

## End of Award Report

### The New Zoos: Science, Media and Culture

#### Background

Major zoos throughout the world are experiencing something of a renaissance. After a period of declining visitor numbers, many zoos are once again 'must-see' visitor attractions on a variety of tourist itineraries. As a result, many zoos are planning, constructing, and opening multi-million dollar exhibits. For example, the Bronx Zoo opened its state-of-the-art 'Congo Gorilla Forest' exhibit in 1999 at a cost of US \$ 43 million. A year before that, the Disney Corporation, once better known for its preference for animatronic animals, added a 500-acre nature theme park to its Disney World complex at an estimated cost of US \$ 800 million.

Similar dynamics have taken place in Asia, Australia, and Europe. In the UK, the Paignton Zoo sold assets worth millions of pounds in 1994 and obtained matching funding from the European Union in order to transform its installations into what it now describes as an 'environmental park'. In 1995, the Bristol Zoo embarked in a similar process and began a construction programme that culminated with the opening in 1999 of its 'Seal and Penguin Coasts'. A number of other zoos in the UK have also engaged in similarly ambitious projects. For example, in 2000 the London Zoo opened its 'Web of Life' exhibition at a cost of some £4.4 million, and in 2001 the Chester Zoo opened its 'Spirit of the Jaguar' display at a cost of £2 million. More recently, the Paignton Zoo opened a satellite facility in Torquay called 'Living Coasts' at a cost of £7 million. The Bristol Zoo is currently designing an all-new environmental park in North Bristol at an estimated cost of £25 million.

The extraordinary level of investment in the new zoos and their displays reflects a process of re-invention that first became evident in the 1990s, but which can be dated at least as far back as the 1970s. During this decade, many major zoos faced a number of challenges. While animal rights activism may be regarded as the most significant of these, it can be argued that other factors have been, and continue to be at least as significant: these include the discourses and sensibilities generated by modern environmentalism; the emergence of new forms of consumption (not least so-called 'green' forms of consumption); and as part of these, a changing media landscape. Perhaps the single most significant change in the last aspect has been the emergence, from the late 1950s onwards, of natural history documentaries on television as the most significant source of representations of 'exotic' animal geographies.

In varying ways and with varying degrees of significance for different zoos, the dynamics listed above have both enabled and forced zoos to transform their public *raison d'être*, and their characteristic forms of displays. Where their public *raison d'être* is concerned, many zoos now suggest that their primary purpose is to aid conservationist efforts by preserving endangered species in their collections and by participating in conservationist research projects *in situ*. As of 2002, European Union legislation requires UK zoos to participate in at least one of the following: research from which conservation benefits accrue to the species; training in relevant conservation skills; the exchange of information relating to species conservation; or, where appropriate, captive breeding, repopulation or reintroduction of species into the wild. Perhaps most significantly from the point of view of the present research, it also requires zoos to engage in activities that encourage 'public education and awareness in relation to the conservation of biodiversity, in particular providing information about the species of animals kept in the zoo and their natural habitats' (DEFRA 2003: 30).

Where the new forms of display are concerned, many exhibits are now designed on the basis of so-called 'naturalistic' and 'immersion' principles. The modernist emphasis on sculpted concrete and hygiene that once dominated zoo design has been displaced by exhibits that simulate habitats. Rainforests, deserts, a variety of pelagic environments, and savannahs are now amongst the most popular sub-genres of 'immersion' exhibits. Such exhibits are justified on the grounds that they provide what the zoological field describes as 'biological enrichment' for the animals on display, even as they provide a more suitable context for environmental education.

To date, very little critical research has been conducted that investigates the validity of these and related claims. In 2002, a survey of existing literature published by the American Association of Zoos and Aquariums (AZA) concluded that 'Little to no systematic research has been conducted on the impact of visits to zoos and aquariums on visitor conservation knowledge, awareness, affect, or behaviour' (Dierking et al. 2002:1). This diagnosis is valid beyond the U.S.; at the time this research project was being completed, no research had been published that investigated the relation between the new zoos' pedagogic discourses, their appropriation by the family groups that constitute zoos' predominant visiting mode, and the relation between these practices and broader cultural dynamics<sup>1</sup>.

### **Objectives**

In this context, and following the thematic priorities of the ESRC's Science in Society programme, the most general aim of the *New Zoos: Science, Media & Culture* project was to investigate the re-modelling of science and environmental communication in the context generated by the new zoos. As part of this aim, the project had the objective of developing and applying an interdisciplinary theory and methodology with which to explain the production, construction and reception of any new forms of pedagogic discourse (Bernstein 1990; 1996). The goal of this process was to provide a diagnostic of the state of science and environmental communication in the new zoos, and to offer zoo educators practical recommendations for the development of pedagogic practice.

A central aspect of the theoretical framework was the notion there is no automatic continuity between what zoo designers invite visitors to observe, and what visitors actually attend to. Following the work of the cultural historian of art and science Jonathan Crary (1990; 2001), the project proposal suggested that observation is not a passive on-looking at a spectacle, but the process of *conforming one's action to*, or *complying with*, social rules and conventions. The act of observing involves far more than just the act of 'seeing'; it involves a complex socio-corporeal practice. This practice both produces and reproduces social coding orientations, or what the sociologist Basil Bernstein (1990; 1996) describes as certain modalities of classification of categories, and their characteristic modalities of framing. With Crary (1990) the project proposal further suggested that the observer for any given context is, as observer, the effect of a heterogeneous system constituted by discursive, social, technological, and institutional relations. In this sense, any given *modality* of observation may be both differentiated from, and related to the individual observer who pays *attention* to a particular phenomenon. Far from being purely subjective, attention may be regarded as a rule-governed process in its own right, albeit one that allows observers to make perception and what is perceived their own (Crary 2001).

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<sup>1</sup> The research that comes the closest to these criteria is Davis (1997). Davis' research nonetheless focussed on an aquarium and theme park, and conducted relatively small scale visitor research with school children. A number of relatively small-scale studies structured on the basis of a positivist epistemology have investigated particular 'factors' in individual visitor responses; for a recent example, see Anderson et al. (2003).

