

# ***Hypermedia in Archaeological Exhibitions: different kinds of interactivity and visualization***

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## **Abstract**

This paper describes possibilities of hypermedia in archaeological exhibitions concerning aspects of visualization and interactivity. It explains two very different kiosk systems, which supported exhibitions at the Kunst- und Ausstellungshalle der Bundesrepublik Deutschland (Bonn) in 1997 and 1998. The first program deals with a very specific problem in (pre-) history regarding demographic data of the Scythians (nomadic horse-riding warriors who lived in the northern Black Sea region, ca. 7th-4th century B. C.). It offers both an adventure-like experimental situation (including a simulation) and a small database to compare the experimental results with real archaeological data. The second program covers general aspects of a whole archaeological culture (the Iberians, former inhabitants of the Mediterranean coast of the Iberian Peninsula, ca. 8th-1st century B. C.). The visitors can explore seven themes ('daily life', 'environment', 'economy', 'art', 'religion', 'settlements', 'foreigners') and a time line with important events. One of the main tasks of this program is the ability to allow the visitors realistic impressions of archaeological sites. This is achieved by providing interactive panorama technology – without a 'lost in space'-feeling.

## **1. Introduction**

In this paper I want to discuss two very different hypermedia systems. These kiosks supported archaeological exhibitions at the Kunst- und Ausstellungshalle der Bundesrepublik Deutschland (Art- and Exhibition Hall of the Federal Republic of Germany, from now on abbreviated as "KAH") in 1997 and 1998 respectively.

The conference presentation deals with special aspects of interaction and visualization related to both programs and some more general remarks about the use of hypermedia in the museum environment and archaeological exhibitions.

## **2. Ariantes interactive**

### **Introduction**

This application was developed as a part of my MA-thesis (Kriszat, 1996). It was shown in the course of a so-called "Scythian week" during the temporary exhibition "Zwei Gesichter der Eremitage - Die Skythen und ihr Gold/Von Caravaggio bis Poussin" ("Two faces of the Eremitage: The Scythians and their gold/From Caravaggio to Poussin") at the KAH from April 8th to 12th 1997. One part of the exhibition showed Baroque paintings while the other part mainly presented Scythian gold (KAH, 1997). As a specialist of Scythian archaeology my professor, Renate Rolle (Rolle, 1989), was involved in this exhibition. She arranged my contact with the exhibition hall. Here I want to show the final 'polished' museum version of this application.

The original goal of "Ariantes interactive" was to incorporate many ideas concerning "archaeology and new media" into one computer program. Nevertheless, it fit the context of the Eremitage exhibition very well: "The Scythians and their gold" was object-centered, showing the precious - mostly golden - objects. Additional information consisted of contemporary reports written by Herodotus. "Ariantes interactive" incorporates additional objects of daily Scythian life (e. g. bronze arrow heads and cooking vessels) and puts them into another context. Besides the use of magnifying glasses inside the exhibition (to examine precisely made details), the application provided further opportunities for interaction.

### **Contents**

This program discusses a very specific problem concerning the Scythians. These nomads and feared horse-riding warriors lived in the area of the modern Ukraine, ca. 7th-4th century B. C.

In most cases it is very difficult to get demographic data of ancient societies, especially of societies without written documents. Nevertheless, Herodotus gives us a hint to the number of Scythians. The Greek "father of history" who lived in the 5th century B. C. writes:

"What the population of Scythia is I was not able to learn with certainty; the accounts which I received varied from one another."

I heard from some that they were very numerous indeed; others made their numbers but scanty for such a nation as the Scyths. Thus much, however, I witnessed with my own eyes. There is a tract called Exampaeus between the Borysthenes and the Hypanis. I made some mention of it in a former place, where I spoke of the bitter stream which rising there flows into the Hypanis, and renders the water of that river undrinkable. Here then stands a brazen bowl, six times as big as that at the entrance of the Euxine, which Pausanias, the son of Cleombrotus, set up. Such as have never seen that vessel may understand me better if I say that the Scythian bowl holds with ease six hundred amphorae, and is of the thickness of six fingers' breadth. The natives gave me the following account of the manner in which it was made. One of their kings, by name Ariantas, wishing to know the number of his subjects, ordered them all to bring him, on pain of death, the point off one of their arrows. They obeyed; and he collected thereby a vast heap of arrowheads, which he resolved to form into a memorial that might go down to posterity. Accordingly he made of them this bowl, and dedicated it at Exampaeus. This was all that I could learn concerning the number of the Scythians.' (Herodotus, Book IV, 81).

