

Visitor Responses at National Zoological Gardens, Dehiwala, Sri Lanka

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Abstract

People visit zoos to meet animals, to observe them. It is, in fact, a monument to the impossibility of such natural encounters. There are number of factors that affect visitor responses, animal's activity and personality, exhibit design, visitor's personality, age, gender, level of education, cultural background, days weather, visual competition, etc. (Bitgood et al. 1988; Bitgood 2002; Davey, Henzi & Higgins 2005). Some irresponsible zoo visitors flaunt the rules by 'irresponsibly' feeding the animals, and in some cases, inflict deliberate injury. In contrast some visitors have been injured or killed by reaching into a cage to feed or pet an animal (Fox 1990). This study aimed to comprehend various factors affecting zoo visitor's response. Six enclosures were selected based on their representative differences, their sizes were measured and physical features were recorded including relative distance between observation point and animals and length of the observation point. At each exhibit 5 successive visitor groups were observed for viewing time. Composition of each group (male/female/children) and activity of animals were also recorded. This was repeated for 6 random weekend days. Ten randomly selected visitor groups from different ethnicity were followed from starting point to the end and they were interviewed informally. Four observers were assigned to record events at locations know to be potentially vulnerable to adverse incidents. Furthermore, numbers of

visitor stops were recorded at ten exhibits at different levels of visual competition. Results confirmed most of the observations made by previous authors apart from the effect of visual competition and animal's size on visitor's response. Female dominant visitor groups and groups with children seemed to spend more time at exhibits than male dominant visitor groups and groups without children. Also there was a hint of gender based animal preference. Irresponsible visitor behaviors that occur frequently may have been caused by acute factors like sociocultural and socioeconomic pressure or chronic factors like extra juvenile behavior of some individual visitors and induced hostile behavior of some male animals.

Key words

Irresponsible visitor behavior; mean viewing time; visitor's response; visual competition

Introduction

Public zoos came into existence just as animals began disappearing from daily life. People visit zoos, to observe animals. It is in fact, a monument to the impossibility of such encounters. Modern zoos are an epitaph to a relationship, which was as old as man. People unconsciously tend to reflect upon themselves when they visit a zoo (Fox 1990).

As a group, zoo visitors are not sophisticated in their knowledge of animals. They have a sentimental, emotional interest in animals rather than one based on factual understanding (Bitgood 2002). More than 50% of the zoo visitor groups in general have children (Rosenfeld 1987 cited Serrell 1988).

1 During the past few decades, zoo exhibits have characteristically evolved from the classic
2 menagerie-type cages into modern naturalistic exhibitory that aims to improve animal's
3 welfare standards (Hancocks 1980; Shepherdson, Mellen and Hutchins 1998).

4 There are numerous factors that influence visitor behavior. These factors are either
5 associated with the zoo environment, captive animals or visitors. Animal factors include
6 their presence, activity, size, color, rarity and visibility; exhibit factors include design and
7 location, sound, labeling and signing, where as visitor variables include demographic and
8 personality attributes, as well as group influences (Wolf and Tymitz 1979; Bitgood,
9 Patterson & Benefield 1988; Bitgood 2002; Davey, Henzi & Higgins 2005).

10 Johnston (1998) found structural aspects of the exhibit's appearance as an important
11 influence on visitor behavior. According to Campbell (1984), exhibits can be categorized
12 into three groups, first generation (closed iron and concrete exhibits), second generation
13 (more space, open) and third generation (more natural and more space). Most of the
14 exhibits at the National Zoological Gardens, Sri Lanka, fall in to the category of second-
15 generation exhibits according to Campbell's (1984) classification. A few fall between
16 second and third generation exhibits.

17 Shettell-Neuber (1988) suggested that passive animals are viewed for longer periods in
18 third generation exhibits and more active animals are better viewed at second generation
19 exhibits. Visitors sometimes respond more positively to naturalistic exhibits with
20 increased visitor durations, viewing time, searching behavior, social interaction, animal
21 related conversation and positive attitudes (Price et al. 1994; Johnston 1998; Wood 1998;
22 Tortfield et al. 2003; Davey, Henzi & Higgins 2005).

