

Analysis of the educational potential of a biology exhibit

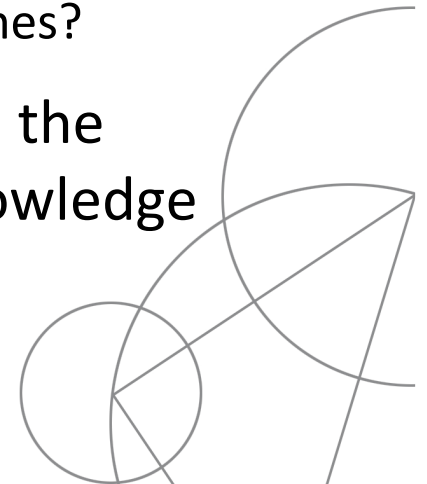
Do the learning outcomes of visitors correspond to the intentions of the exhibit designers?

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Summary

- **Objective:** To analyse the educational potential of an exhibit at a science centre
- **Research Question:** Do the learning outcomes of visitors correspond to the intentions of the exhibit designers?
- **Method:** Compare the observed learning outcomes to the intended learning outcomes
 - How to measure the learning outcomes of visitors?
 - How to compare observed and intended learning outcomes?
- **Conclusion:** The visitors interact with the exhibit in the intended way, but do not acquire the intended knowledge



Case: *Cave Expedition*

(Experimentarium, Copenhagen)



Biological Content

The adaptations of the blind cave beetle to its environment of permanently dark caves

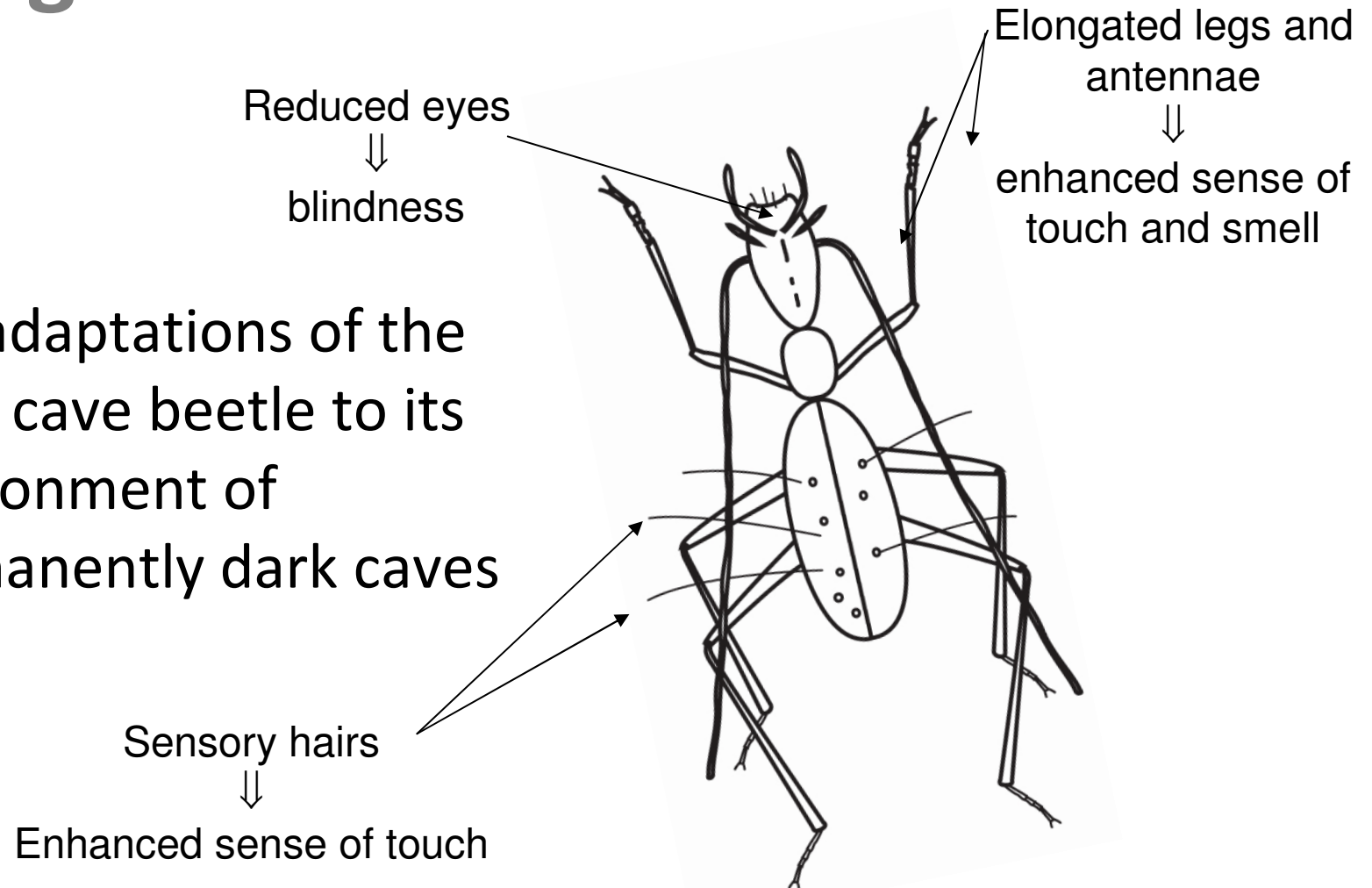


Exhibit type or genre

An *immersion* exhibit

- Immerses the visitor within a three-dimensional environment
- The visitor is relocated to a different time and place

