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Evaluation of Selected Educational Opportunities of Chimpanzees *Pan troglodytes* and *Pan paniscus* Exhibitions in Zoological Gardens

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Abstract: *Evaluation of Selected Educational Opportunities of Chimpanzees Pan troglodytes and Pan paniscus Exhibitions in Zoological Gardens.* The aim of the hereby research was to identify the criteria influencing the educational value of animal enclosures. Next, the criteria were used to evaluate 11 selected exhibitions of chimpanzee *Pan troglodytes* and *Pan paniscus* in different zoological gardens. The criteria were identified during two-stage cameral analysis, which included project, behavioural and organisational assumptions. The analysis provided 52 criteria divided into 9 groups: area size, vegetation, water, ground (relief), landscape (shaping of visibility), arrangement, equipment components, microclimate, animals. The criteria were then used to evaluate the exhibition using an ordinal scale (-1, 0, +1). The total result indicated the best designed and arranged exhibitions with highest educational value in Münster and Cologne. Criteria from the groups: area size, landscape (shaping of visibility) and arrangement were the key points for evaluating the educational value o fan exhibition. High notes obtained for these groups of criteria had positive influence on other criteria. Moreover, it was proved that a criteria from groups: landscape (shaping of visibility), arrangement and vegetation are decisive creation of a "natural" barrier between the visitors and animals, which harmonised with the surrounding landscape.

Key words: zoological garden, exhibitions, education, transmission of information, landscape replication

INTRODUCTION

Zoological gardens have various roles: educational, recreational, scientific, conservation (preservation of endangered species) and protecting genetic resources of animals (diversity). Education is among the most significant roles and may include environment protection programs presenting dangers to various species, relations between economy, lifestyle and natural environment with its resources (Olech 2003). However, the most important aspect of the zoo's educational role is presenting animals and their behaviour in environment similar to natural. Presentation of the complexity of an ecosystem: environment, animals, interrelations and interactions can have influence on the society's educational awareness. It is estimated that American zoological garden are visited by over 104 million visitors every year (AAZPA 1992) while 14 Polish zoos are visited by 2.5 million individuals annually (Topola 2004). Assuming that every average visitor spends 2 hours in the zoo and that every minute they learn (consciously or subconsciously) 1 piece of information, the number of educational opportunities is about 12.5 billion for American zoos and 300 million for Polish zoos (Coe 1987). Moreover, a visit to zoo is a direct and real experience and not TV fiction. It is also important to mention that, according to Joslin's et al. (1986), research in Chicago zoo, 80% of visitors are children under 10 years of age with parents.

Nowadays, during the design phase or rearrangement of animal exhibitions, the needs and safety of animals as well as the visitors' safety are among the top priorities. Unfortunately, the first impression and imitation of the natural environment are neglected. Even exhibitions which satisfy all the needs of animals, often give the visitors a wrong idea about the natural habitat of the animal. Creating the impression of an animal being shown in a fragment of its natural habitat is often wrongly implemented or even totally omitted. An example of that trend could be a multi-level enclosure for great apes equipped with lines, nets, a variety of plastic buckets, cardboard boxes and rags, which certainly encourage the animals'

behaviour. They are able to move on different heights, play around and build rag dens every evening. Although the visitors (children) must be delighted to see a pack of apes playing around, they might be mislead about their natural habitat which they might imagine as a kind of rubbish dump (Polakowski 1987).

The information provided above indicates that there are huge possibilities for zoological gardens to influence environmental awareness of the society. This was included in the hereby article as analysis of educational role of chimpanzees exhibitions. This evaluation will be focused on exhibitions and their functioning and special attention will be given to the impression (information) which the visitors may acquire themselves having seen a given exhibition. All the information facilities located in the visitors' area (information boards, models, educational corners with artistic presentations) will not be described in this article The aim of this evaluation is to identify the exhibitions with the best arrangement and highest educational value as well as to answer the question: *Which criteria have the most influence on the educational value of an exhibition?*

METHOD OF RESEARCH

The subject of research was analysed based on a number of information and data obtained in theoretical research (chamber) and outdoor research. The first type was two-stage research using analysis of content method (Cartwright 1965). The starting point in the analysis identifying the set of criteria were 3 ideas creating an educational message: context, content and message (Coe 1987). The second stage of theoretical research included review and analysis of publications to identify behavioral (Chamove *et al.* 1982, Coe 1985, Estes 1991, Goodall 1978), project (Blaser 2001, Coe 1994, Nash 1982, Pinxten 1999, Polakowski 1987, Shepherdson 1988, Tierschutz 2002), and organizational assumptions (Coe 2004, Nogge 1985, Polakowski 1987). This resulted in identification of 52 criteria divided into 9 groups such as: area size, vegetation, water, ground (relief), landscape (shaping of visibility), arrangement, equipment components, microclimate, animals.