1 Most zoo visitors do not read signs, and they must be short, eye catching and very
2 relevant if they are to be read at all (Serrell 1988). Information displays and exhibit
3 design is extremely important as poorly exhibits may lead visitors to form wrong
4 impressions on animals that ultimately can work against wildlife conservation (Coe
5 1985).

6 Some zoo visitors show little respect for the animals they have come to see. They flaunt
7 the rules by feeding the animals irresponsibly (sometimes giving food leftover with the
8 packing, with stones, wood bark), and in some cases, they inflict deliberate injury. In
9 contrast some visitors, in misguided efforts to establish a closer rapport with the animals,
10 have been injured or killed by reaching into a cage to feed or pet an animal. Fox (1990)
11 introduced the term “Zoopath” to describe the first group and the term “Zoophilic” to
12 describe the second group. Teasing, feeding, shouting, throwing stones, vandalism and
13 even animal poisoning, cause distress, or death, to captive animals (Hediger 1969). It is
14 possible to observe irresponsible visitor activities at the National Zoological Gardens,
15 Dehiwala, Sri Lanka, almost every day (Chamikara 1993). Apart from irresponsible
16 visitor behaviors, there are instances where animals have demonstrated aggression
17 towards visitors. For example, Mitchell et al. (1992) found that captive Mangabeys were
18 more aggressive towards visitors of the same sex.

19 Davy (2006) stressed that more international research (in human animal interactions) is
20 needed, particularly from developing countries that are home to most of the world’s
21 biodiversity. According to literature, no zoo visitor surveys have been done in Sri Lanka
22 which emphasize human-animal interactions. This study aimed to comprehend how

visitors perceive the existing exhibits, and various factors that are affecting their response.

Materials and Methods

Six different exhibits were selected involving following animals; 1. Ostrich (*Struthio camelus*, n=5, circular arena, radius 4m), 2. Macaw (*Ara macao*, n=5, rectangular, 3.5x4.5m), 3. Siamang gibbon (*Hylobates syndactylus*, n=2, cylindrical, radius 2.5m height 3m), 4. Jaguar (*Panthara onca*, n=6, square 3x3m), 5. Hamadryas baboon (*Papio hamadryas*, n=4, square, 4.5x4.5m) and 6. African lion (*Panthara leo*, n=4, island having a glass observation point, radius 7.5m). These exhibits represent various generation types (Campbell 1984), animals of different relative sizes, different interactive characteristics, and individuality.

At each selected exhibit, two observers recorded viewing times of five successive visitor groups (number of individuals in a group varied from 2 to 25) and observed the activity of animals when they were being observed. It was repeated for six random weekend days (higher attendance). Total number of 180 (5*6*6) groups were observed. Composition of each group (number of males, females, and children) was also recorded.

Given that, different animals show different levels of activity at different times of the day, order of enclosures observed was rotated to avoid any bias caused by the effects of time of the day.

Levels of animal activity were scored arbitrarily by the two observers; following the criteria of Table 1 and inter-rater reliability test (Cohen's Kappa) was done to test the reliability of the scoring (Garson 1998).

In addition, the distance between visitors and animals was measured and relative measures regarding size of the animal and the physical features of exhibits were recorded (Ebenhoh 1992).

On a weekday (low visitor numbers) length of observation points of 10 randomly selected animal enclosures were measured. Number of visitor stops were recorded when visual competition was >1 (length of observation point is excessively filled by visitors and <1 (length of observation point is not filled by visitors) [visual competition = number of visitors/ length of the observation point of the exhibit (m)] in 4 random weekend days.

Randomly selected 10 visitor groups from different ethnic backgrounds (clearly distinguishable from their attire and language) were followed from starting point to the end. They were informally interviewed and their vocal comments were recorded. To record significant visitor-animal interactions, four observers were located at exhibits known to have potential adverse visitor activities (according to the zoo authorities)

To test certain field assumptions made while observing the effect of congestion and visual competition on visitor response, an on-field experiment (where two 'dummy' visitors were set to stare at one of the least stopped exhibit ("Mouse deer") that was practically "invisible" to visitors) was carried out.