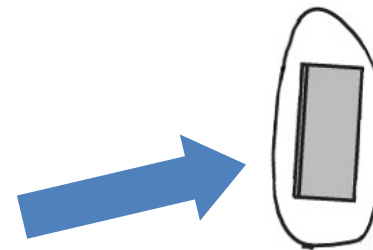
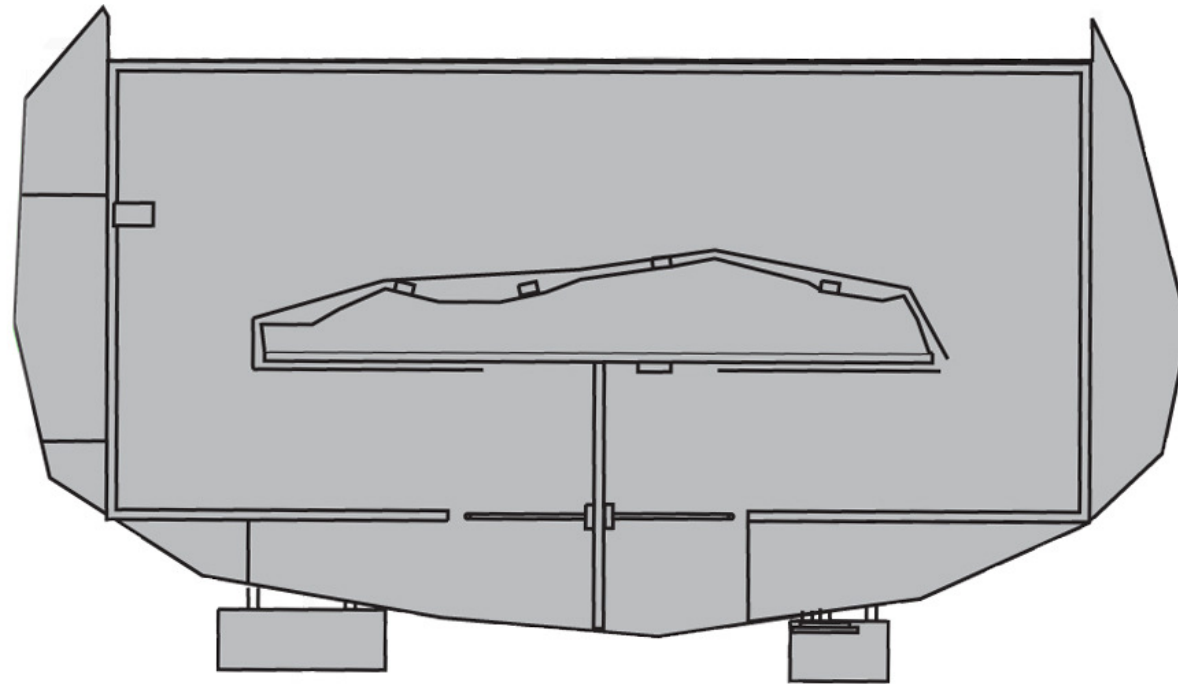
In this case

- The visitor becomes the cave beetle and enters its habitat
- Learning goal: to enable the visitor to *experience* how the cave beetle is adapted to its environment



