

Following visitors and what it tells us

The use of visitor tracking to evaluate 'Spirit of the Jaguar' at Chester Zoo

by **David Francis** (Research Assistant), **Maggie Esson** (Education Programmes Manager) and **Andrew Moss** (Education Officer) EDUCATION DIVISION | CHESTER ZOO | UNITED KINGDOM

At the 6th International Symposium on Zoo Design (2005), in Torquay (UK) it was promulgated that the major developments in zoo design in recent years have been in exhibits aiming to engage and inspire the public in new and exciting ways (Innovation or Replication? 2005). This trend for designing exhibits with visitors in mind has been coupled with an interest in finding out how visitors behave in and respond to zoo exhibits.





Looking at some of the exhibits that have been built in recent years, 'Congo Gorilla Forest' at Bronx Zoo (\$43 million), 'Masoola Rainforest' at Zurich Zoo (\$42 million), 'Gorilla Kingdom' at London Zoo (\$10.4 million) and 'Realm of the Red Ape' at Chester Zoo (\$7.1 million) reveals that the designing and building of themed and immersive exhibits is now a multimillion pound industry. It is therefore understandable that zoos should want to try to determine whether such exhibits are successful in meeting their objectives. Part of that understanding is to study visitor behaviour.

Visitor Studies

Evaluation of teaching and learning practices, both formal and free-choice, is becoming an increasingly important part of the zoo educator's role. The World Zoo and Aquarium Conservation Strategy (WAZA 2005) states that it is "... essential that zoos and aquariums use a variety of methods to evaluate the impact of their education and training programmes." EAZA's recent decision to join the Visitor Studies Association (EAZA News 2007) reflects the growing interest in understanding how visitors behave in Zoos and Aquariums. An additional consideration is that almost every funding proposal for education support requires a statement about how a project will be monitored, evaluated and reported. This article takes an in-depth look at visitor tracking, a methodology which can be used to study visitor behaviour in zoo exhibits and be added to the educator's evaluation tool box. Visitor tracking typically involves unobtrusively tracking visitors around an exhibit to determine three indicators:

- the dwell time of the exhibit
- the attracting power of exhibit elements
- the holding power of exhibit elements

Exhibit elements include animal enclosures and pieces of interpretation. Typically this method can be best applied to indoor, linear exhibits.

Visitor tracking is a useful methodology from an educational perspective because studies have demonstrated a positive correlation between visitor learning and the time

visitors spend in exhibits (Balling & Falk 1980; Raphling & Serrell 1993; Borun et al. 1996). Furthermore, the use of dwell time to quantify visitor experience remains a widely accepted methodology within the field of visitor studies and potentially allows for the comparison of different exhibits between institutions (Ross & Lukas 2005).

In comparison with museums the frequency of visitor tracking studies undertaken in zoos has been sporadic, and certainly no study exists on the scale of that undertaken by Serrell (1998). This study comprised 110 different museum exhibits (14 of which were in zoos and aquariums). From her findings Serrell looked for universals of visitor behaviour across museum exhibits and then attempted to develop criteria by which the success of an exhibit can be judged (Serrell 1998). Those studies that have been undertaken by zoos typically exist in isolation and because they lack a universal methodology are not comparable across institutions (Bitgood & Benefield 1987). For example if visitor tracking studies do not define the size of the exhibit area, using dwell times to make comparisons between studies becomes irrelevant.

This study suggests a methodology that may be applicable for zoos and aquariums wishing to undertake visitor tracking research. If more zoos undertake such research a database of visitor behaviour in zoos and aquariums can be created and from universals of visitor behaviour can be determined, for example the average number of pieces of interpretation visitors are likely to stop at, or the amount of time we can expect visitors to spend in an exhibit of a specific size.