To avoid any misunderstanding, the purpose of this application is not to solve the problem of Scythian demography but to make people aware of interesting (pre-)historical questions and ways to discuss them critically (and possibly solve them).

### Structure

The start screen of the program offers two different "gateways" to knowledge and experience (see Figure 1):

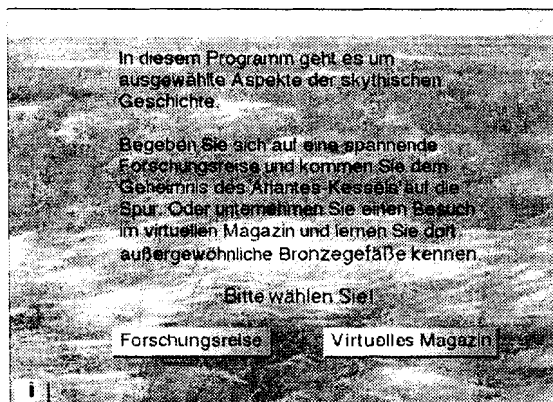


Figure 1 "Ariantes interactive" - the start screen.

1. An adventure-like sequential story (with Herodotus' report of a journey) leads to a virtual

experiment (containing a simulation) and the discussion of its results. Here the user's Degrees of Freedom related to the possibilities for navigation are low because of the limits of the framework story.

2. A small database with free navigation allows the user to compare the experimental results with archaeological finds (including hypertext links, an alphabetical site index, an interactive distribution map, etc.).

This branch of the program offers many Degrees of Freedom with many possibilities for navigation.

### The game and experimental level

This level provides fewer possibilities for navigation than the "information path". The user has fewer Degrees of Freedom. Navigation buttons like those of the information level and additional information (annotations, distribution maps) exist but other features are missing like an alphabetical index or free access to other parts of the system at any time. Depending on the story, the visitor mostly moves in a linear way.

### Framework story

The "game and experimental" level provides a role game: the user himself is invited to work as an archaeologist in the Ukraine. The player's goal is to examine the story of King Ariantes and his people. By means of the framework story, I want to explain the media specific aspects of this level.

After having chosen to become an archaeologist, the player is told that he is already a specialist in Scythian archaeology. Then he receives a letter from the Academy of Sciences in Kiev. He is invited to join an exploring expedition to Kiev. First of all, an animation illustrates the journey to the Ukraine: an aeroplane flies from the visitor's place to Kiev (see Figure 2).

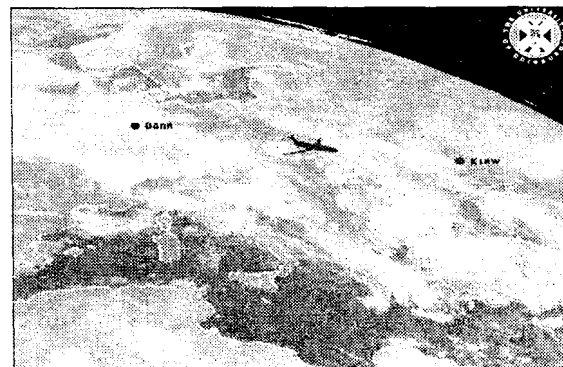


Figure 2. The "flight" to Kiev.

After his arrival in Kiev, the user is asked to fill out a visa with questions on the user's age and sex (see Figure 3).

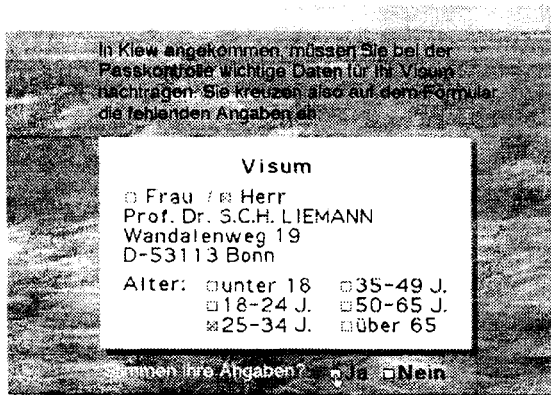


Figure 3. The visa with its questionnaire

Besides representing one more chance for human-machine interaction, this part was incorporated to store user data for further evaluation.