The exhibit *Cave Expedition*

Text panel 1

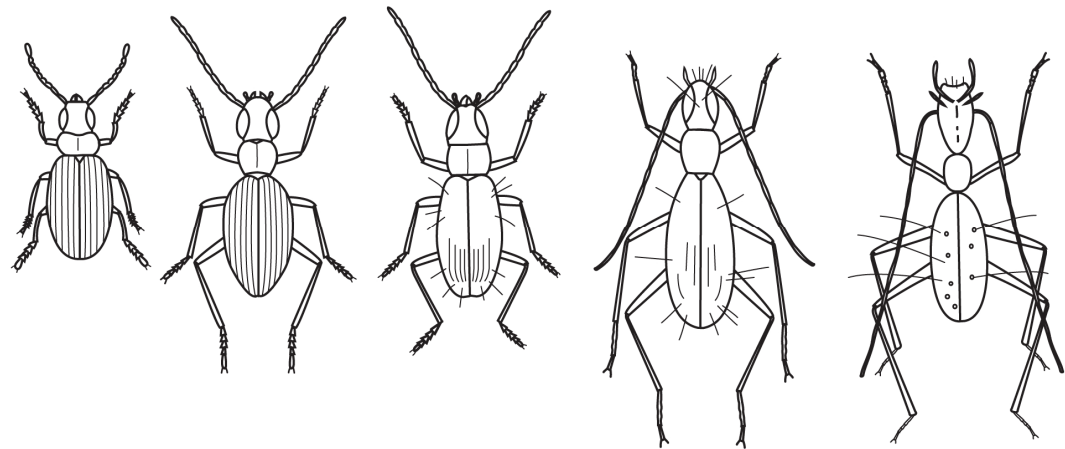


The exhibit *Cave Expedition*

Text panel 1

At home in the dark

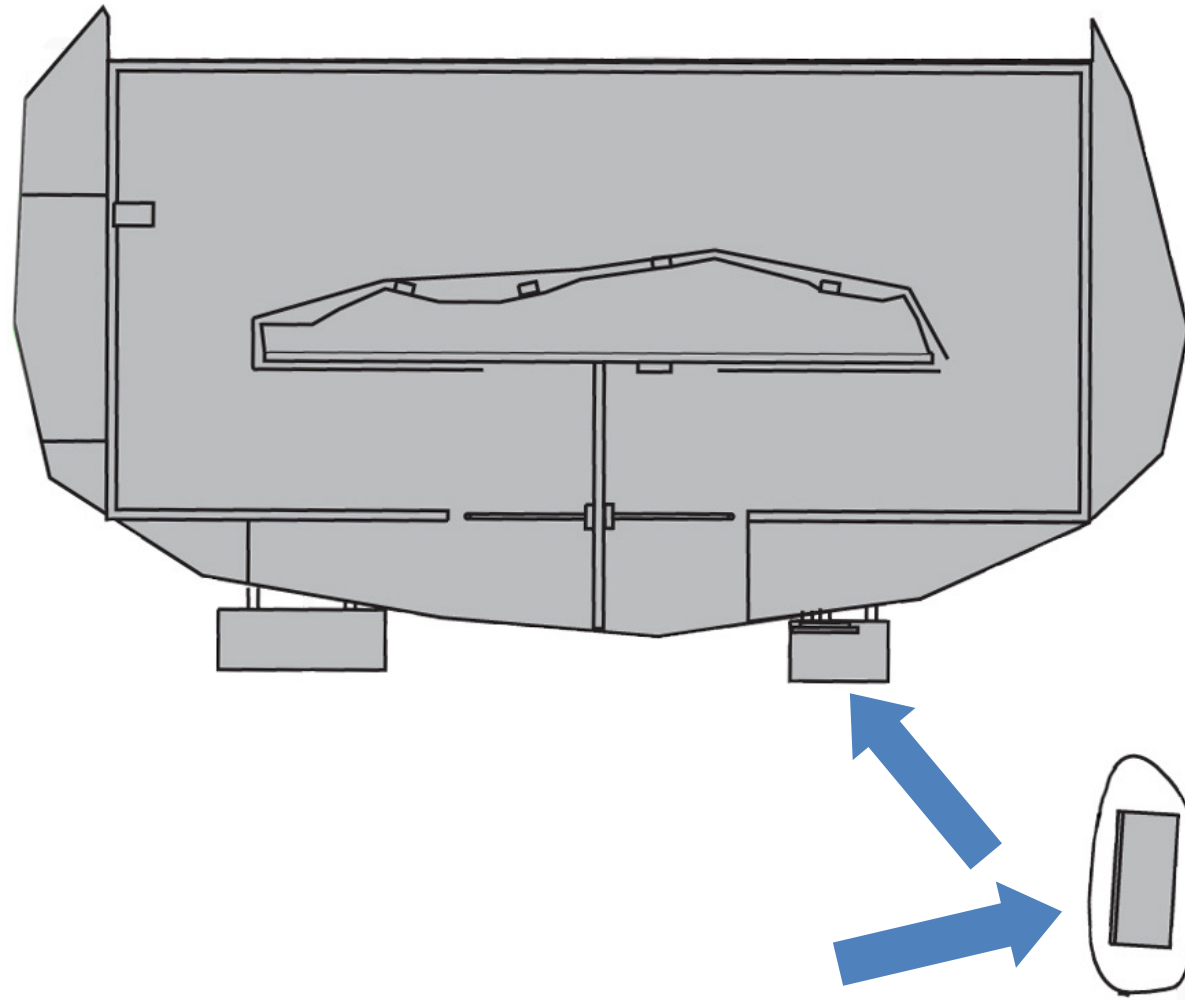
Living in caves where it is permanently dark, the blind cave beetle has developed senses other than sight. It has much longer legs and antennae than related species which live above ground, increasing the area available for receptors for smell, touch, and taste, which enable it to find its way around – as well as to choose its next meal.



Beetles with different degrees of adaptation to life underground. Left: Beetles that live on the ground. Right: Beetles that live underground.

The exhibit *Cave Expedition*

Text panel 2



The exhibit *Cave Expedition*

Text panel 2

Cave Expedition

Wait for the light to turn green and go into the cave.