'Spirit of the Jaguar'

The visitor tracking study we are using to illustrate our methodology takes place in the 'Spirit of the Jaguar' (SOJ) exhibit, an indoor, one-way exhibit at Chester Zoo (UK). SOJ was built in 2001 at the cost of \$4 million and has an indoor visitor area of 315.6m². The interior consists of two themed areas, the larger savannah zone and the smaller adjoining rainforest zone, each zone contains a glass-fronted enclosure housing a solitary jaguar. Both zones contain integral species in separate enclosures. Integral species act to illustrate biodiversity, reminding visitors that flagship species are part of an assemblage of species in an ecosystem. They also provide an alternative animal experience should the flagship species not be visible. During the study the integral species in SOJ were poison arrow frogs (*Dendrobates* sp), butterfly goodeids (*Ameca splendens*) and leafcutter ants (*Atta cephalotes*).

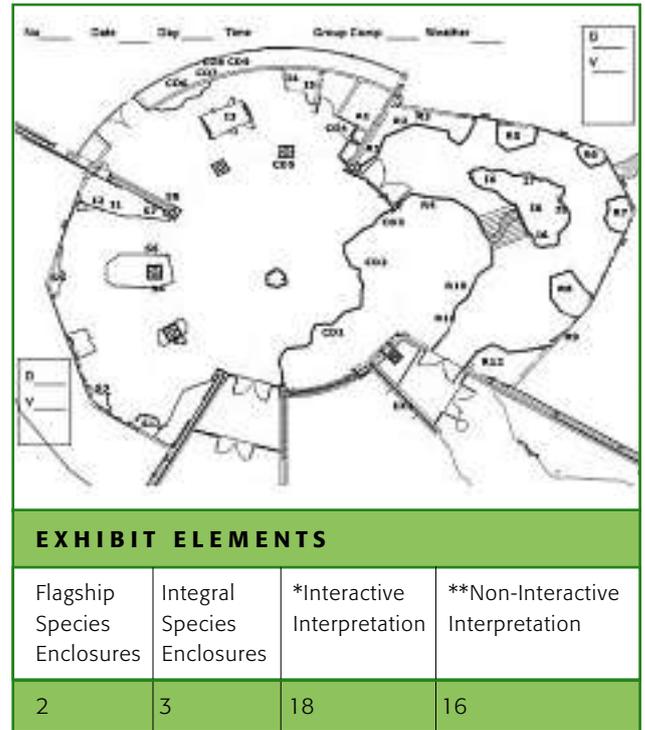
Visitor Tracking Methodology

A sample size of 300 visitors were tracked in August and September 2005. These weeks fall within the school summer holidays when the exhibit experienced a heavy visitor density.

We applied the following data collection methodology:

- The researcher was out of zoo uniform and in “plain clothes” to allow unobtrusive observation of visitors.
- The researcher counted the visitor density in the exhibit before tracking began. The researcher then selected the third visitor group to pass through the entrance to ensure each group was selected randomly.
- Upon entering SOJ, the first member of the visitor group to make a definite movement towards an exhibit element was selected as the representative member of that group.
- Once selected the visitor was tracked around the exhibit and their movements recorded on a map of the exhibit (figure 1).
- Visitor behaviour was recorded as the subject moved around the exhibit. The principal behaviour recorded was whether an individual stopped at an exhibit element. A stop was defined as when, “a visitor stops, with both feet planted on the floor, and head or eyes pointing in the direction of the exhibit element for 2 to 3 seconds or more” (Serrell 1998). A visitor returning to a previously visited exhibit element was not counted as an additional stop.
- The holding power for each exhibit element the visitor stopped at was recorded. Holding power was defined as the length of time a visitor was stationary and looking at an exhibit element (Bitgood et al. 1986).
- When the selected group member left SOJ the exit time was recorded.
- Visitor density was counted once the selected visitor left the exhibit.
- The researcher returned to the entrance of the exhibit and repeated the process for the third visitor group to enter the exhibit once the researcher was in place.

Figure 1. ‘Spirit of the Jaguar’ contains 39 exhibit elements.



* Interactive interpretation includes video monitors, soundboards, flip panels, scent signs and signs which incorporate tactile models.