The outdoor research included inspections in 11 zoological gardens in the years 2002-2003, during July and August. The exhibitions in question are found in 6 European countries: Poland, Germany, Great Britain, Belgium, Switzerland, and Denmark. The data for research was collected in all zoological gardens with chimpanzee exhibitions which were visited by the author during work on this and other research projects. Selection of subjects for research was guided by information from publications as well as specialist guidelines from research centres (zoological gardens, EAZA). Actually the subject of outdoor research were 11 chimpanzee exhibitions located in Wrocław, Berlin (Berlin Zoo), Frankfurt am Main, Hannover, Cologne, Münster, Wuppertal, London, Antwerp, Basel, Copenhagen.

During the inspections, exhibitions were measured, described and photographed, animal behaviour was observed and local specialists were consulted to determine criteria. All observations took place at the same time of the day (10.00, 13.00 and 18.00 hrs) for one hour at a time. Three periods of observation were necessary to obtain the average daily behaviour of animals, that is a preliminary etogram (Shepherdson 1989). Based on the observed behaviour, the educational role of individual exhibitions can be evaluated.

Data gathered during the research was analysed according to 52 criteria measure in an ordinal scale (-1, 0, +1), -1 stands for unacceptable conditions (bad), 0 – intermediate, +1 – proper conditions (good).

The final educational value was determined having the total value of all criteria for every exhibition for chimpanzees (Common Chimpanzee *Pan troglodytes* and Pygmy Chimpanzee (bonobos) *Pan paniscus* . There were applied identical criteria for both species because are no significant differences in educational value in between them. The content of criteria and evaluation method were determined according to information from publications

and consulting local specialists in zoological gardens. Consultations included surveys and latest information obtained in each zoo. The survey (Tab. 1) consisted of several question groups: general information, light, vegetation, relief, ground (surface) and functioning of exhibitions.

TABLE 1. Criteria for evaluation of chimpanzee *Pan troglodytes* and *Pan paniscus* exhibitions – results of content analysis in publications

Group	Number	Criterion
Area size	A.1	Is the external enclosure larger than 300 m^2?
	A.2	Is the internal enclosure larger than 100 m^2?
	A.3	Is the area of internal enclosure larger than 25 m^2/80 m^3 for each chimpanzees?
Vegetation	B.1	Do plants cover over 25% of the exhibition area?
	B.2	Is vegetation in the exhibition similar to vegetation in chimpanzees' natural environment?
	B.3	Is vegetation in good condition?
	B.4	Is part of the vegetation accessible to animals?
	B.5	Can chimpanzees climb on trees?
Water	C.1	Is reservoir in the external enclosure?
	C.2	Is the exhibition surrounded by water (moat)? (Fig.3)
Ground (relief)	D.1	Is the area slightly rough? Are there hills and hollows?
	D.2	Is water access slightly sloping?
	D.3	Is the enclosure's area covered with grass?
	D.4	Is the surface of the enclosure covered with wood bark, sawdust or bedding?
Landscape (shaping of visibility)	E.1	Do visitors watch the animals from view spots hidden behind plants?
	E.2	Is it possible to watch the animals from different altitudes?
	E.3	Are visitors on one viewing spot not visible from other viewing spots?
	E.4	Does arrangement of the exhibition allow for watching the animals with other exhibitions or animals in the background?
	E.5	Are the animals shown with vegetation or other natural forms in the background?
	E.6	Attention of visitors on the viewing spots should be directed to one exhibition
	E.7	Is the exhibition surrounded by plants or other natural screen so that the animals are not visible from each side (animals are not cornered by visitors)? (Fig.2)
	E.8	Visitors should not be mislead about the chimpanzee' natural habitat (landscape)
	E.9	Is the sunlight behind the visitors' back while watching the animals?
Arrangement	F.1	Do visitors walk into the area occupied by an animal (e.g. the viewing spot is surrounded by the exhibition)?
	F.2	Do visitors try to spot the animals?
	F.3	Are visitors at the outer edges of exhibition and animals in its centre?