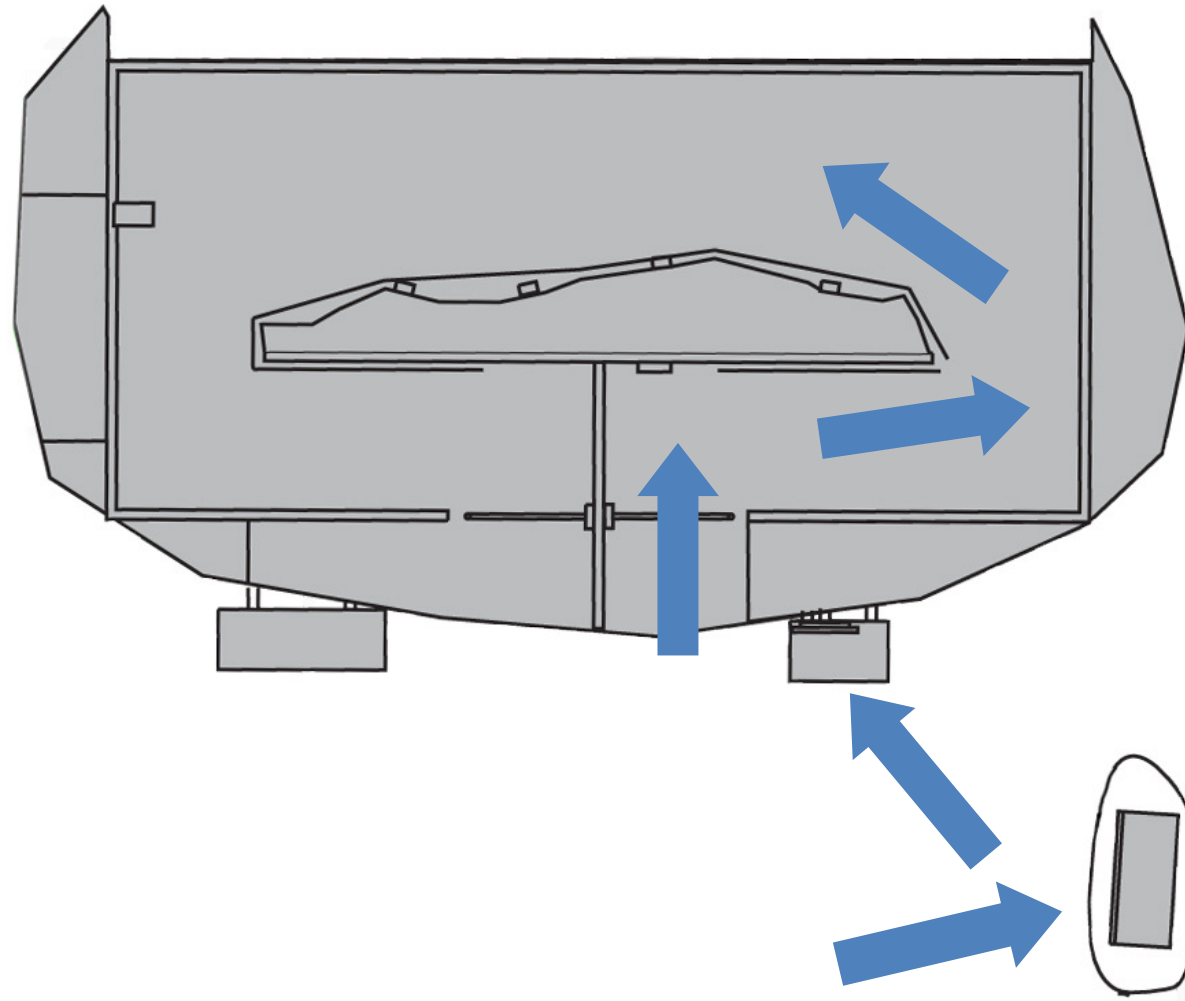
Enter the darkness.

Feel the walls, find the animals, smell the odours.

When you are outside, identify your findings.