The project thereby had the aim of researching the dialectic of observation and attention (observation/attention) as these might be mediated by a complex ensemble of social institutions, technologies, and their codes. The ensembles which the project focused on were those immediately associated with the genre of the 'new zoo', and its characteristic forms of design; those associated with the 'family outing', as mediated by familial practices relating to gender, age, class, and ethnicity; and those associated with popular culture and the modalities of observation produced by a variety of genres of mass communication. As a key part of the diagnostic, the research was to explain how these three sets of institutions might mediate both the production of general modes of observation in zoos, and the characteristic ways by means of which visitors might attend to them.

As the sections that follow explain, the project has met all its theoretical and methodological objectives, and will fulfil the practical objectives when a separate report is presented to the Bristol and Paignton Zoos at the end of March 2005.

### **Methodology**

In the relative absence of similar research on the subject, the project took the form of an exploratory case study at two zoos: the Bristol Zoo Gardens in Bristol, and the Paignton Zoo Environmental Park in Paignton, Devon. The two zoos were chosen because, as was noted earlier, both have participated actively in the organisational and design changes associated with 'new zoos' in the UK. They were also chosen in order to give the project a comparative dimension: while the Bristol Zoo is an urban zoo that maintains a number of its historical features, the Paignton Zoo as a whole has recently undergone major refurbishment and is located in large park just outside of a town in South Devon.

Following the proposals of Thompson (1990) in the context of the study of mass communication, the project distinguished between the production, construction, and reception of pedagogic discourse and modalities of observation. It employed ethnographic methods to study the production and reception aspects, and semeiotic<sup>2</sup> methods to study the aspect of construction. While the focus was on the qualitative analyses of construction and reception of the zoos' displays, the research sought to contextualize these aspects with interviews of zoo staff, a survey of directors of British zoos, and a postal survey of almost 450 member households of the Bristol and Paignton Zoos.

A detailed account of each of the methodologies employed by the project is beyond the scope of this report; the following is an outline of the research methods employed in the course of the research, and of some of the issues that arose with respect to their implementation.

#### *1. Research methods employed to investigate the production of pedagogic discourse and new modes of observation*

Three different research methods were employed to investigate the aspect of production:

- Informal interviews with the managerial teams, and with educational staff at both zoos. The interviews had the object of elucidating each zoo's professional discourses with respect to the production of pedagogic discourse, and the design of the displays.
- Participant observation in events organised by the Federation of British and Irish Zoos and Aquaria (recently renamed as BIAZA, the British and Irish Association of

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<sup>2</sup> The spelling of the word 'semeiotic' is deliberate insofar as the project drew extensively on the theory of Charles Sanders Peirce (1931-1958).

Zoos and Aquaria). One of the unexpected outcomes of the project was that the principal investigator was invited to participate at conferences organised by the Federation; this enabled a wider contextualization of the study of the production aspect.

- A survey of the directors of UK zoos. This survey had the object of investigating professional discourses about environmental education, zoo design, and mass communication in the broader field constituted by British zoos and aquaria. In the event, only six zoo directors out of a total of 55 approached returned their surveys. The award holder plans to attempt to procure a better response rate in the Spring of 2005; if this new bid is more successful, the resulting dataset will be forwarded to the ESRC.

## *2. Research methods employed to investigate the construction of pedagogic discourse and modalities of observation in zoo displays.*

The project employed three different methods to investigate this aspect:

- *Visits to state-of-the-art displays in European, U.S., and Australian zoos.* Thanks to an earlier grant of the British Academy, it was possible to compare the design of the displays in the two participating zoos to those found in a number of zoos throughout the world.
- *Semeiotic analyses of the structuring of pedagogic discourse, and technologies of observation at the Bristol and Paignton Zoos.* During the first eight months of the project, the principal investigator conducted numerous visits to both zoos in order to investigate the design of each zoo's displays. The object of the analysis was firstly, to develop a semeiotic 'grammar' of zoo displays and their forms of pedagogic discourse; and secondly, to discern the main modalities of observation in each zoo.
- *Semeiotic analyses of the promotional literatures in both zoos' leaflets, guide-books, and websites.* This level of analysis had the objective of examining the ways in which each zoo constructed its pedagogic discourse and represented its organisational *raison d'être* in the public sphere.

## *3. Research methods employed to investigate the reception of pedagogic discourse and modes of attention amongst zoo visitors.*

The project investigated the visitors' reception of the zoos' pedagogic discourse and modalities of attention by means of both qualitative and quantitative research methodologies and methods.

### A. Qualitative Research

The most important aspect of the investigation of the reception aspect involved ethnographic research with family groups. The project defined a family group as being constituted by a minimum of one parent or guardian, and one child or offspring. The 'unit' of the family group was chosen because families tend to be at once the focus of most zoos' marketing activities, the most common configuration of visiting practice, and a key mediation of observational activities. The project suggested that family groups' 'nonformal' pedagogies—the relatively unselfconscious teaching and learning of social codes as part of the everyday (or indeed a

'special-day') course of events—might well play just as significant a role in science and environmental communication as the zoos' own informal pedagogies.

The project employed the local news (print and time-based) media in the Bristol and South Devon regions to recruit the families via purposive sampling techniques. Families were offered cash and other incentives to participate in the project. The news and incentives generated a total of approximately 100 applicants; of these, 35 family groups were selected with a total of 59 adults and 72 children. A breakdown of the families that participated is found in Appendix 1.