Data series were analyzed using ANOVA with MINITAB. When testing one variable others were always kept constant.

Results

Exhibit 1 was a circular arena of 4m radius covered by 2.5m parapet wall. It has a sandy floor, single tree and two shrubby plants), Exhibit 2 was rectangular (3.5x4.5m) shaped, one side with colorfully painted cement block wall and three sides were covered by a green mesh. There was a dead tree for Macaws to rest. Exhibit 3 was a cylindrical enclosure with 2.5m radius and 3m height. It was made up of iron bars and there is a tyre hanged by a rope for Siamang gibbon to play. Exhibit 4 was a basic iron and concrete square 3x3m enclosure. Exhibit 5 was square, 4.5x4.5m shaped enclosure with a big tree in the middle. One side was made up of cement block wall and other three sides were covered by a strong iron mesh. Exhibit 6 is an island of about 7.5m radius covered with water barrier. It also has a glass observation point.

Table 2 showed a significant difference ($p < 0.05$) between mean viewing time at exhibit 6 than most of other exhibits (1, 4, and 5). Interestingly, there was no significant difference found between exhibit 6 (3rd generation) and exhibit 3 (1st generation). Another set of significant difference was found between mean viewing time at exhibit 2 (Macaw) and that of exhibits 4 (Jaguar) and 5 (Hamadryas baboon). There were no significant differences found between mean viewing times at exhibits 1, 3, 4 and 5.

Table 3 indicated that the presence of children increases viewing times of visitor groups significantly ($p < 0.05$). Viewing times of visitor groups with more female numbers were taken as constant variables in the significance test.

According to Table 4 visitor groups consisting predominantly of females seemed to spend more time at exhibits than groups having more male numbers ($p < 0.05$). Significance of

1 the difference declined with the decreasing level of animal activity. However analysis
2 showed that at the highest level of animal activity (level 4), the difference in mean
3 viewing time between groups with higher number of females and groups with higher
4 number of males was seen less significant ($p > 0.05$).

5 Table 5 indicated that this might have been caused by the significant deviation to the
6 general trend, (where groups with higher number of males recorded higher mean viewing
7 time as compared to groups with higher number of females) found at exhibits
8 “Hamadryas baboon” and Jaguar (big cats).

9 Table 6 showed that with the increasing activity of Hamadryas baboon visitor groups
10 having more female numbers tend to spend less time at the exhibit.

11 According to Figure 1, combined mean viewing time for all exhibits a showed positive
12 correlation with the animal activity ($r=0.77^*$, $DF=29$). To keep other variables constant
13 groups with equal number of adult males and females and groups containing children
14 were taken in the analysis.

15 Results suggested that there is an extremely weak correlation ($r=0.02$) between relative
16 sizes of the selected animals and mean viewing times of selected groups.

17 Figure 2 indicated that the mean level of viewing time is inversely correlated ($r= -0.93^{**}$)
18 to the distance between animal and visitor.

19 More number of visitor stops was recorded when sensory competition is between 0.5-1 as
20 compared to 0-0.5.

Discussion

How exhibit type (physical features) affects visitor response

At the national zoological gardens, Dehiwala, Sri Lanka there are only very few exhibits that resemble third generation exhibits. From those selected exhibits, exhibit numbers 3 and 4 fall into the first generation. Exhibits, 1, 2, and 5 can be categorized as second-generation exhibits and exhibit 6 falls somewhere between second and third generation exhibits (Campbell 1984). Exhibit 6, (comparatively more natural enclosure) recorded the highest mean viewing time confirming the findings of (Price et al. 1994; Johnston 1998; Wood 1998; Tortfield et al. 2003; Davey, Henzi & Higgins 2005). Results showed significant differences between mean viewing times at exhibit 6 (3rd generation) and at exhibits (1, 4 and 5) and no significant difference between exhibit 6 and exhibit 3 (1st generation). Exhibit 6 contained African lions that are by nature relatively inactive during the day and more active at night. Exhibit 3 contained Siamang gibbons that are livelier in nature and have sympathetic looks and showed high level of positive interaction with visitors. It conforms to both arguments of Shettell-Neuber (1988) who suggested that passive animals are viewed for longer periods in 3rd generation exhibits and more active animals are better viewed in 1st generation exhibits. The significant difference between mean viewing times at exhibit 2 and exhibits 4 and 5 is may be because Macaw is a more colorful attractive and lively creature than others and the background and the multiple colored species have more potential to attract visitors than monotonous exhibits. No significant differences were found between mean viewing times at exhibits 1 (2nd generation), 3 (1st generation), 4 (1st generation) and 5(2nd generation).