The exhibit *Cave Expedition*

The interior



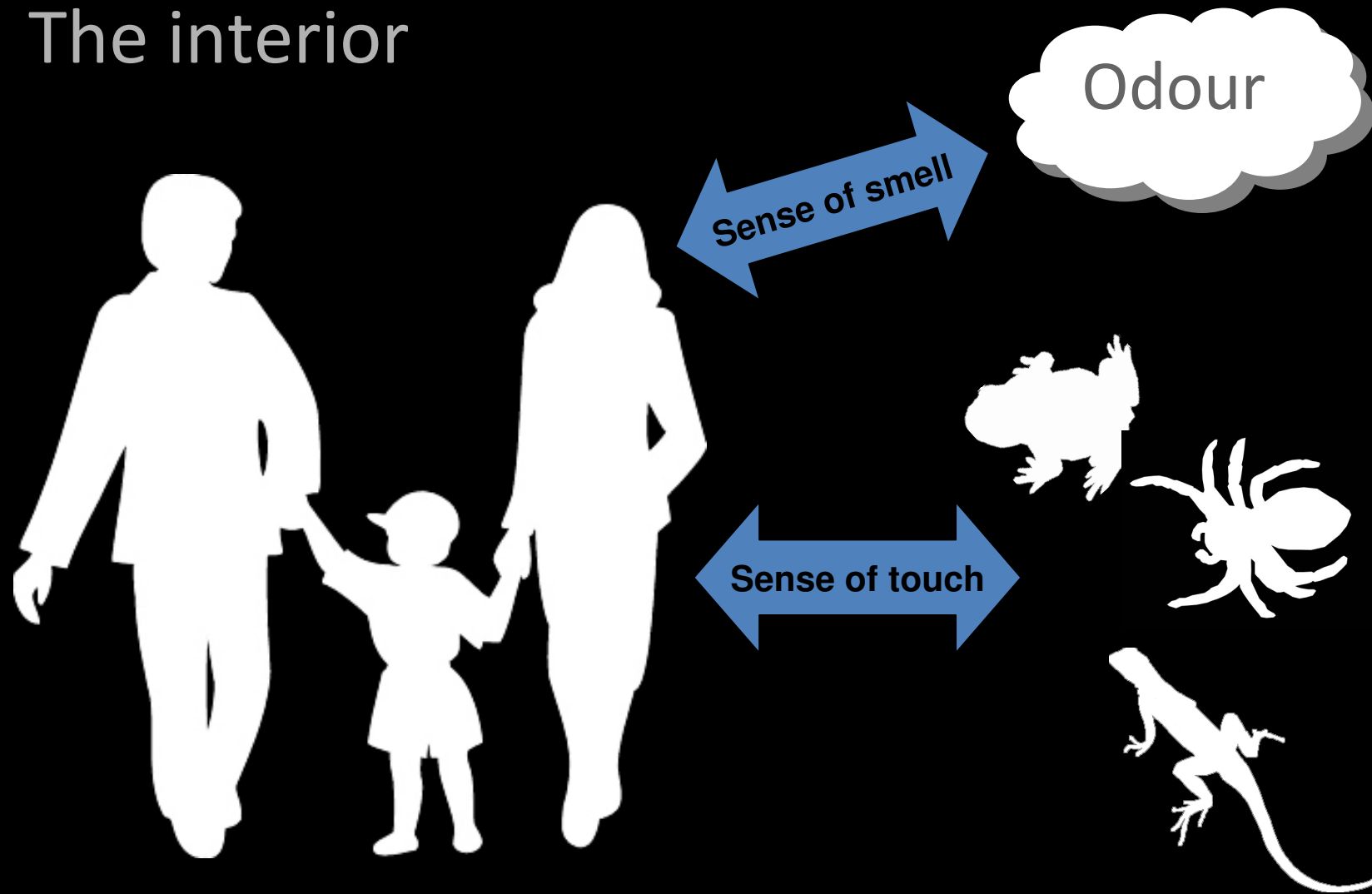
The exhibit *Cave Expedition*

The interior



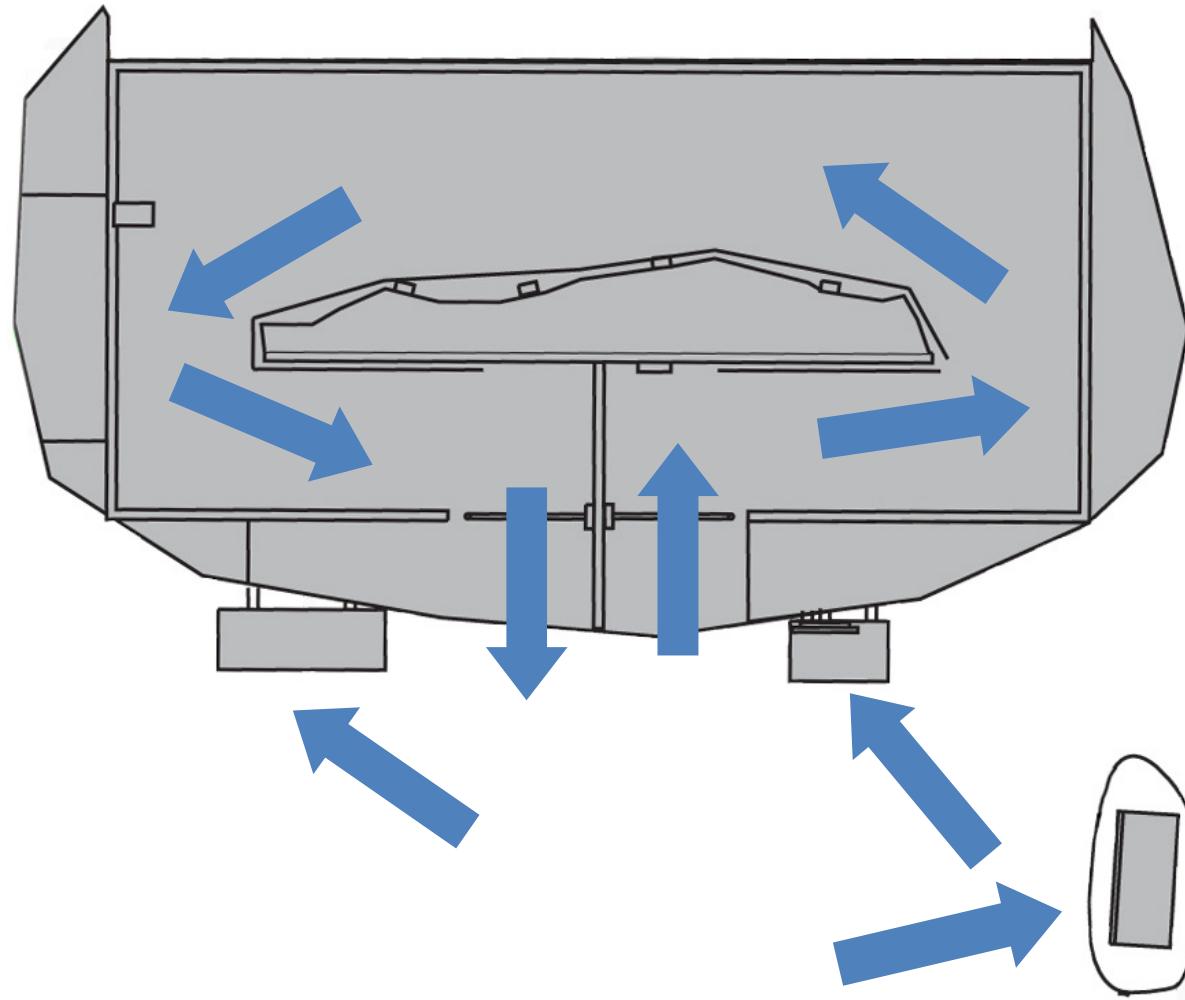
The exhibit *Cave Expedition*

The interior



The exhibit *Cave Expedition*

Text panel 3



The exhibit *Cave Expedition*

Text panel 3

Check your conclusions

What are the three animals you have touched?

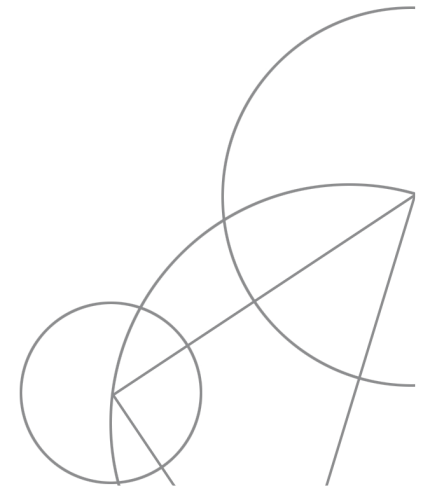