The ethnographic research with the families involved three separate research methods:

- *Participant observation with each family at one of the two zoos.* Each of the families visited one of the two zoos. The visits had a duration of between three and seven hours, and allowed the researcher to investigate the manner in which the families attended to the various aspects of the displays.
- *Auto-ethnographic 'video diaries' produced by each family during a second visit.* Each of the families was asked to visit the zoo a second time, in order to produce their own 'video diary' of the second visit. This method was designed to enable an investigation of the manner in which the ways of attending to the zoo displays might vary in the absence of the researcher, but also, in the presence of a technology of observation intimately associated with mass communication. The project had originally contemplated that the families would continuously video the second visit, which might well last as long as the first visit (i.e. between three and seven hours). However, delays in the start of the visitor research, and logistical difficulties forced the project to reduce the duration of the second visit to a morning or afternoon, with each family using one hour-long tape (the longest available in the mini-DV format). While 35 family groups engaged in a first visit, a variety of circumstances ranging from poor health to bad weather meant that in the end only 27 video diaries were produced.
- *Follow-up interview in family homes.* The last ethnographic activity involved a follow-up visit by the researcher at the family homes. In conjunction with the video diaries, the follow-up visit introduced a longitudinal dimension to the ethnographic work, and allowed the researcher to obtain a better sense of the nonformal pedagogic relations amongst families. Each visit was structured by activities designed to involve the children, and culminated in a first joint viewing of the family's video.

## B. Quantitative Research

In addition to the qualitative research with the family groups, a postal survey was sent to 500 member households of each of the two zoos. 444 questionnaires were returned, with 237 members of the Bristol Zoo, 202 members of the Paignton Zoo, and 5 questionnaires with no stated membership. The samples for each of the zoos were obtained by way of each zoo's database of member households. The households selected for mailing were obtained using stratified random sampling techniques; as in the case of the family groups recruited for the ethnographic research, a distinction was sought between middle and working classes. While it was possible to ascertain this distinction via telephone interviews for the family groups, the absence of information about zoo members' occupations in the two zoos' databases made it necessary to use the ACORN system based on postal codes.

The purpose of the survey was twofold: first, it was designed to investigate questions generated by means of the qualitative research in a relatively large sample of respondents. In particular, the survey was designed to investigate the attitudes amongst frequent zoo users to the different modes of observation and dimensions of naturalism revealed by the qualitative research (see results, below). To this end, psychometric questions were employed

to investigate visitor affinity to a multidimensional scale of attitudes towards four different forms of naturalism in zoo displays: what the qualitative research described as *iconic-environmental* naturalism; *symbolic-scientific* naturalism; *indexical-multisensual* naturalism; and *anthropomorphic-popular* naturalism. The different naturalisms were operationally defined by means of a total of 56 indicators that took the form of 4-point Likert questions<sup>3</sup>.

The survey was also designed to produce data about family visiting and leisure patterns, and as part of the last category, data on patterns of media use, most notably television. The design of the survey made it possible to investigate possible relations between demographic indicators, family leisure patterns, and the evaluation of the four modes of observation described in the results section below.

## Results

The size of the project and the limits to the length of this report preclude a detailed report of the results. The following is a summary of some of the main results of the project. These are divided into two subsections: the findings resulting from the semeiotic analysis of the construction of pedagogic discourse and the modes of observation; and the findings resulting from the ethnographic and quantitative research of the reception of pedagogic discourses and the visitor modes of attention.

### *Analysis of Construction*

As noted in the introduction, the 'new zoo' pedagogic discourse is premised on a turn to naturalistic forms of zoo design. In both zoos participating in the project, it was apparent that a significant shift was underway towards the institution of so-called 'naturalistic' and 'immersion' exhibits. At the Bristol Zoo, this shift has taken place primarily *within* individual displays; the spaces 'in between' displays have been landscaped according to comparatively traditional principles of landscape gardening which in-house surveys suggest are popular with visitors. By contrast, the Paignton Zoo, which was extensively refurbished beginning in 1994, has worked to produce a principle of naturalism not just within, but *across* its entire campus, which the zoo has divided into a series of habitats: wetland, forest, savannah, desert, Devon woodland, and tropical forest (the older 'Primley' sector is scheduled for redevelopment along habitat lines as part of the current 10-year plan).

At the time that the analysis took place, these zones, described by the zoo as naturalistic habitat areas, were still in relatively early stages of landscaping from the point of view of the plantings, and the differences between them were not immediately obvious to a casual observer. Moreover, in both zoos there remained a variety of older types and styles of display, and concomitant modalities of observation. These ranged from large paddocks at the Paignton Zoo where there was little or no effort to produce a technology of observation, to displays in which vantage points had been carefully framed as part of an itinerary of viewpoints designed to both inspire, and manage visitors' modes of observation. This was particularly true in the Bristol Zoo's *Seal and Penguin Coasts*, and in the Paignton Zoo's new satellite facility in Torquay, *Living Coasts*.

Despite this range of exhibits, the research was able to isolate four overarching modes of observation, each associated with a certain semeiotics, and a certain type of realism and naturalism<sup>4</sup>:

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<sup>3</sup> The overarching epistemology of the project rejected the assumption that informs 5-point Likerts, that a position of 'neutrality' is possible with respect to an attitude.

<sup>4</sup> As suggested by Kress and Van Leeuwen, every realism has its naturalism: 'realism is a definition of what counts as real, a set of criteria for the real, and it will find its expression in the 'right', the best, the (most) 'natural' form of representing that kind of reality, be it a photograph or a diagram' (1996:163). With Peirce's (1938-51) triadic model of the sign, this account may be modified to suggest that the naturalism of any given representation may be articulated as a matter of degrees of iconicity, or an

