual tracking and pawing (predatory/play behaviour)	1,655.00	12.00	0.00	1	http://www.youtube.com/watch?v=v2ELm6w86n4
Cat	Directed visual tracking and pawing (predatory/play behaviour)	610.00	41.00	1.00	1	http://www.youtube.com/watch?v=cE97Gy1UIH0
Cat	Licking; response to unmoving image	14.00	0.00	0.00	1	http://www.youtube.com/watch?v=3QQVpddOalo

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