What scent have you smelled?

Check by pushing the buttons.

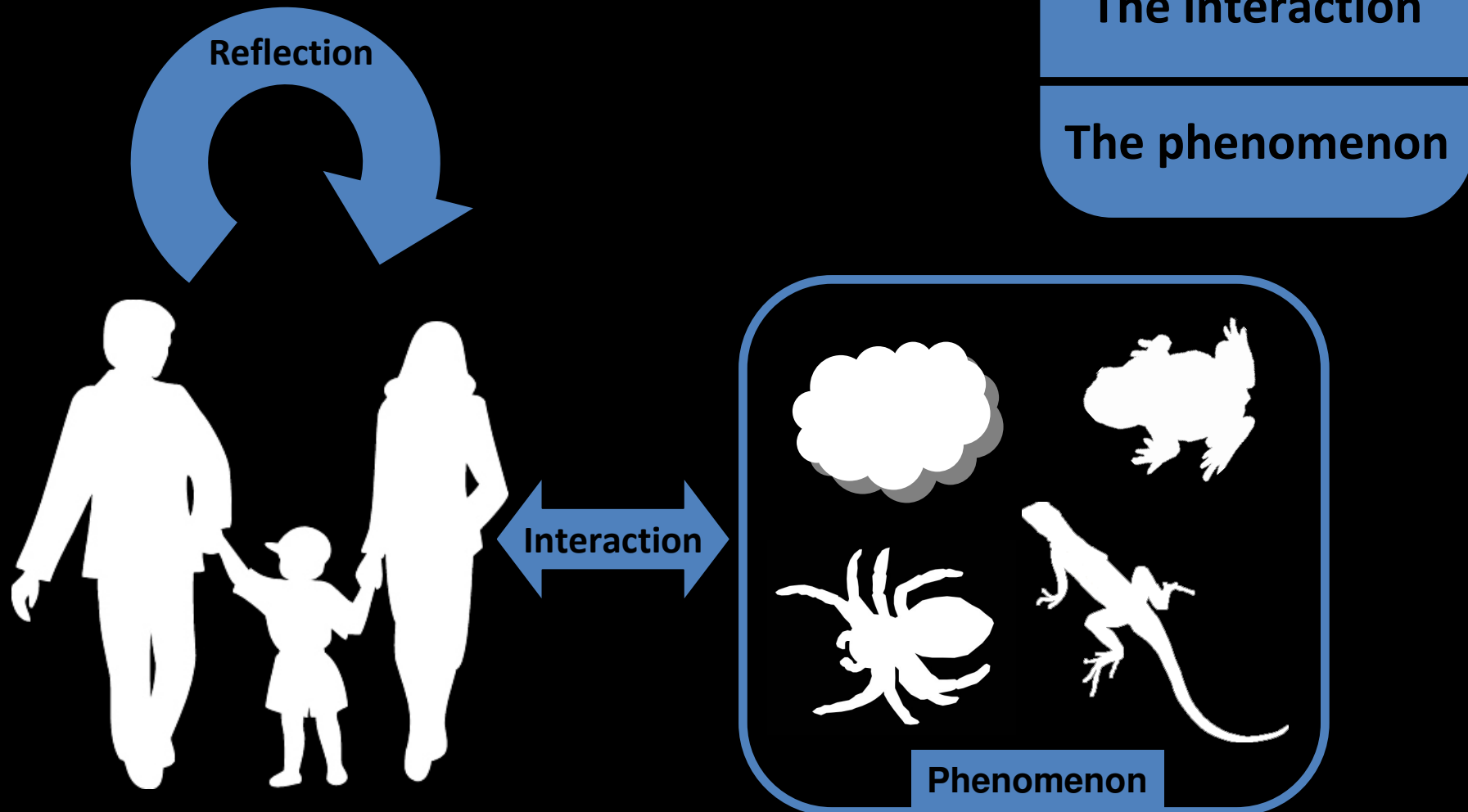
The visitor and the exhibit

Defining the learning goal

- The objective of the exhibit is to “enable the visitor to experience how the blind cave beetle is adapted to its environment of permanently dark caves”
- *Experience*: “to learn by directly perceiving a phenomenon or event”



What is experience?