- Modes of observation premised on an *iconic-environmental naturalism*, in which the predominant criteria of resemblance are derived from photographic realism, and from the discourses and sensibilities of modern environmentalism. The paradigmatic example is an 'immersion' exhibit such as Bristol Zoo's Seal and Penguin Coasts, or the Paignton Zoo's Desert House. The visitor-observer is invited to observe the display in predominantly visual terms: the display should 'look' like a particular environment. The animals of course 'look' like themselves (though we shall note that even this apparently simple truth was contested by some of the children that participated in the project), but one of the innovations associated with the 'new zoos' is that they work to produce a context of display that attempts to reproduce what the species' *habitat* either looks like, or *might* look like.
- Modes of observation premised on *symbolic-scientific naturalism*, in which the predominant criteria of resemblance are derived from a rationalist realism, and a discourse of natural history. The paradigmatic examples are the *signs* that explain the natural history of the animal, and/or some biological theory (e.g. evolution). The visitor-observer is invited to use verbal and other explanatory media to engage in a process of observation that in some respects inverts the order of re/presentation assumed by iconic-environmental naturalism: what matters is not so much a high degree of visual iconicity, as an iconicity based on principles of explanatory abstraction. This in order to ascertain how and why the specimen on display is a likeness not just of itself, but of its *species*. Where this mode is based on more recent biological theories (as opposed to older natural history paradigm), the visitor-observer is invited to discern the hidden as well as the 'universal' aspects of the specimen's and species' morphology and/or ethology.
- Modes of observation premised on an *indexical-multisensual naturalism*, in which the predominant criteria of resemblance are derived from an empiricist realism, and from a discourse of the ascribed pedagogic virtues of multisensuality. The paradigmatic example is the animal *encounter* or any activity at the zoo that involves what Peirce describes as an 'energetic interpretant' or a dynamic of action-reaction that involves touch, smell, hearing, or taste (e.g. multimedia, or zoo activity centre practices).
- Modes of observation premised on an *anthropomorphic-popular naturalism*: in which the predominant criteria of resemblance are derived from a carnivalesque or grotesque realism (Bakhtin 1974), and which build on popular anthropomorphic, and cosmomorphic discourses. The paradigmatic example is an animal show in which animals are made to perform tricks that enable visitors to engage in what the project describes as the *circuit of anthropomorphism and cosmomorphism* (Lindahl-Elliot 2005): the animals are 'humanized', even as the visitors are invited to identify with the animals, and thereby to 'animalize' themselves. The natural is constructed as the cultural, or rather, as the *boundary* between the natural and the cultural. Insofar as this is the case, this mode of observation might equally be described as a form of anti-naturalism; the project has nonetheless described it as a naturalism because there is still a principle of iconicity or resemblance that is based on a conflation of the human and the non-human.

The following qualifications are required to clarify this typology.

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ascribed correspondence between the representamen or representation itself (in this case the zoo display), the object of representation (the animal and environment represented by the display), and its interpretants (the meanings attributed by designers, and visitors to a given display). Naturalism, from this perspective, involves social judgement and prescription insofar as an observer must frame the relation between the three aspects of a sign of nature as being more or less continuous. Put differently, naturalism entails deciding that there is no significant discontinuity between the 'natural' object of representation, the representamen, and the interpretant; or that, for the representational task at hand, the correspondence between the three is adequate (Lindahl-Elliot 2005).

First, the four modalities are by no means mutually exclusive. While it was possible to identify some types or aspects of exhibit that were more strongly associated with each of these modes, it was also possible to suggest that any one display could involve all four modalities. For example, the 'animal encounter' style displays arguably had elements of all four modalities of observation. Moreover, many of the signs combined an iconic or environmental naturalism with the scientific.<sup>5</sup>

Second, there is no necessary continuity between the predominant mode on the level of the design of the displays, and their appropriation by visitors: the model is premised on the notion that different visitors might respond to any display on the basis of forms of observation that contradict or interrupt the intentions of zoo designers.

Third, at any given moment, an animal's actions may entirely transform the mode of observation, and 'trigger' a different ascription of naturalism amongst visitors. For example, a gorilla running up to a glass screen and pounding on it was bound to transform a mode premised on an iconic naturalism into one strongly driven by an indexical naturalism.

While both zoos included exhibits with each or all of these modes, this selfsame typology enabled the researcher to characterize some of the differences between the zoos. One significant, and paradoxical difference between the two zoos was that the larger displays at the Paignton Zoo, and their extensive use of landscaping often meant the iconic naturalism prevailed on the level of design, but also, that the displays were less likely to generate modes of observation driven by an indexical naturalism unless the specimen on display came very near the viewing areas. This meant that visitors tended to identify strongly with the style of the zoo, but were also more likely to have greater difficulty seeing at least some of the animals. By contrast, almost exactly the opposite phenomenon occurred at the Bristol Zoo, which had smaller displays in which visitors were more likely to experience the animals on the basis of an indexical-multisensual mode of observation.

Given these differences, it is perhaps unsurprising that the Paignton Zoo's promotional literatures emphasized the iconic-environmental naturalism, whereas the Bristol Zoo's promotional literatures and slogan emphasized the indexical-multisensual: 'See It-Sense It-Save It'.

Given the limits in the length of the report, it is not possible to engage in a detailed analysis of the recontextualization of the scientific discourse on the level of the zoos' signs. It thereby suffices to highlight the following aspects:

First, a majority of the ID and contextual signs at both zoos were structured by a natural history discourse of the animals/plants. Second, in a small number of generally older signs in both zoos, it was also possible to find signs that conveyed a biological discourse that described the 'hidden' aspects of a given species' morphology, i.e. its internal structuring, as well as its relation to more or less 'hidden' natural processes and forces. In discussion with zoo educators, it would appear that these generally older signs' textbook-like qualities have fallen out of favour, and are now regarded as inappropriate for the context of zoos. Third, the following forms of environmental discourse were present: *conservationist* discourses that described threats to individual species and their habitats and made the (normative) case for the preservation of particular species; *environmental* discourses, *senso stricto*, that

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<sup>5</sup> More generally, the project was premised on the notion that, even if some forms of anthropomorphism are more explicit than others, any human representation (or re/presentation) of non-human nature is, by its very nature, 'humanizing'. If we were to fully abstract the different relations of resemblance from particular discourses, we might further conclude that any display must ineluctably have elements of each of these forms of observation: a dimension of iconicity; indexicality; symbolism or convention; and reference back to the 'human'.

described threats to environments (including human communities), and which made the (normative) case for changes in human practices; and *ecological* discourses, that described ecological *relations* amongst species for a given habitat, with or without reference to threats to the ecologies. In some instances there was overlap amongst these categories; there was, however, little in the way of an effort to articulate the various types of discourses from the perspective of one overarching narrative capable of integrating the various forms and levels of explanation. References to conservationist discourses were particularly prevalent in both zoos, and references to the threats to particular species were an integral and systematic aspect of especially the Paignton Zoo's sign system. By contrast, in both zoos environmental discourses were comparatively infrequent, and there was little reference to *ecological relations* (significant exceptions could be found in the Bristol Zoo's aquarium, and 'Smarty Plants' exhibits). References to inter-relations were almost always framed in terms of natural history data on feeding, predation, and so forth. Indeed, analysis further revealed that, even in the 'state-of-the-art' displays, a fundamental tension existed between the ideal of moving towards habitat-like displays, and the need, in most cases, to enclose different species in separate spaces. While some of the signs in both zoos (and especially some of the older signs at the Bristol Zoo) did offer analyses of ecosystematic relations, most signs focussed on the natural history of the individual species, and/or on an *organismal* ecology.