As explained by Johnston (1998), these exhibits have different physical attributes that may impact positively as well as negatively. It suggests that, apart from the nature of the animal, visibility, background, order of the exhibits, status of the immediate surroundings and the animal presentation (single species or multiple species) may also have an effect on visitors viewing time.

Effect of the Presence of Children on Visitor Group Response

More than 70% percent of the 180 groups studied contained children, conforming to the studies of Rosenfeld cited by Serrell (1988). Results of this study (shown in table 3) indicated that groups containing children spend more time at exhibits than groups without children ($p < 0.05$). Viewing time increased with level of animal activity. For one thing, it is the first ever introduction to the wild for most children and they are inclined to become more fascinated than adults do. Other could be that parents in visitor groups are likely to spend more time in educating their children.

Effect of Gender Balance on Visitor Group Response

Groups consisting predominantly of females tended to spend more time at exhibits as compared to those groups consisting predominantly of males. According to Table 4, mean viewing times increased significantly ($P < 0.05$) with the level of animal activity and dropped remarkably when animal activity was at the highest level. Interestingly, Table 5 shows that at two exhibits namely, Hamadryas baboon and Jaguar (big cats) the trend was exactly the opposite. It could be influenced by false courtship behavior of Hamadryas

1 baboon repelling some female dominant visitor groups or it may have been resulted by
2 frequent interactions that were observed between male visitors and male Baboons (some
3 of them were hostile encounters that were similar to the observations made by Mitchell et
4 al. (1992). Alternatively it could be a case of the male visitor's fascination towards big
5 cats (individual male animal image preference).

6 **Effect of Animal Activity on Visitor Response**

7 Results of the study showed a strong correlation ($r=0.77$, $DF=29$) between combined
8 mean viewing times of visitor groups at all exhibits and animal activity, a finding similar
9 to that of Bitgood et al. (1988). So it is quite clear that visitors are preferring interactions
10 with animals they come to observe. However, after comparing mean viewing times of
11 visitor groups with higher female numbers at various activity levels of Hamadryas
12 baboon (as shown in table 6), it is clear that female visitors repelled from the exhibit
13 with the baboons hyper-activity. It may have been caused by the "animal's false courtship
14 behavior" that creates anthropomorphic cognition (utter disdain) in some female visitors.
15 This behavior is a seasonal one and difficult to consider as a permanent factor that affects
16 visitor behaviors.

17 **Effect of Animal's size on Visitor Response**

18 Contrasting to the views of Bitgood et al. (1988), the results (as indicated by the Figure 2)
19 suggested that there is no linear relationship between the mean viewing time and the
20 animal's size. However, the data range is inadequate to make such a firm conclusion that

1 there is no relationship between animal's sizes and mean viewing time. Yet, informal
2 interviews and vocal comments of visitors revealed that more than the sheer size, the
3 animal's individual nature, appearance, and general reputation affect visitor's response. It
4 also suggested that there are inborn animal image preferences for each individual visitor.

5 **Effect of the Distance between Visitors and Animals on Visitor** 6 **Response**

7 Supporting the arguments of Bitgood et al. (1988), results of the study also suggested that
8 visitor groups tend to spend more time when they are closer to the animal. A sense of
9 adventure at some situations and an affinity to innocent looking wild creatures, followed
10 by intimate interactions in other situations, might have prompted visitors liking of closer
11 encounters. Only deviation that was found at the exhibit "African Lion" (the highest
12 distance between visitor and the animal) is may be due to the more naturalistic nature
13 features of the exhibit. However it should be mentioned that some enclosure (especially
14 of aggressive animals) should be kept certain distance away from visitors in order to
15 maintain their safety.