Measuring visitors' experiences

**Reflections about
interaction**

**Interaction with
characteristics**

**Exhibit's
characteristics**

Technology

Technique

Task

Praxeology
(Chevallard, 1999)

Praxeologies in exhibits?



Palaeontology Lab, Royal Belgian Institute of Natural Sciences, 2008

What is the praxeology in this exhibit?



Task (what challenge does the exhibit give the visitor?)

- to put together the bones of an Iguanodon front foot

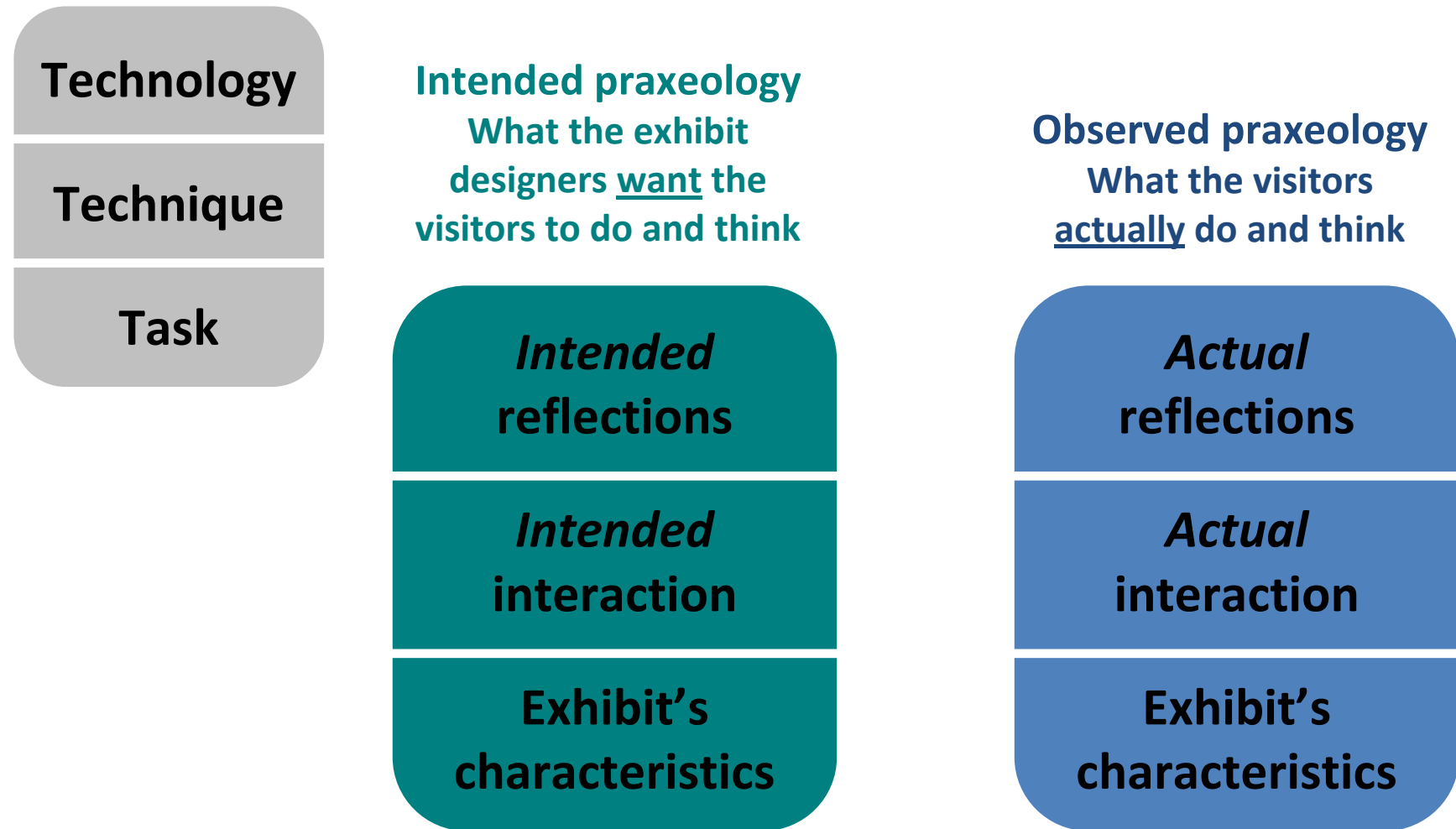
Technology (how should the visitor interpret this activity?)

- bones make up the limbs and appendages of animals; the Iguanodon is extinct so the fossilised bones are the only remains; the activity is thus like that of a paleontologist

Technique (how can the visitor do this?)