The summary of this level of analysis will conclude by briefly considering the dimension of transmediation in displays. An analysis of transmediation revealed that neither of the zoos had engaged in the dynamics of narrativization or indeed 'Disneyization' (Beardsworth and Bryman 2001) that characterize some of the major American zoos (e.g. Disney's Animal Kingdom). The analysis nonetheless suggested that especially the *Seal and Penguin Coasts*, and Paignton's new *Living Coasts* could be described as technologies of observation that were strongly indebted to the forms of observation and visualisation associated with film and especially TV nature documentaries. The analysis suggests that such displays did not so much recreate the 'natural' surroundings of the animals as they reproduced elements of the forms of observation associated with film and TV. 'Immersion' in such displays was thus as much a matter of a simulation of the animals' original geographies, as it was of 'immersion' in a mass-mediated, virtual geography, and its characteristic forms of visualisation.

#### *Analysis of the reception of zoo displays*

The semeiotic analysis began to make it evident that, at both zoos, science and environmental communication were mediated by an extraordinarily rich and complex array of modalities of observation. The question on the level of reception research was thus, how would the different families engage with this complexity? More precisely, how would they *attend* to this matrix of modes of observation?

Both the ethnographic research with 35 family groups, and the survey of zoo member households suggest that, at least on the level of explicit verbal discourse, adult visitors privileged the iconic-environmental naturalism and its implied mode of observation. Visitor commentary produced in the context of participant observation, and the post-visit interviews suggested that adults valued, as a matter of an *a priori* and highly normative discourse, the larger, 'leafier' enclosures, whether these resembled the animals' original geographies or not. There seemed to be no awareness on the part of the visitors that such displays did not necessarily equate with a higher standard of animal welfare. Conversely, virtually all of the families commented on the extent to which the older modernist enclosures at both the Bristol Zoo (most notably the lion, pygmy hippo, and the older bird cages) and the Paignton Zoo (most notably the bird cages found in the Primley zone, and the old monkey house) were, in the words of one visitor, 'simply not on'. Here too, there was virtually no awareness that such displays might not be inherently worse from the point of view of animal welfare than displays structured along the lines of an iconic naturalism.

The survey of zoo member households provided some support for this result, and for the four dimensions of observation and naturalism more generally. Using SPSS, the 56 items on the scale of zoo display naturalisms were assessed for their suitability for factor analysis, and the correlation matrix revealed numerous coefficients of 0.3 and above. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.88, and the Bartlett's Test of Sphericity attained statistical significance. These results supported the factorability of the correlation matrix, and so a principal components analysis (PCA) was run. The PCA revealed 14 components with eigenvalues exceeding 1, explaining 59% of the variance. However, the screeplot revealed a clear break after the third, and fourth components. Despite the relatively low account of variance, these components were chosen for further investigation by means of a Varimax rotation. The rotated solution appeared to support a four-way differentiation that was broadly consistent with the one suggested by the qualitative analysis; significantly, the analysis suggested a similar pattern of responses to all questions about the importance of different kinds of signs.

In both zoos, respondents were most likely to suggest that a reduced number of items associated with iconic-environmental naturalism were 'very important', with very little variation on the basis of age, self-ascribed class, education, occupation or gender. Visitors in both zoos expressed the strongest affinity for items associated with the scale that tested for iconic-environmental naturalism: especially, 'Having animal enclosures that resemble natural habitats', 'Using trees and plants inside enclosures to mimic the animal's original environment', 'Having big enclosures', and 'Creating enclosures in which animals can breed'. Items classified by the research as belonging to the scale testing for scientific naturalism were generally given high to intermediate scores: these included 'Providing information about scientific efforts to preserve endangered species', 'Having signs explaining how animals behave in the wild', 'Providing signs showing where the animals come from in the wild' and so forth. There was, nonetheless, a very significant reduction in the number of visitors who thought these aspects to be 'very important' (from the high 300's to the mid-200's, for the general response in both zoos). The least favoured items were those of the mode of observation associated with anthropomorphic-popular naturalism. Items such as 'Coaching animals to perform tricks', 'Having funfair rides such as dodgems', or 'Having animal shows' were consistently given the lowest scores by respondents of all ages, self-ascribed classes, gender, and occupations.

Despite the significance of these survey results, it is important to distinguish between a relatively explicit *discourse* about display design, and the actual practice of visiting, particularly as mediated by nonformal pedagogic interactions within family groups, and by the practices of children aged five years and under. Here both the participant observation, and the video diaries revealed a multitude of practices that often contradicted the results of the survey, the visitors' verbal discourse, and the zoos' promotion of a single naturalism. Indeed, actual visiting practice suggested that a visit to either of the two zoos involved a concatenation of the different modes of observation, with most visitors engaging actively (and pleasurably) in all of the different modes.

The exact configuration of modes was contingent on a variety of factors ranging from the state of the animals in a given display, to social variables such as age and class. We might nonetheless begin by noting that even if the promotional literatures of both zoos emphasized the values of iconic-environmental modes of observation (this was especially true in the case of the Paulton Zoo), a majority of visitors expressed a certain frustration if they could not readily see any of the specimens. The explicitly anthropomorphic concept of animal 'privacy' was seldom invoked in order to rationalize the fact that iconic-environmental naturalism might well go hand in hand with a lower degree of animal visibility.