During his work in the archive, the scientist discovers Herodotus' report of a journey to Scythia.

The following three screens display this translated report. On demand it can be heard (by clicking on Herodotus' picture or the combined speaker symbol). Embedded hyperlinks show different media types. The area mentioned by Herodotus is probably the region between the rivers Bug and Dnjepr. It is illustrated with a map and animated paper boats (see Figure 4).

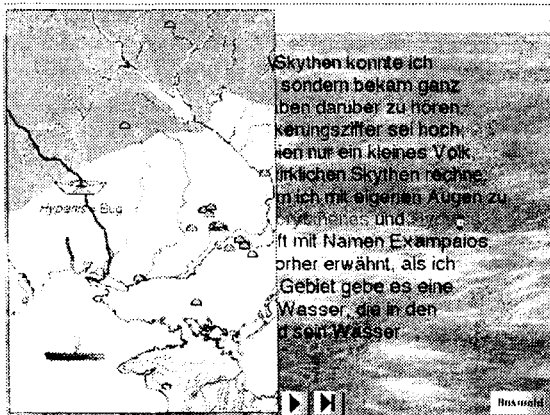


Figure 4. Animated visualization of the river Hypanis ( Bug).

A small window informs the user about Herodotus (see Figure 5).



Figure 5. Information window about Herodotus.

The last of the screens displaying Herodotus' report contains one of the most interesting media types inside this level. The hyperlink "arrow" opens a window containing a Scythian arrow head made of bronze (see Figure 6).

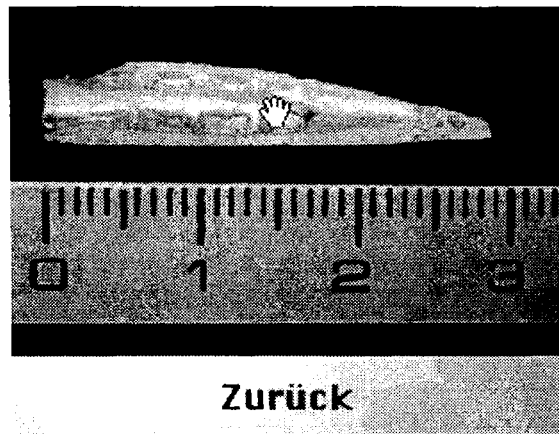


Figure 6. The virtual Scythian arrow head.

A scale gives an idea of its dimensions (like its length of 29 mm). After clicking on the arrow the user can turn it horizontally by pressing the mouse and moving it into the desired direction. This "virtual object" is in fact an interactive movie (actually depending on Apple Inc.'s Quicktime VR<sup>a</sup> technology). It consists of 36 scanned photographs, taken with a usual SLR camera.

The screen following Herodotus' report presents the idea of an experimental "census": Herodotus describes the measures of the large bronze vessel he had seen. He gives data for its content (600 amphorae) and the thickness of the wall (6 fingers). During antique times, the bronze most widely

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used was an alloy of 10 % tin and 90 % copper (which is still available).

The average weight of Scythian arrowheads collected in the Eremitage (St. Petersburg) is 4 grams.

By taking these data it is possible to reconstruct the weight of Ariantes' monument. Furthermore, dividing this weight by the average weight of Scythian arrow heads should yield the number of melted arrow heads (during my studies I read an article by Soviet scientists who calculated in a similar way, see Marchenko/Sceglov, 1989). For easier calculation, a hemispherical vessel without stand is assumed, using the formula of sphere content.

Nevertheless, in ancient Greece the units of measure were different: e. g. one "amphora" could mean 32.4 litres in Lesbos or 19.6 litres in Chios. The unit of measure for thickness ("finger" or "dactylos") also differed regionally.

Based on the premises described above, the user himself can perform the experiment. The corresponding screen shows two sliders on the right hand side (see Figure 7).