	F.4	Is the exhibition arranged in the way that viewers may be surprised by unexpected appearance of an animal? (Fig.1)
	F.5	Do viewers watch the animal in surroundings similar to natural?
	F.6	Do viewers watch the chimpanzees without any visible barriers between them?
	F.7	Is it possible to watch the animals at close distance?
	F.8	Exhibition should not be predictable for visitors
	F.9	Is there a possibility for the animals to hide from the visitors and alienate from other apes?
	F.10	There is a possibility for the animals to move on different altitudes
	F.11	Does the arrangement of the enclosure allow quick rearrangement?
	F.12	Is there a possibility to change the size of the exhibition?
Equipment components	G.1	Using artificial termite mounds or hollow tree trunks with food, which makes the animals use self-made tools (f.e. sticks0 to get the food out
	G.2	Are some types of food served by hiding them under the bedding or in the trees?
	G.3	Large number of attached lines, nets, mats styled to resemble natural elements as well as loose items in the exhibition (pieces of wood, tree trunks, branches)
Microclimate	H.1	Is the temperature during the day constant (23 - 24ºC)?
	H.2	Is there an operating ventilation system without marginal areas of air stagnation?
	H.3	Is the internal enclosure water-sprayed so that air humidity is about 80%?
	H.4	Enclosure should not have northern exhibition
	H.5	Enclosure should not be sloping from the North (cold air flow)
	H.6	Is the internal exhibition lightened also with natural light?
	H.7	Are the animals able to stay in the sunshine during all day?
	H.8	Is approximate 30% of the internal exhibition shaded?
	H.9	Is the internal exhibition shade not covered over 60% of exhibit area
Animals	I1	Are chimpanzees presented in groups of at least nine specimens?
	I.2	Do the animals reproduce?
	I.3	Do the animals solve conflicts themselves without fighting?
	I.4	Is the observed behaviour similar to natural?
	I.5	Is there no abnormal behaviour (stereotypical or pathologic)?

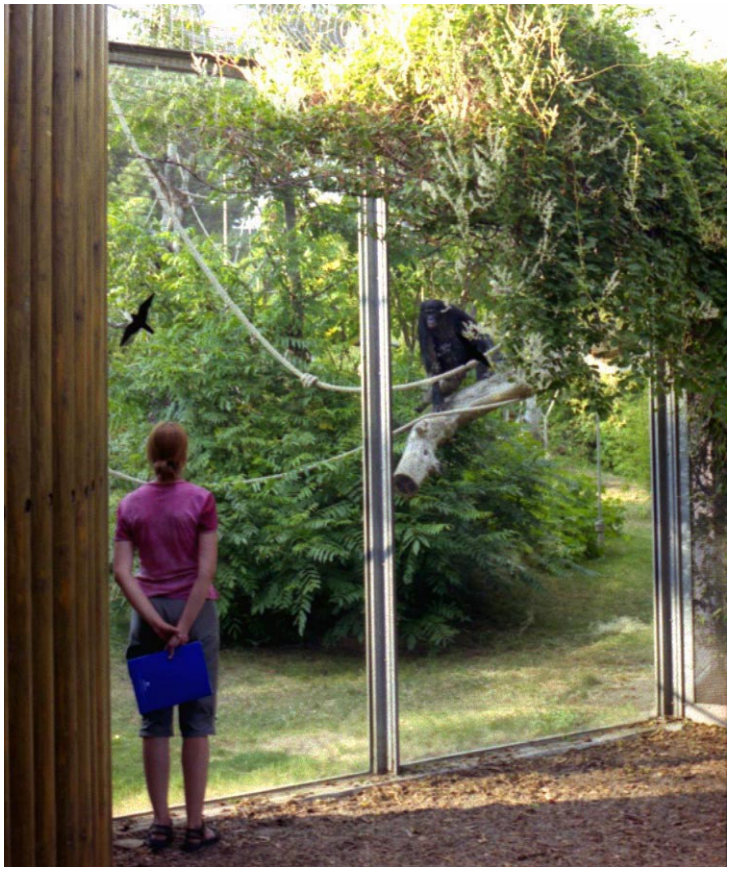

FIGURE 1. The exhibition is arranged in the way that viewers may be surprised by unexpected appearance of an animal - zoological garden in Cologne