It was also the case that, even if both zoos privileged what might be described as exotic geographies of nature, many of the children aged five and under engaged as attentively, if

not more attentively with the more 'mundane' geographies represented by both zoos. For example, many of the families with younger children spent more time attending to the goldfish in a small pond next to the Paignton Zoo's rhino exhibit as they did the rhino itself.

This inversion was also expressed by both adults and children in the explicitly anthropomorphic interpretation of the 'exotic' species. For instance, at both zoos visitor observations of lions tended to be articulated in terms of dynamics that sought to identify the 'Mummy Lion' and the 'Daddy Lion', or that compared the sleeping lions to the habits of the tabby at home. We can say in this sense that parents and children engaged in anthropomorphic projections that paradoxically 'naturalized' the animals' otherness by relating them to 'home'; at least for the youngest children, 'home' was 'the natural', and the coding orientations thus both began, and concluded on this premise. In the case of the female guardian born in the Philippines, this process took a remarkable turn insofar as she repeatedly identified 'everyday' species that she had seen or grown up with but which were now displayed as 'exotic' animals.

As part of the above dynamic, animals also served to cosmomorphically identify different family members; for example, a number of children associated the silver-back gorillas with their fathers, and pointed to the alpha-males and said 'Look, it's Daddy!' To be sure, the male parents in most families, but especially in the families with parents in the routine or manual occupations, were more likely to adopt a nonformal pedagogic role that repeatedly joked about the animals' 'transgressions': ie having morphologies, or engaging in behaviours which could be regarded as being transgressive insofar as they occurred in a public space, and insofar as they were interpreted with reference to human cultural taboos or prohibitions: for example, finding that the howler monkeys at the Paignton Zoo had defecated in their enclosure, that the turtles at the Bristol Zoo were 'riding piggyback' (mating), or that the baboons in Paignton had bright pink 'bums'. The observation of such phenomena provided a rich space of parent-child complicity in which to both affirm and contest, blur and redefine the boundaries between the human and the non-human, and what was acceptable and not acceptable 'behaviour' in public. They also attested to the significance of what the research describes as the nonformal pedagogies, and the anthropomorphic naturalism and mode of observation.

In general, these dynamics tended to bypass both zoos' informal pedagogic discourses. However, on numerous occasions within each visit, events occurred that led both children and adults to enquire about the nature of a certain species. On such occasions, question-and-answer dynamics occurred during which informal, and even relatively formal pedagogic relations replaced the nonformal, and in which the information provided by the zoos in the identification signs played a significant role (by contrast, as a rule, almost none of the visitors employed the larger contextual signs provided by both zoos). The use of the information provided by the zoos was particularly evident amongst families of 'naturalists', ie families with a particular interest in natural history, and amongst families with one or more parents with occupations in the managerial and intermediate classes. These families were more likely to employ the visit as an opportunity to teach and learn in ways that made explicit the textual source of their information, i.e. pointing to the signs, and engaging the children in more 'dialectical' forms of pedagogic relation, e.g. asking questions, or encouraging the children themselves to read the signs. These families were also the most likely to engage in relatively 'parsimonious' forms of observation, and thereby were more likely to take longer to circulate through the exhibits. They were also more likely to engage in activities of consumption at home that strengthened this disposition: for example, they bought and encouraged their children to read books about animals that echoed the modes of observation that this report has described in terms of iconic-environmental naturalism, or see videos and TV programmes about the natural world. It is possible to suggest, in this sense, that these families expressed the strongest affinity to the natural history discourse associated with a symbolic-scientific naturalism and its concomitant modes of observation.

Amongst these 'ideal visitors', but also amongst the rest of the family groups, one or more of the following dynamics nonetheless made their reception of the zoos' pedagogic discourse, as mediated by the zoos' signs, more complex:

First, children five and under tended to engage with the displays in ways that reworked what the project describes as the tacit 'encyclopaedic' or 'field guide' model of the signage. In general, children of the age in question were unlikely to engage with signs unless they were prompted to do so by their parents (as explained above), or unless some aspect of the sign caught their eye, and/or required some explanation. The symbols of environmental threats in the Paignton Zoo's signs were, in this sense, particularly if unexpectedly effective as a device that generated discussion, and then indeed became the subject of a game for several of the children. Another significant exception involved signs and multimedia displays whose logic of use was governed by an indexical-multisensual mode of observation. For example, the Bristol Zoo's Zoolympics succeeded in engaging parents and children alike; the signs were, however, not always successful in generating a shift from the indexical to the scientific mode of observation: more often than not, especially the younger children engaged in relatively mechanical physical actions that were unlikely to lead to a discussion of their meanings unless the parents intervened. This was also true of the Paignton Zoo's 'paws' signs, which most children simply liked to *touch*.

More generally, this indexical mode could be said to constitute a much more significant aspect of the younger children's modes of observing and inter-relating with a variety of features of both zoos, including the ostensibly 'transparent' boundaries employed in several displays. Where adults stood and watched, the children pressed, climbed, pushed, and engaged in far more explicitly corporeal forms of observation. The best metaphor of this process could be found in the Paignton Zoo, where many children actually used the signs as a kind of lever with which to pull themselves up onto the fences in order to obtain a better vantage point.

Perhaps the most significant challenge to an encyclopaedic model of sign-use was nevertheless be found in the instances when animals moved, moved close to vantage points, and/or engaged in playful, aggressive or other kinds of behaviour. On such occasions, visitors' attentions focussed on the animals, and an indexical action-reaction mode of observation prevailed. This much is unsurprising; what is perhaps more significant is that in such circumstances visitors were either unlikely to look at the signage, or if they did, they wished to find explanations for the immediate behaviour, or 'biographical' information about the particular *specimen*.