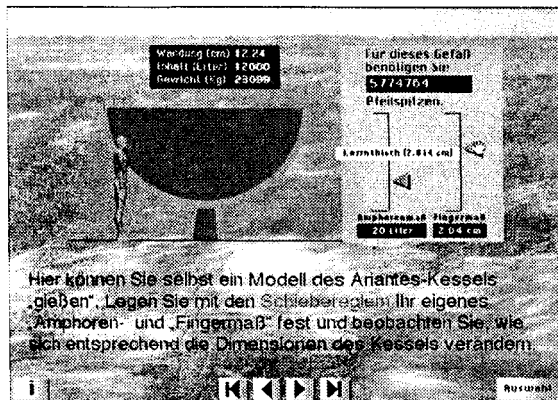


Figure 7. The virtual experiment.

With pressed mouse they allow the adjustment of the units of measure referring to volume and thickness (respectively, "amphora" and "finger"). Yellow underlying bars indicate known units of measure. After adjusting one of these parameters, all measures of the vessel (weight, size, thickness of the wall, etc.) are calculated. Thereafter, the vessel in the size suggested by the user is virtually "cast". Its measures and the number of arrow heads necessary to make it up also appear, thereby rendering the assumed Scythian population (on arrow head per person). A person on the left side of the vessel serves as scale.

The following screen discusses the results obtained (in each case more than a million arrow heads) and shows on demand the lowest and highest number (see Figure 8).

The "scientist" is asked whether he thinks that his results are realistic from a technical point of view

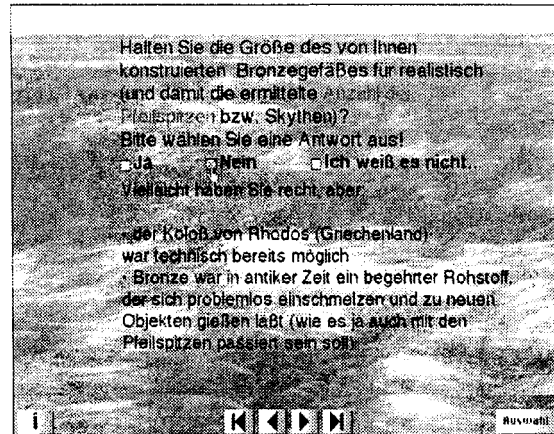


Figure 8. The discussion of the experimental results

(i. e. If it was technically possible to cast such a large bronze vessel in Scythian times). The principle of this dialogue is always to confront him with opposite arguments. For example: if the user agrees, he is confronted with the relatively small weight of vessels found so far. The heaviest contemporary Scythian and Greek vessels are shown for comparison.

The last screen of this level gives the opportunity either to consult the "virtual magazine" (= information level) or to enter the digital visitor's book (see Figure 9).

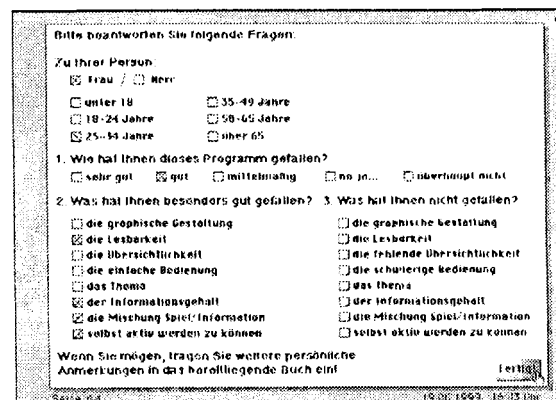


Figure 9. The digital visitor's book.

## The information level

The database consists of two catalogues containing either Scythian cauldrons or other large bronze vessels.

Each catalogue provides an introduction screen containing general information about the corresponding category of objects (see Figure 10).

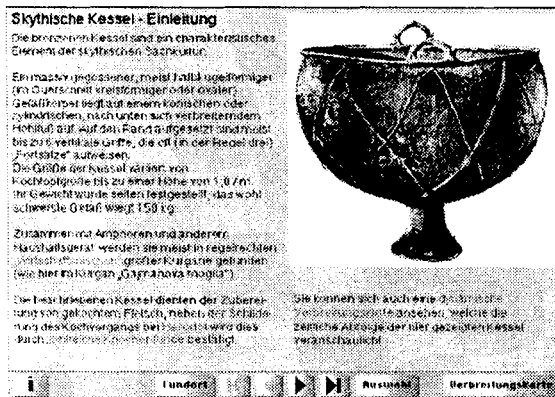


Figure 10. Scythian cauldrons - introduction screen.

Each catalogue entry has its own screen sharing the following common layout (see Figure 11).