16 **Effect of Visual Competition on Visitor Response**

17 Studies carried by Bitgood et al. (1988) in 13 United States zoos demonstrated that high
18 visual competition could decrease average viewing time. Yet, in the National Zoological
19 Gardens Sri Lanka the situation is exactly the opposite, as crowding attracts more people

1 to the exhibit (illustrated by Figure 3). Some visitors stopped even after the observational
2 point was filled by visitors. Less crowded exhibits seemed seriously unpopular. That
3 might be due to the inquisitive nature of the Sri Lankan zoo visitors. They might have a
4 perception that if people highly compete at an exhibit it must be worth competing. Other
5 factor is that Sri Lanka is a densely populated country and peoples' comfort levels do not
6 necessarily decline with congestion (relatively low personal space), as compared to the
7 people from United States. A simple on-field experiment, where two 'dummy' visitors
8 started staring at an exhibit ("Mouse deer") that was practically "invisible" to visitors few
9 minutes before, recorded rapid gathering of visitors supports the previous argument
10 regarding the "inquisitive nature of the Sri Lankan zoo visitors".

11 **Irresponsible Visitor Behaviors**

12 Event recording and random observations made during a period of two months suggested
13 that there are at least 2-3 irresponsible visitor activities taking place at the national
14 zoological gardens almost every weekend day. Similar observations were made by
15 Chamikara (1993). These situations were found to be triggered by the socioeconomic
16 and socio-cultural backgrounds of certain groups of visitors, as revealed by informal
17 interviews. Majority of them were coming from areas where population density is very
18 high and they are pressurized by many social, ethnic, and economical factors. It could be
19 the demographic effect on visitor's response that was explained by Davy et al. (2005). It
20 is considerably clear that they may try to release some amount of that pressure by
21 engaging in "irresponsible" activities.

1 Animal's appearance and sometimes-hostile behavior also could influence potential
2 adverse visitor behaviors. For example, one male Hamadryas baboon threw handful of
3 soil at a male visitor without him provoking the animal. It is quite similar to the findings
4 of Mitchell et al. (1992) where male Mangabeys showed aggression towards male
5 visitors. There were also a number of irresponsible behaviors noted among some young
6 male visitors. It might be that, young males commit such activities to gain attention from
7 young female visitors (as a common mode of getting recognition).

8 Despite numerous clear red notices "Don't feed animals!", "Please stand behind the
9 protective bar" irresponsible visitor behaviors were observed in more than 50% of those
10 groups observed (Figure 4b). As Serrell (1988) noticed it was quite evident that most zoo
11 visitors do not read signs.

12 There were some not so adverse irresponsible behaviors (Figure 4a) might be influenced
13 by animal's appearance, initial behavior (e.g. learning behavior of begging in monkeys)
14 and anthropomorphism that create 'genuine sympathy' or 'false sympathy' (dominance).
15 False sympathy is harmful as it encourages irresponsible animal feeding (feeding animals
16 with food leftovers, packed food, leaves, wood bars etc.) (Fox 1990).

17 Some of the visitors seemed to have misunderstood certain behaviors of some animals.
18 The Display of wide open mouth" by Hippopotamus (a territorial behavior) was mistaken
19 for begging food. Therefore, it suggests that misinterpretation of animal behavior is also
20 influencing irresponsible feeding by the visitors. As Coe (1985) pointed out exhibits
21 should be informative and better designed to prevent misinterpretation, otherwise
22 ultimately it would go against the conservation efforts.

Conclusions

It is possible to conclude that physical attributes of enclosures play a major role in manipulating visitor's responses (argued by many authors, Wolf and Tymitz 1979; Bitgood et al. 1988; Bitgood 2002; Davey et al. 2005). Confirming the argument of Shettell-Neuber (1988), it can be concluded that comparatively slow moving animals are better observed at 3rd generation exhibits and when comes to far more active animals more visible and closer encounters preferred by the visitors.