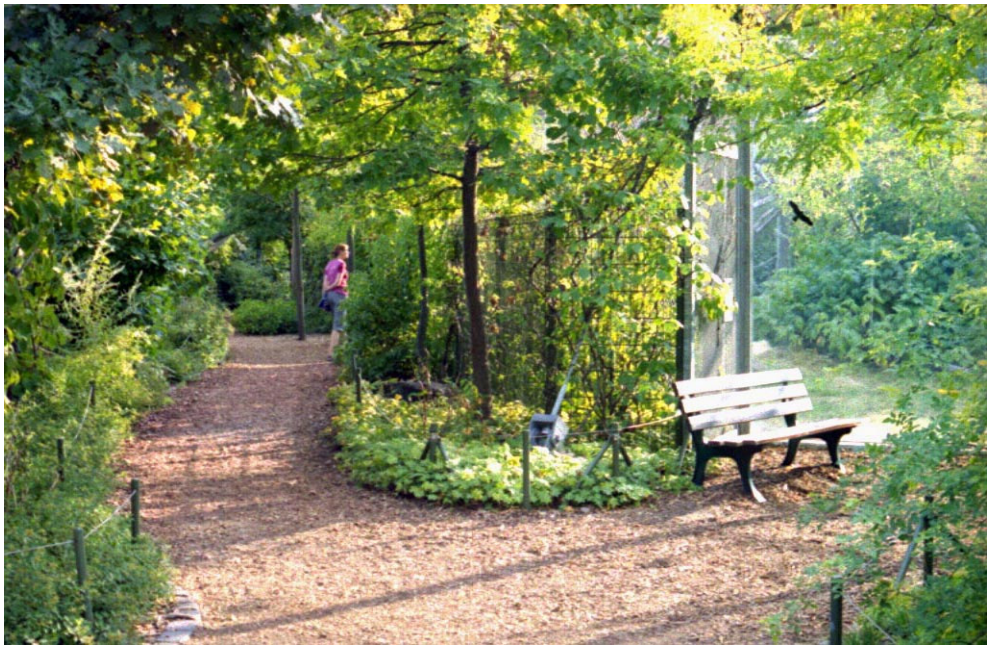

FIGURE 2. The exhibition is surrounded by plants or other natural screen so that the animals are not visible from each side (animals are not cornered by visitors) - zoological garden in Cologne

FIGURE 3. The exhibition is surrounded by water (moat) - zoological garden in Münster

RESULTS

TABLE 2. Results of outdoor research concerning evaluation of the educational value of chimpanzee *Pan* troglodytes and *Pan paniscus* exhibitions in 11 European zoos

* bonobo exhibition – *Pan paniscus* Pygmy Chimpanzee

		Cities in which are located zoological gardens with researches exhibitions										
Group	**Criterion number**	Wrocław	Berlin zoo	Frankfurt am Main*	Hanover	Cologne*	Münster	Wuppertal*	London	Antwerp	Basle	Copenhagan
Area size	A.1	1	1	-1	1	1	1	-1	0	-1	-1	-1
	A.2	1	1	0	0	1	1	0	-1	0	1	1
	A.3	1	0	-1	0	0	0	0	-1	-1	0	1
	A	**3**	**2**	**-2**	**1**	**2**	**2**	**-1**	**-2**	**-2**	**0**	**1**
Vegetation	B.1	1	1	-1	-1	1	1	-1	-1	-1	-1	-1
	B.2	-1	-1	1	1	1	-1	1	-1	0	0	1
	B.3	1	1	0	1	1	1	1	0	-1	-1	1
	B.4	1	0	-1	-1	1	1	-1	-1	-1	-1	-1
	B.5	1	-1	-1	-1	1	0	-1	-1	-1	-1	-1
	B	**3**	**0**	**-2**	**-1**	**5**	**2**	**-1**	**-4**	**-4**	**-4**	**-1**
Water	C.1	-1	-1	-1	1	-1	1	-1	-1	-1	-1	-1
	C.2	0	0	1	0	-1	1	-1	-1	-1	-1	1
	C	**-1**	**-1**	**0**	**1**	**-2**	**2**	**-2**	**-2**	**-2**	**-2**	**0**
Ground (relief)	D.1	0	-1	-1	1	-1	1	-1	-1	0	-1	0
	D.2	-1	-1	-1	1	-1	1	-1	-1	-1	-1	1