** Non-interactive interpretation is defined as signs which consisted of text and images only.

The frequency distribution in figure 2 is skewed to the right. This right skewed distribution is typical of that found for visitor dwell times in exhibits (Serrell 1998).

The skewed nature of the distributions mean that the median is a more accurate measure of central tendency than the mean. The median dwell time for SOJ was 341 seconds (5 minutes 41 seconds). Visit duration ranged from 29 seconds to 47 minutes 54 seconds. There was at least one jaguar visible for 60% of visitor groups tracked. The median dwell time when at least one jaguar was visible was 419 seconds and the median dwell time when no jaguars were visible was 249 seconds. A Mann Whitney test was performed and the result was found to be statistically significant ($p < 0.05$).

Results

Overall dwell time

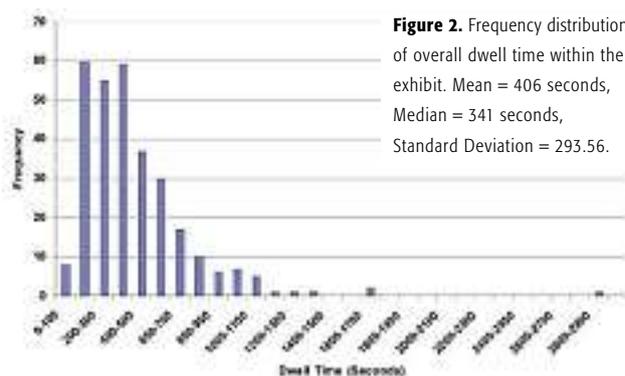


Figure 2. Frequency distribution of overall dwell time within the exhibit. Mean = 406 seconds, Median = 341 seconds, Standard Deviation = 293.56.

Stops at exhibit elements

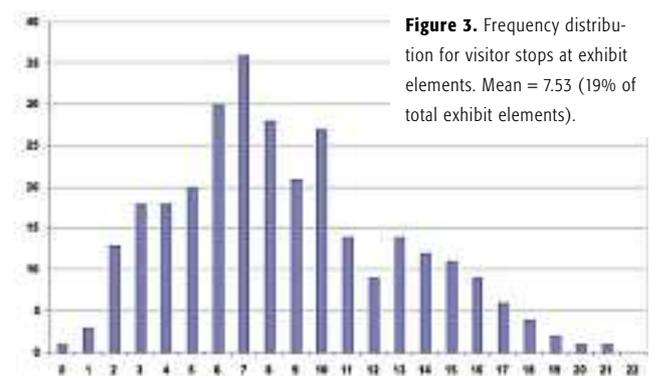


Figure 3. Frequency distribution for visitor stops at exhibit elements. Mean = 7.53 (19% of total exhibit elements).



The largest number of exhibit elements stopped at by visitor groups was 21 (53%). The lowest number of exhibit elements stopped at by visitor groups was 0. On average visitors stopped at 7 exhibit elements.

The average visitor stopped at the following exhibit elements: two jaguar enclosures (100% of total flagship species enclosures stopped at), one integral species enclosure (33.3% of total integral species stopped at), three pieces of interactive interpretation (16% of total interactive interpretation stopped at) and one piece of non-interactive interpretation (6.25% of total non-interactive interpretation stopped at).

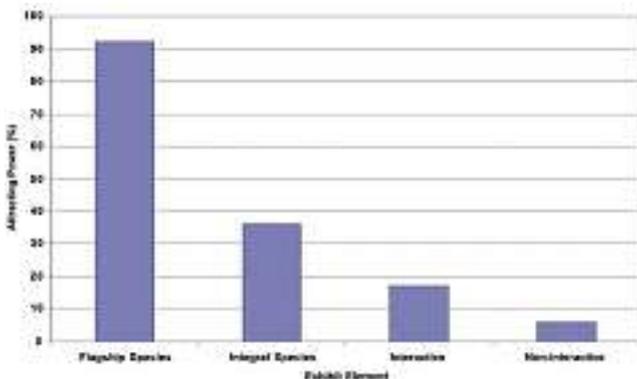


Figure 4. Mean Attracting power (the percentage of visitor groups that stopped) for the four categories of exhibit elements. Flagship species (n=2) = 92.5%, Integral species (n=3) = 36%, Interactive Interpretation (n=18) = 17.06%, Non-interactive Interpretation (n=16) = 5.87%