Visitors seemed to respond positively when animal is active and interactive, except where Hamadryas baboon's hyper activity rebuffed female dominant visitor groups. Groups with children are likely to spend more time than groups with no children. Female dominant visitor groups seemed to spend more time at the exhibits as compared to male dominant visitor groups, with two exceptions at Hamadryas baboon and Jaguar. It suggested a hint of difference in animal preference between males and females.

Results of the study contrasted the conclusions of Bitgood et al. (1988) and it is difficult to propose linear relationship between size of the animal and visitors response. Likewise contrasting relationships was found between crowding (visual competition) and number of visitor stops, where crowding increased visitor stops. It may be due to the inquisitive nature, and differences in personal space between zoo visitors of United States and Sri Lanka.

Adverse irresponsible visitor behaviors especially in developing countries are seem be influenced by many acute factors (sociocultural, socioeconomic, personality etc.) and chronic factors (extra juvenile attitude of some visitors and induced aggression of some

male animals). Other not so adverse but irresponsible behaviors might be caused by affinity and ‘true sympathy’ or ‘false sympathy’ of visitors induced by some animal’s learning behaviors.

Visitors seem to like animals to be closer when they are observing. However sufficient distance should be kept between visitors and animals to prevent either party being injured. To prevent false interpretation of animal behaviors, appropriate information displays should be placed in front of enclosures. In all possible situations it is better to keep multiple species in a naturalistic enclosure resembling their own habitat.

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Table 1: Scoring method for recording level of animal activity

Criteria	Scoring Points
1. Vivacious movements and interacting with visitors	3 to 4
2. Moving entire body back and forth	2 to 3
3. Moving a body part and looking at the visitor	1 to 2
4. Sleeping, moving a body part	0 to 1

Table 2: How the physical features of exhibit affect visitor response (groups with children and had equal number of males and females were used as constants variables in the analysis) CI=0.95, n=37, DF=34

Exhibit Number	Exhibit Type	Generation Category	Mean Viewing Time (Sec.)
1	Open small circular arena	Second	56.2bc
2	Medium-large sized square shaped cage with colorful background	Second	90.0ab
3	Small-medium sized cylindrical iron barred cage	First	66.6abc
4	Medium sized square shaped typical iron bared cage	First	40.0c
5	Medium to large sized square shaped net cage surrounding a live tree.	Second	45.6c
6	Medium-large sized open island with water barrier and a glass wall	Third	111.6a

* Means within a column followed by the same letter are not significantly different at the 0.05 level

Table 3: Mean viewing times of visitor groups with children and groups without children at selected exhibits at different levels of animal activity, (females>males groups were taken as constant, $n \geq 9$ *CI=0.95)

Level of animal activity	Score 1	Score 2	Score 3	Score 4
Mean viewing time of visitor groups with children	48.3	49.4	85.0	135.0
Mean viewing time of visitor groups without children	25.0	28.0	48.6	65.0
Significance (P)	0.02	0.03	0.03	0.02
DF	8	14	13	11

Table 4: Comparison of mean viewing times of Female dominant groups and Male dominant groups (at different animal activity levels, selected sample groups with children $n \geq 12$, *CI=0.95)

Level of animal activity	Score 1	Score 2	Score 3	Score 4
Mean viewing time of visitor groups (Females>Males)	48.7	52.9	98.1	64.6
Mean viewing time of visitor groups (Males> Females)	30.0	39.0	46.2	59.3
Significance (P)	0.11	0.07	0.01	0.06
DF	11	16	11	11

Table 5: Comparison of isolated mean viewing times of Female dominant groups and male dominant groups at exhibits Hamadryas baboon and Jaguar (Big cats) $n \geq 9$ *CI=0.95

Exhibit	Mean Viewing Times of visitor groups (Sec.)		Significance (P)	DF
	Females >Males	Males >Females		
Hamadryas Baboon	40.0	105.0	0.02	9
Jaguar (Big Cats)	26.8	52.5	0.03	8

Table 6: Mean viewing times of groups with higher number of female at different activity levels of Hamadryas baboon (*CI=0.95, n=12, DF=11)