	D.3	1	1	-1	1	1	1	-1	-1	-1	-1	-1
	D.4	-1	-1	1	-1	1	1	-1	-1	-1	1	-1
	D	**-1**	**-2**	**-2**	**2**	**0**	**4**	**-4**	**-4**	**-3**	**-2**	**-1**
Landscape (shaping of visibility)	E.1	-1	-1	-1	-1	1	1	-1	0	-1	-1	-1
	E.2	-1	-1	-1	1	-1	0	1	-1	-1	0	-1
	E.3	-1	-1	-1	0	1	1	-1	0	-1	-1	-1
	E.4	-1	-1	-1	-1	0	1	-1	-1	-1	-1	-1
	E.5	0	0	-1	0	1	1	-1	-1	-1	-1	-1
	E.6	1	1	0	1	1	1	1	0	1	1	1
	E.7	-1	-1	-1	0	1	1	-1	-1	-1	-1	-1
	E.8	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-1
	E.9	0	0	-1	1	1	1	-1	0	-1	0	-1
	E	**-5**	**-5**	**-8**	**0**	**5**	**7**	**-5**	**-5**	**-7**	**-5**	**-7**
Arrangement	F.1	-1	0	-1	0	1	1	0	-1	-1	-1	0
	F.2	0	-1	-1	-1	1	1	-1	-1	-1	-1	-1
	F.3	1	0	0	1	1	1	0	1	0	0	1
	F.4	0	-1	-1	-1	1	1	-1	-1	-1	-1	-1
	F.5	0	-1	-1	-1	1	1	-1	-1	-1	-1	-1
	F.6	-1	-1	0	-1	1	1	0	-1	0	0	0
	F.7	0	0	1	1	1	0	1	0	1	1	1
	F.8	0	-1	-1	-1	1	1	-1	-1	-1	-1	-1
	F.9	0	-1	-1	0	1	1	-1	-1	-1	-1	-1
	F.10	1	1	1	0	1	1	1	1	1	1	0
	F.11	0	-1	-1	0	1	1	-1	-1	-1	-1	-1
	F.12	0	-1	-1	-1	1	1	-1	-1	-1	-1	-1
	F	**0**	**-7**	**-6**	**-4**	**12**	**11**	**-5**	**-7**	**-6**	**-6**	**-6**
Equipment components	G.1	-1	0	-1	-1	-1	-1	-1	0	1	1	1
	G.2	0	0	1	1	1	1	1	1	0	0	1
	G.3	0	0	0	-1	1	1	-1	-1	0	0	-1
	G	**-1**	**0**	**0**	**-1**	**1**	**1**	**-1**	**0**	**1**	**1**	**1**
Microclimate	H.1	0	1	0	1	1	1	1	-1	1	1	1
	H.2	-1	1	-1	1	1	1	1	-1	0	0	1
	H.3	-1	1	-1	1	1	0	1	-1	0	1	0
	H.4	-1	-1	-1	0	1	1	-1	0	-1	0	-1
	H.5	-1	-1	-1	1	1	1	-1	1	-1	-1	-1
	H.6	-1	-1	-1	0	0	-1	1	-1	-1	0	1
	H.7	1	0	0	1	1	1	-1	1	-1	0	-1
	H.8	1	0	-1	0	1	1	0	-1	0	0	0
	H.9	1	0	-1	0	1	1	0	1	0	0	0
	H	**-2**	**0**	**-7**	**5**	**8**	**6**	**1**	**-2**	**-3**	**1**	**0**
Animals	I1	0	0	-1	0	0	1	0	-1	1	1	1
	I.2	-1	-1	-1	-1	-1	0	0	-1	1	1	1
	I.3	-1	-1	-1	1	-1	1	1	1	0	1	1
	I.4	0	0	0	0	0	1	0	0	-1	1	1
	I.5	-1	1	1	1	-1	1	1	-1	-1	1	1
	I	**-3**	**-1**	**-2**	**1**	**-3**	**4**	**2**	**-2**	**0**	**5**	**5**
Sum		**-7**	**-14**	**-29**	**4**	**28**	**38**	**-16**	**-28**	**-26**	**-12**	**-8**

The maximum total number of points was 52 points and the lowest possible result – 52 points (Tab.2). The zoo in Münster scored the highest (38 points) and the zoo in Frankfurt am Main scored the lowest (-29 points). Results of the educational evaluation allow for dividing the zoological gardens in question into four groups:

- high educational value: Münster 38, Cologne 28
- moderate (acceptable) educational value: Hanover 4
- bad educational value: Wrocław –7, Copenhagen –8, Basel –12, Berlin -14
- very bad educational value: (misleading educational message): Wuppertal –16, Antwerp –26, London –28, Frankfurt am Main –29