In such situations, traditional genres of zoo signs revealed their limitations. Where an encyclopaedia is premised not just on a certain order of abstraction but also on a certain spatio-temporal gap between the event of reading-knowing and the known event, the zoo context is one of an extraordinary immediacy: visitors may want to know *now* why the animal looks like, or is doing, *that*. One of the key findings of the project in this sense was that the relation between the zoos' explicit signs, and their animals was by no means automatically 'symbiotic' or mutually reinforcing; often, the two kinds of 'signs' competed with each other for the visitors' attention.<sup>6</sup>

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<sup>6</sup> It might be thought that having a docent or keeper *in situ* to provide talks might solve this problem, and indeed post-visit discussions suggested that visitors found many of the keeper talks particularly useful. However, leaving to one side the impossibility of having a keeper on hand in all displays all the time, talking about the animal did not necessarily transcend this 'problem'. Though less limited than the static sign in some respects, the keeper too, could only go by what s/he knew, or what s/he could represent.

Perhaps the most interesting results of the project on this level of analysis concerned the relationship between observation and transmediation. The most striking example of this involved the extent to which blockbuster films such as *Harry Potter* and *Finding Nemo* overcoded the zoo's classification of the animals, and redirected children's patterns of attention. In some cases this led to negotiations over the reliability of the zoos' classification of animals; for example, after *Harry Potter and the Chamber of Secrets*, many children were surprised to find that plumed basilisks at both zoos were not giant snakes. The zoos' cultural authority was by no means taken for granted; in several cases, parents had to explain to the children how or why basilisk might not be Basilisk. In other cases the success of a Hollywood film led children to attend to, and discuss the features of an animal that, prior to the release of the film, had not been the focus of attention; this was most notably the case with clownfish at the Bristol Zoo after *Finding Nemo*.

The medium of television also played a significant, if somewhat more subtle role. During the first ethnographic visits, it became apparent that natural history documentaries provided many families with a criterial horizon, a kind of degree zero iconicity against which to measure various aspects of the displays. Animals that had been seen on the shows were 'recognized' in zoos, and in some cases even named with reference to specific programmes or presenters: 'that's a Steve Irwin crocodile'. In this and in numerous other contexts, the children revealed the conventional nature of the ostensive weakening of the visitor-visited boundaries by repeatedly asking, 'can I go in there?' Several children noted that some of the displays were 'missing' the kinds of events they'd seen on television. For example, the Paignton Zoo zebra enclosure 'ought to have a few lions in it'. Moreover, the constant kinesis associated with moving images of animals on television was likely to be a significant motivation in dynamics in which children questioned repeatedly whether animals were 'pretend animals' when they failed to move whilst being observed.

We may conclude this brief summary of results by noting that the video diaries recorded not just visitor preferences for different animals, but also the process by means of which the practice of recording became the site for 'meta-observation' and 'meta-attention'. Put differently, the video diaries had the unexpected effect of generating an interest in the process of observation, as mediated by video technology. The video diaries were, in some respects, the paradoxical obverse of transmediation more generally: if watching television silently informed observing animals in zoos, the use of the video cameras at the zoo gave rise to numerous interactions concerning the nature of mediated representation/observation. As part of this process, a number of the children were given the opportunity to act as presenters, and many adopted the mode of address of children's animal TV shows, i.e. what Nichols (1991) has described as a 'reflexive' mode of representation.

When the videos were played back in the family homes, two dynamics were particularly striking: first, the extent to which any queries asked by the parents *in the videos* were answered by the children *at the homes* a split second before they themselves offered exactly the same answer *in the videos*. This happened in some cases several weeks after the visits. Second, and in apparent contradiction to this 'power of memory'—and 'power of attention'—even after some of the families filmed some of the animals in close-ups, they failed to recognize the same animal in still pictures shown during the follow up interviews.

In conclusion, the research revealed that the zoo displays could promote a variety of forms of relation to the animals, and that there was no necessary discursive continuity between their different modes of observation. Where discontinuities existed, they could give rise to contradictions and ambiguities that made more complex any dynamic involving science and environmental communication. The same was true on the level of visitor responses to the displays; far from involving a simple, and uniform preference for iconic-environmental naturalism, the research revealed that visitors circulated amongst the different modes of observation and in so doing could transform them by means of nonformal, and often

anthropomorphic pedagogies. The transformations were not necessarily detrimental to the zoos' efforts to engage in science and environmental communication; they did, however, suggest the need for zoo educators to reconsider at least some of their pedagogic strategies.

## **Activities**

The following is a list of the activities which the award holder participated in.

- Third Annual Science in Society Programme Meeting, Crewe, November 2004
- Convenor of an academic session in the 6<sup>th</sup> International Zoo Design Symposium in Torquay, May 2004. As part of this event, the award holder presented the following papers
  - 'Observing Zoo Natures: From Hagenbeck to Disney'
  - 'Deconstructing Four Naturalisms in Zoo Design', paper presented with A. Evans, project Research Associate, at the 6<sup>th</sup> International Zoo Design Symposium, Torquay, May 2004
- 'The Transmediation of Leisure: Some Methodological Problems' paper presented at DigiPlay seminar hosted by University of Surrey/ESRC Centre for Research Innovation and Competition, April 2004
- Tour of Bristol Zoo and presentation to members of project Advisory Group, Bristol, February 2004
- Second Annual Science in Society Programme Meeting, South London, December 2003
- 'Zoo Signs, Zoo Science', paper presented at the British and Irish Zoo Educators Annual Conference, Edinburgh, November 2003
- Seminar on interim results of project, presented to education and science officers of the Bristol and Paignton Zoos, Paignton, August 2003
- 'Zoos, Science, and Pedagogic Discourse', paper presented to members of the Centre for Informal Education and Learning at the Faculty of Education at Kings College, London May 2003
- 'Botanic Gardens, Visitors and the Media: Some challenges for the visitor researcher' Annual PlantNet (Association of British and Irish Botanic Gardens) Conference, University of Wales, Bangor April 2003
- Presentation of New Zoos Project to members of Advisory Group, Institute of Education, London January 2003.
- Launch of Science in Society Programme Meeting, Covent Garden, London September 2002

## **Outputs**

- Mediating Nature: Environmentalism and Modern Culture. Manuscript being considered for publication by the Routledge International Library of Sociology.