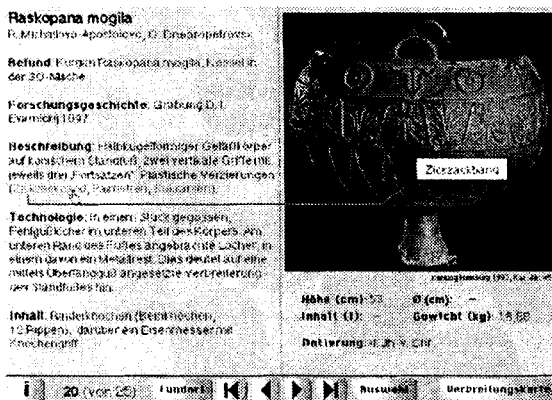


Figure 11. Catalogue entry with embedded hyperlinks

The navigation bar is placed in the bottom part of the screen.

The upper area of the left half of the screen consists of a detailed object description, sometimes containing blue marked links (leading to additional information).

The right half of the screen shows in its upper area the corresponding illustration and reference. Its lower area shows measures and dating of the respective object.

Topographical information referring to the catalogue entries is provided with a distribution map which appears on mouse click; the position of the actual site is shown by a different color and the yellow underlying site name. The distribution map stays on screen until the user touches any point on the right side of the screen (see Figure 12).

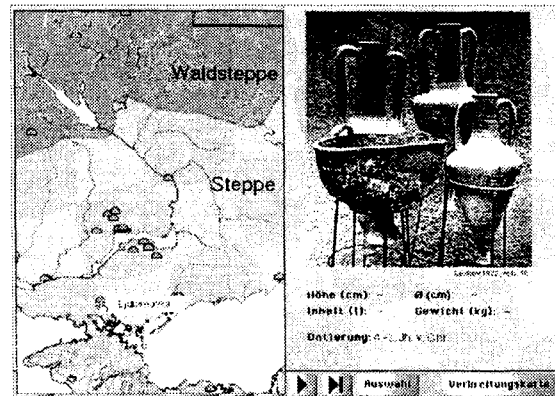


Figure 12. A catalogue entry and its appropriate topographical information.

## Navigation

There exist many possibilities to navigate:

1. Navigation inside the requested catalogue:

The arrow buttons in the middle of the navigation bar allow browsing the screens back and forth - like turning over the pages of a book.

According to consumer electronic devices, two arrow buttons allow jumping to the beginning respectively the end of each catalogue.

Entries already seen can be retraced with the remaining arrow button.

Words and phrases marked in blue indicate hyperlinks. They offer annotations and other additional hints.

Clicking the "site" button shows a site index in alphabetical order. It provides access by name (see Figure 13).

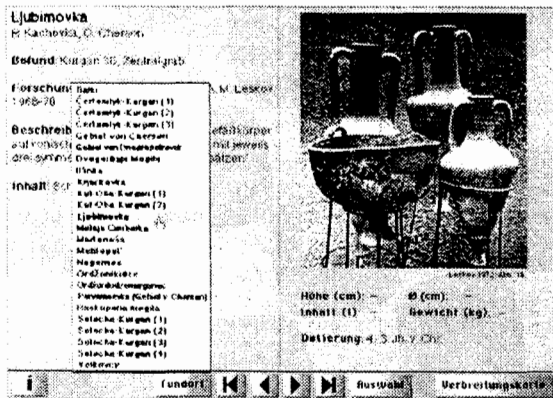


Figure 13. A catalogue entry with opened site index.

The distribution map mentioned above allows navigation too. Clicking on a site symbol opens the respective entry (see Figure 12). The object and its data are shown on the right side of the screen. Upon leaving the distribution map the whole text information is shown instead.

## 2. Access to other parts of the application:

When clicking the "choose" button a small additional navigation bar containing three buttons appears (see Figure 14).

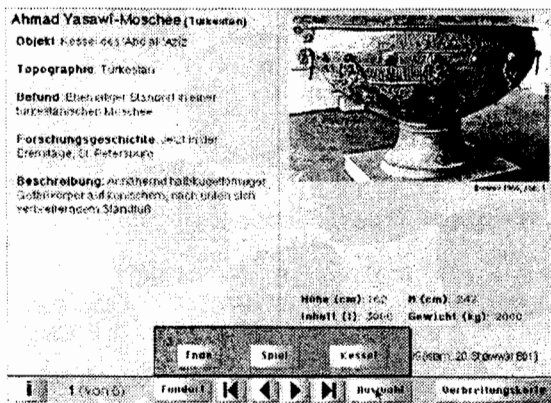


Figure 14. The small chooser bar.