The above results may indicate that chimpanzees exhibitions in Münster and Pygmy Chimpanzee (bonobos) in Cologne meet most of the requirements and convey the right information about the chimpanzee and its environment to visitors. Although exhibitions scored high than they are had a few incorrect design solutions. Exhibition for bonobos in Cologne is entirely on the flat terrain. There isn't water, which conducive to creating a lot of natural behaviour animals. For the sake of zoology issue, which also influence for educational value, in Cologne zoo is too little group animals is presented.
During the outdoor research (2003) in Cologne zoo was 4 individuals and group was unstable. Animals often waged struggle between themselves. Cologne zoo have manage considerable improve the situations in exhibition for bonobos until 2008. Presently in zoo are presented 8 animals and there are lack of conflicts between themselves. It might be argument for correct designed exhibition and problem was only breeding nature.
It might be interesting to notice that the exposition in Copenhagen, despite it was built in 1994, does not meet even the minimum requirements for educational values. It might be caused by the lack of external enclosure and keeping animals in "sterile, laboratory-like" conditions. Although exhibition in Hanover belong to second group, than scored only 4 points. It is cause lower scores in group of categories: area size, vegetation, landscape (shaping of visibility), arrangement. For example:

- external enclosure larger is in norm but it is not enable for increase number of animals and also is not possibility to change the size or rearrangement of the exhibition
- in exhibition in Hanover the vegetation is not accessible to animals (mainly the vegetation are round enclosure) as well as chimpanzees can't climb on trees (it is very important for arboreal animals)

Majority of lower results might be indirect cause that the exhibition in Hanover is built in modernist style.

The results obtained by other exhibitions clearly indicate that their educational message may be harmful and misleading. It is important to notice that the exhibition in Wrocław scored better than other exhibitions with poor educational value (-7) probably due to the large size of its external enclosure covered with good condition vegetation

CONCLUSIONS

1. Area size, landscape (shaping of visibility) and arrangement of the enclosure are key factors influencing the educational value of an exhibition. In many cases positive interconnections may be noted between other criteria (if those criteria are of high value other will have high value as well. Tab.1, Tab.2). The Münster and Cologne exhibition illustrates this tendency as its large area influences the criteria from vegetation and landscape (visibility shaping) groups.
2. The large size of external enclosure allows to create an exhibition which may reflect natural habitat of the chimpanzees and, at the same time, present them in a better way (Tab.1, Tab.2)

3. Criteria from groups: landscape (visibility shaping), vegetation and water are decisive creation of a "natural" barrier between the visitors and animals (Fig.3). The analysed zoos in Münster and Cologne which scored high for those criteria used solutions harmonised with the surrounding landscape (Fig1, Fig.2, Fig.3).
4. The method of research used hereby, proved to be effective in evaluating the educational value of chimpanzee exhibitions in zoological gardens but it isn't fully to answer the questions asked. Thus the method could be improved by using a greater number of criteria with different ranks, a criterion referring to natural environment and a questionnaire for visitors (did the actually remember what we intended to teach them).

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Streszczenie: *Ocena wybranych możliwości edukacyjnych ekspozycji dla szympansów Pan troglodytes i Pan paniscus w ogrodach zoologicznych*. Celem badań było określenie kryteriów wpływających na wartość edukacyjną wybiegów oraz zastosowanie ich w ocenie 11-stu wybranych ekspozycji dla szympansów *Pan troglodytes* i *Pan paniscus* w ogrodach zoologicznych. Określanie kryteria składały się z dwóch etapów badań kameralnych, które odnosiły się do założeń: behawioralnych, projektowych i organizacyjnych. Po analizie materiału uzyskano 52 kryteria, które podzielono na 9 grup: wielkość terenu, roślinność, woda, podłoże (rzeźba terenu), krajobraz (kształtowanie widoczności), aranżacja, elementy wyposażenia, mikroklimat, zwierząt. Następnie, uzyskane kryteria posłużyły do oceny ekspozycji w skali porządkowej –1, 0, +1. Suma wyników pozwoliła wytypować najlepiej zaprojektowane i urządzone ekspozycje pod względem wartości edukacyjnych dla szympansów, które znajdują się w ogrodach zoologicznych w: Münster i Koloni. Kryteria z grup: wielkość terenu, krajobraz (kształtowanie krajobrazu) oraz aranżacja zasadniczo oddziałują na ocenę edukacyjną ekspozycji. Zauważono, że wysoka wartość kryteriów z tych grup wpływa dodatnio na inne kryteria. Ponadto wykazano, że kryteria z grup: krajobraz (kształtowanie widoczności), aranżacja oraz roślinność decydują o stworzeniu naturalnej przegrody pomiędzy zwiedzającymi, a zwierzętami, który harmonizuje z otoczeniem.

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