- by recognising the outline of the foot on the table and matching the bones to the pattern

Praxeology as analytical tool



Constructing the *intended* praxeology

Technology

Technique

Task

"Enable the visitor to experience how the cave beetle is adapted to its environment"

Technique 1

Technique 2

Technique n

Task 1

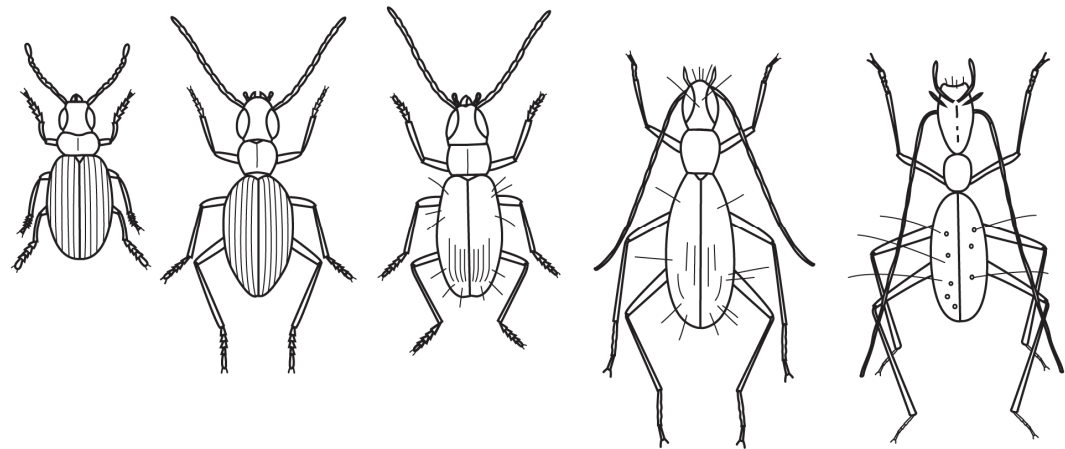
Task 2

Task n

Task 1: Panel 1

At home in the dark

Living in caves where it is permanently dark, the blind cave beetle has developed senses other than sight. It has much longer legs and antennae than related species which live above ground, increasing the area available for receptors for smell, touch, and taste, which enable it to find its way around – as well as to choose its next meal.



Beetles with different degrees of adaptation to life underground. Left: Beetles that live on the ground. Right: Beetles that live underground.

The *intended* praxeology

What the exhibit designers want the visitors to do and think

<i>Intended technology</i>	Deduce that certain adaptations facilitate life underground...
<i>Intended technique</i>	Discern the variation in beetle characteristics in the illustration on panel 1
Exhibit tasks	Perceive that beetles differ systematically from each other as a result of different environments

Task 2: Panel 2

Cave Expedition

Wait for the light to turn green and go into the cave.

Enter the darkness.

Feel the walls, find the animals, smell the odours.

When you are outside, identify your findings.

The *intended* praxeology

What the exhibit designers want the visitors to do and think

<i>Intended technology</i>	Deduce that certain adaptations facilitate life underground... And interpret the exhibit experience in terms of beetle behaviour...	
<i>Intended technique</i>	Discern the variation in beetle characteristics in the illustration on Panel 1	Identify instructions on Panel 2 as regarding cave beetle behaviour
Exhibit tasks	Perceive that beetles differ systematically from each other as a result of different environments	Perceive visitor role as cave beetle in its cave habitat

Task 3: Representation of a cave habitat



The *intended* praxeology

What the exhibit designers want the visitors to do and think

Technologie visée	Deduce that certain adaptations facilitate life underground... And interpret the exhibit experience in terms of beetle behaviour... And interpret interactions as those of cave beetle in its environment		
Technique visée	Discern the variation in beetle characteristics in the illustration on Panel 1	Identify instructions on Panel 2 as regarding cave beetle behaviour	Perceive the characteristics of the exhibit as cave-like
Tâches d'exposition	Perceive that beetles differ systematically as a result of different environments	Perceive visitor role as cave beetle in its cave habitat	Perceive exhibit as a representation of a cave

Intended praxeology

What the exhibit designers want the visitors to do and think

Intended
reflections

Intended
interaction

Exhibit's
characteristics

Observed praxeology

What the visitors actually do and think

Actual
reflections

Actual
interaction

Exhibit's
characteristics

The *observed* praxeology

What the visitors actually do and think



The interactions between visitors and exhibit (*techniques*) may or may not be directly observable

The reflections of the visitors (*technologies*) are not directly observable

The *observed* praxeology

Method

	Observation	'Think aloud'	Interview
Visitor technology		✓	✓
Visitor techniques	✓	✓	

The *observed* praxeology

Results

Visitor
Techniques



Visitor
Technology

This experience just shows you other senses [than vision] that you can rely on when you are in a different situation.



**Intended
praxeology**

*Intended
reflections*

*Intended
interaction*

**Exhibit's
characteristics**



**Observed
praxeology**

*Actual
reflections*

*Actual
interaction*

**Exhibit's
characteristics**

In sum...

- By using the notion of praxeology as a tool for exhibit analysis, I was able to
 - Observe a divergence between intended and actual learning outcomes
 - Pinpoint at which level this divergence occurred
- The implications of this finding for exhibit design are described in my paper!