Depending on the actual part of the application, they provide access to the areas' "cauldrons" (Kessel) or "comparative objects" (Vergleichsobjekte), and "game" (Spiel) or "end" (Ende).

Hitting the "i" button shows a small help screen with basic information how to use the application.

## Illustration of historical processes

On demand, the integrated distribution map changes to a so-called "dynamic distribution map" (see Figure 15).

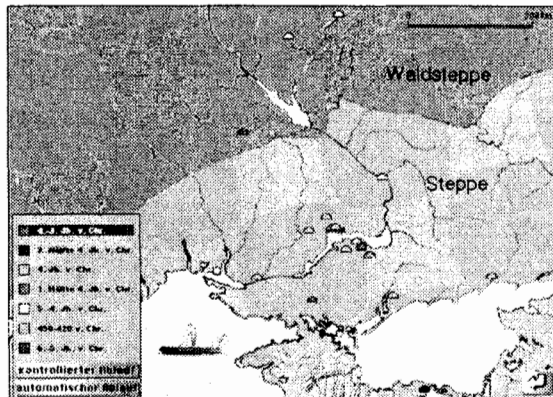


Figure 15. The "dynamic distribution map" showing all sites.

It shows the chronological distribution of the mentioned sites. Hitting the start button hides all sites. Then one site after the other appears, starting with the oldest object found. They are colored differently according to date. The user can decide if he wants to see an automatic process or if he wants to influence the process. If he chooses the latter possibility, each mouse click reveals "younger" objects on screen.

This example shows the possibility of automatic animation and reconstruction of processes using fixed data.

## Presentation

During the "Scythian week", the visitors could use one computer terminal. If requested, I gave practical advice or additional contextual information (like a "Cicerone" of the "Studiolo-Concept", see below).

As a kind of "subjective evaluation", the visitors were pleased to write a comment into a visitor's book.

The main idea of this kiosk was to create an explorative and experimental environment. The users could manipulate data without keyboard input, nevertheless receiving unique results.

## Authoring software

The authoring tool used for initial prototyping has been Apple Inc.'s Hypercard 2.2. Because of the required vector graphics capability (the experimental cauldron consists of vector graphics), the final version of the program was developed with Allegiant Inc.'s Supercard 2.5.2 (remark: planned as a platform independent title, the promised Supercard Windows player never saw the light, now Incwell Inc. is owner of Supercard, perhaps this company will fulfil the old promise).

## System requirements

- Apple Macintosh
- Processor: 68030, PowerPC recommended
- System 7.5 or higher
- Quicktime 2.5 or higher
- 12 MB of free RAM
- 15 MB of free hard disk space
- Monitor: Thousands of colors, resolution 640 x 480 pixel

## 3. "Iberians interactive"

### Introduction

Unlike the first kiosk with its very special topic, this second application deals with the whole culture of the Iberians (who lived from the 8th to the 1st century B. C. at the eastern coast of the Iberian Peninsula). The exhibition "Die Iberer" (The Iberians) was shown at Paris, Barcelona and Bonn in 1997 and 1998 (see KAH 1998). Compared to the Moorish history of Spain with its famous remains (e. g. the Alhambra in Granada), the older Spanish history is more or less unknown, especially that of the Iberians.

The goal of this exhibition was to make the modern European people aware of Iberian culture. The computer application was meant to support this task.

There still exist a few points of contact between Iberian times and today. For this reason, the application mentions aspects like the Mediterranean climate and vegetation as opposed to northwestern European environmental conditions. Those circumstances have influenced the construction of

houses and settlements etc. Contemporary reports of ancient authors like Strabo and Tacitus show their opinion of Iberians and ancient Germans, telling interesting details. Many visitors of the exhibition may have visited Spain as tourists, for this reason some actual statistical data are presented.

Another important aspect was the adequate integration of mostly unknown but nevertheless impressive archaeological sites - some of them situated near tourist centers.

In general, the application tries to cover all aspects of Iberian culture and life. To fulfil this task, exemplary and representative facts were chosen.