- 'The Natures of Naturalistic Enclosures' in Plowman A.B. and Tonge, S.J. (eds.) 2005. Innovation or Replication. Proceedings of the 6th International Symposium on Zoo Design. Whitley Wildlife Conservation Trust, Paignton. 164p. ISBN 0 950 9294 4 1, pp. 87-97.
- 'Science and Environmental Education at the Bristol and Paignton Zoos: Some conditions of possibility', Interim report presented to Bristol and Paignton Zoos, August 2003
- 'The Imaginary Institution of Nature' working paper presented to the *New Zoos* project advisory group, London, February 2003
- 'The Problem with Saussure: some thoughts on the nature of ant-bites' working paper presented to the *New Zoos* project advisory group, London, February 2003
- 'Zoo Semeiosis' working paper presented to the *New Zoos* project advisory group, London, February 2003
- 'Zoos as Heterotopias: some notes towards a theory of zoological space-time' working paper presented to the *New Zoos* project advisory group, London, February 2003

### **Impacts**

The methodology, and interim results of the project have been presented to the directors, education officers, and science officers of the Bristol and Paignton Zoos. Users in both of these institutions reported that the analyses helped them to re-interpret their own practice. Both zoos have modified aspects of some of their designs on the basis of preliminary analyses.

The project has also been presented to several conferences organised by the different wings of Federation of British and Irish Zoos and Aquaria/BIAZA (see activities). The paper presented to the conference with zoo educators in Edinburgh was especially well received, and several zoo educators suggested that the analysis offered at that conference opened up new avenues for zoo education.

Finally, a similar response was forthcoming from members of zoos from around the world who participated in the 6<sup>th</sup> International Symposium on Zoo Design. Comments during and after the presentation suggested that the research was very well received, and assisted members in the process of re-interpreting the own practice.

### **Future Research Priorities**

The following is a list of the research subjects that might be pursued following the completion of the current project:

1. The representation of 'hybrid' and urban natures. Zoos throughout the world have thus far focussed on the re/presentation of an 'exotic' nature that is premised on a strong discursive opposition between culture and nature, the urban and the rural. Both research, and practical designs are now required that explore what is arguably the more common, and in some respects just as significant 'nature': the nature found in cities, suburbs and other developed areas whose environments are under-represented in zoos and related institutions.
2. The use of new media in zoos. A number of zoos have begun to experiment with new media, and new forms of multimedia. The relation between 'live' animals and 'virtual' animals is likely to become more and more significant, especially after the emergence of hybrid 'zoo-museums' such as @Bristol.
3. The development of critical forms of pedagogic discourse. The current research has provided a diagnosis, and will be followed by some practical recommendations. It is however clear that an 'intermediate' form of research is now required that employs a

form of action research to develop new forms of pedagogic practice in zoos and related institutions.

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Appendix 1: Families participating in the ethnographic aspects of the visitor research

\*=pilot, F=Female, M=Male,MI=Managerial-Intermediate,R=Restricted<sup>7</sup>

Zoo	NS-SEC	No. of Guardians	Gender/Age of Children	Location of Family Home
Bris 1	MI	1F	M14,F12,M6	Bath
Bris 2	MI	1F	M6,F5	Tetbury
Bris 3	MI	1F & 1M	M4,M2	Bristol
Bris 4	MI	1F & 1M	F9,F7,F5	Wanborough
Bris 5	MI	1F & 1M	M6, M3	Yate
Bris 6	MI	1F & 1M	F9, F7,F5	Wotton-Under Edge
Bris 7	MI	1F & 1M	F6,M6,M6	Bath
Bris 8*	MI	1F & 1M	M9,M4,F3,M1	Swindon
Bris 9	MI	1F & 1M	F6,F4,F3	Bristol
Bris 10	MI	1M & 1F	M6	Dorchester
Bris 11	R	1M & 1F	M7	Bristol
Bris 12	R	1F	F6,M4	Stratton-on-the-Fosse
Bris 13	R	1F	M4	Bristol
Bris 14	R	1M & 1F	F6,F3	Bristol
Bris 15	R	1M & 1F	M12,F11,M6	Bristol
Bris 16	R	1M & 1F	F8, M5	Paignton
Bris 17	R	1M & 1F	M7,F6	Mansfield
Bris 18	R	1M & 1F	F7	Torquay
Bris 19	R	1F	F8,M5	Bristol
Paig 1	MI	1M & 1F	M12,F8,M6,M3	Swindon
Paig 2	MI	1F	M6	Teignmouth
Paig 3	MI	1M & 1F	F11,M6	Kingsteignton
Paig 4	MI	1M & 1F	M7,M5,F1	Teignmouth
Paig 5	MI	1M & 1F	M11,F9,M6	Bristol
Paig 6	MI	1M & 1F	F5	Bridgend
Paig 7	MI	1M & 1F	F7,F5	Berkshire
Paig 8*	MI	1M & 1F	M7,M5	Yate
Paig 9	MI	1F	F8,F6,F2	Bristol
Paig 10	R	1F	M6	Bristol
Paig 11	R	1M & 1F	M7,M4	Plymouth
Paig 12	R	1M & 1F	M8,F6	Newton-Abbot
Paig 13	R	1M & 1F	F9,M7	Swindon
Paig 14	R	1M & 1F	M6	Torquay
Paig 15	R	1M & 1F	M5,F2	Kingsteignton
Paig 16	R	1F	F6,F4	Bristol

<sup>7</sup> Based on a variant of the National Statistics Standard Economic Classification [NS-SEC], in particular, their 'Simplified Method'. This method was used to select an even number of families per zoo based on a simple distinction between Managerial and Intermediate (classes 1-4 on the 8 class NS-SEC) and Routine (classes 5-7 on the 8 class NS-SEC).

Number of families:35

Number of children: 72

Number of guardians: 59

Total number of subjects: 131

Appendix 3: Survey of Zoo Member Househ