Activity level	Mean viewing time (sec.)
1	30 a
2	60 b
3	40 a
4	35 a

* Means within a column followed by the same letter are not significantly different at the 0.05 level

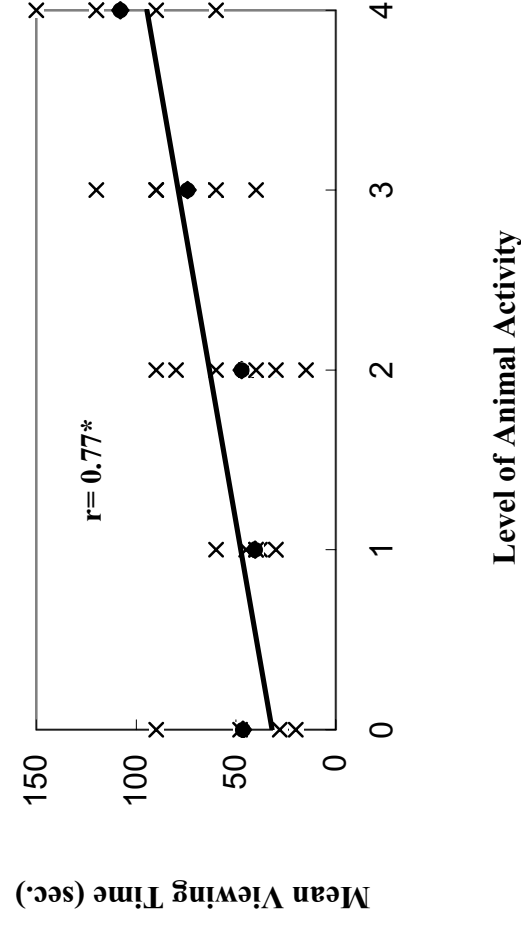


Figure 1: Combined mean viewing times of visitor groups for all exhibits Vs Animal activity

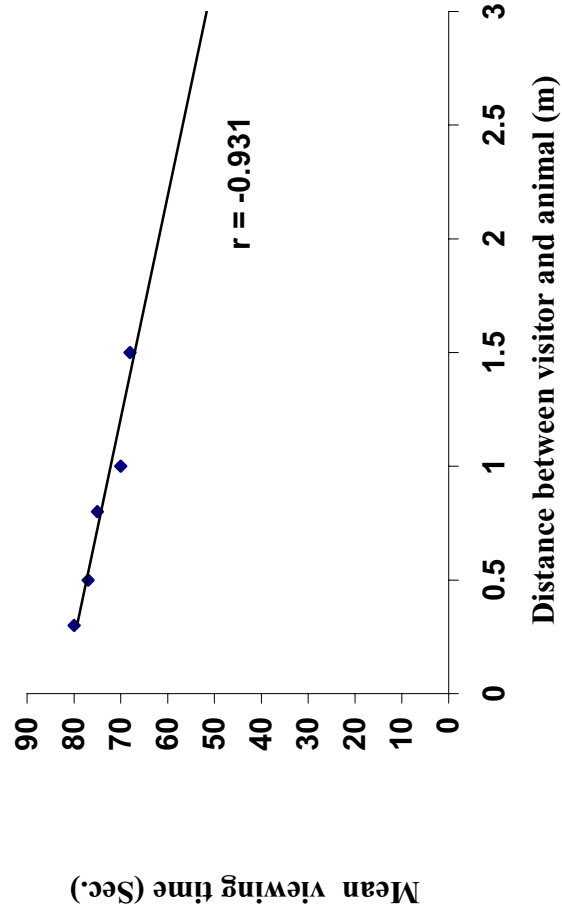


Figure 2: Relationship between mean viewing time and distance between visitor and animal.



Figure 3: Visual competition; visitors are competing at an exhibit even after the observation point has been fully occupied.



Figure 4a: Zoophilic activity; visitor driven by a sympathetic feelings trying to feed Siamang gibbon with a banana.



Figure 4b: Zoopath activity; despite the warning, an irresponsible visitor, crossing protective bars and taking a photograph of Jaguars just after turning a ringtone of his mobile phone on for Jaguars to hear.