Attracting power of exhibit elements

Figure 4 shows that there is a clear hierarchy of attracting power with the majority of visitors stopping at flagship species and just over a third of visitors stopping at the integral species. Previous studies have shown live animal exhibits have a higher attracting power than interpretation (Ross & Lukas 2005). Figure 4 indicates that interactive interpretation has on average an attracting power three times than that of non-interactive interpretation.

Holding power of exhibit elements.

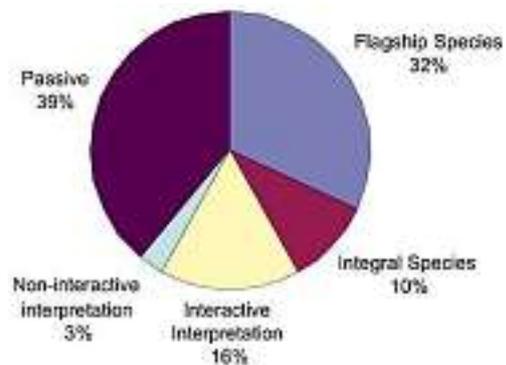


Figure 5. illustrates how visitors spend their time in SOI.

Figure 5 shows that 61% of that time is spent engaged with exhibit elements while 39% of that time is classified as passive. Passive activity includes any activity not spent stopped at an exhibit element. The average visitor spends 109 seconds at the flagships species, 34 seconds at integral species, 54 seconds at interactive interpretation and 10 seconds at non-interactive interpretation. 133 seconds is spent passively.

Discussion

SOJ achieves a median dwell time of 341 seconds. Whether this can be considered a success for an exhibit of this size is difficult to establish without a sound sample size of other studies with which to compare it. Several studies have been conducted looking at visitor dwell time in zoo exhibits (Marcellini & Jenssen 1988; Phillpot 1996; Ridgway et al. 2005; Ross & Kristen 2005). However, many other visitor tracking studies do not report the dwell time as a median, or state the visitor area. This makes comparison between studies difficult. Only when more studies are conducted that correlate the size of the visitor area with dwell time will we be able to quantify the success of SOJ.

As well as providing us with a dwell time, this study also adds to our existing knowledge of how visitors spend their time within an exhibit. Figure 5 illustrates that a large proportion of a visitors' time in an exhibit is spent passively walking between exhibit elements. When engaged with exhibit elements visitors spend the most time at flagship species enclosures.

Few studies have looked at whether visitors are attracted to integral species. This study confirms that visitors are attracted, but to a lesser extent than to flagship species. The three integral species all had similar attracting powers, attracting around 30% of visitor groups compared to the 90% attracting power of the flagship species. This is unsurprising as large animals are thought to have higher attracting and holding powers than smaller animals (Bitgood and Benefield 1987; Ward et al. 1998).

Interior 'Spirit of the Jaguar'.



Both figures 4 and 5 illustrate that in terms of attracting visitors and holding their attention interactive interpretation is considerably more successful than non-interactive interpretation. Visitors stop at 7 (18%) of exhibit elements on average in SOJ. Of the 14 studies in zoos and aquaria undertaken by Serrell (1998) visitors stopped at on average 35.5% of exhibit elements. However, five of these were temporary exhibitions and three did not contain live animals. They are therefore atypical of zoo exhibits and more research needs to be undertaken to see if these results are representative.

Conclusion

The aim of this study is to add to our knowledge of how visitors behave within our exhibits. The objective is to use that understanding to improve existing exhibits and design new ones more effectively. We hope that this study will encourage other institutions to conduct similar studies and go on to share their findings. ♦

Author Contact Details: Maggie Esson | M.Esson@chesterzoo.org

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