The author was free in determining the contents and design of the application (of course in agreement with the staff of the KAH). In March 1997 a journey to Spain was undertaken to receive additional information and to take most of the presented outdoor photographs.

### Structure, navigation and general layout

Because the typical visitors of the KAH are older people with a higher education (in Germany people are generally less computer literate), the interface had to be as simple and intuitive as possible. I decided to use very few icons; in my point of view there exists only a few really "speaking" ones (like the question mark).

Represented by icons and additional text, the start screen shows the seven topics of the application (see Figure 16): daily life ("Alltag"), art ("Kunst"), "Religion", economy ("Wirtschaft"), environment ("Umwelt"), foreigners ("Fremde") and settlements ("Siedlungen").

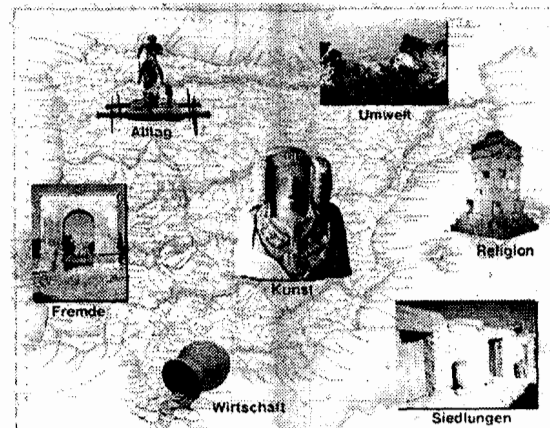


Figure 16. The "Iberians Interactive" start screen.

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Each of these topics contains 3 or 4 subsections . The respective screens provide abstracts, hyperlinks, pictures, interactive movies and access to a time line.

If a subsection needed more space, screens were added. For example, the subsection trade ("Handel") of the topic economy ("Wirtschaft") consists of two screens, indicated by different numbers.

Each screen contains the relative high menu bar (see e. g. Figure 17).

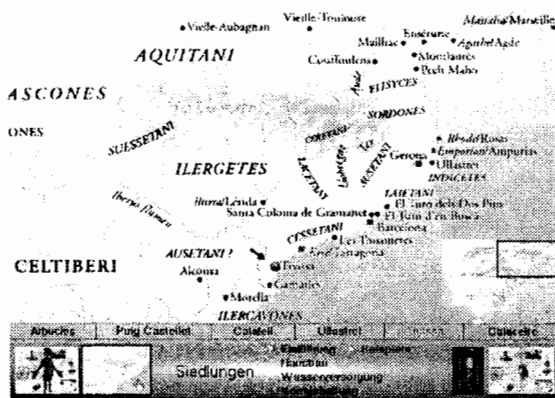


Figure 17. The distribution map, actually indicating the site of Tivissa.

It shows the name of the chosen topic and its four subsections. The active subsection is indicated by yellow color and an arrow in front of it. When touched with the cursor, selectable subsections and buttons become highlighted in blue.

A button on the left (a miniature start screen) leads to the help screen, providing general hints using the program.

The button on the right leads back to the start screen.

Depending on the subsection (sometimes on the right of the help button) an anthropomorphic icon appears (see Fig. 23), providing contemporary citations of either Strabo or Polybios (related to the Iberians) or Tacitus (related to the Germans). Depending on the context, this button sometimes shows a small map, leading to a distribution map (see e. g. Figure 17).

The small animated hourglass on the left of the start button leads to the time line.

### Contents

We have three kinds of sources which inform us about the Iberians:

1. archaeological remains like graves and settlements
2. their language and writing (which is not deciphered yet)
3. documents written by contemporary Greek and Roman authors.

According to these sources, the Iberians lived on the eastern and southeastern coastal region of the Iberian Peninsula, with overlapping regions towards the more western situated Celtic and Celtic-Iberian culture. The Iberian culture was under influence of foreign colonies and peoples like Phoenicians/ Carthaginians, Greeks, and finally the Romans. Therefore, many elements of the Iberian culture are either derived from or were influenced by those cultures. For these foreigners, the Iberian peninsula was a real El Dorado - rich in gold and silver.

Below is a detailed description of the seven topics and the time line.

### The time line

The time line screen consists of a modified menu bar at the bottom and a map of the Iberian Peninsula in the upper part of the screen (see Figure 19).

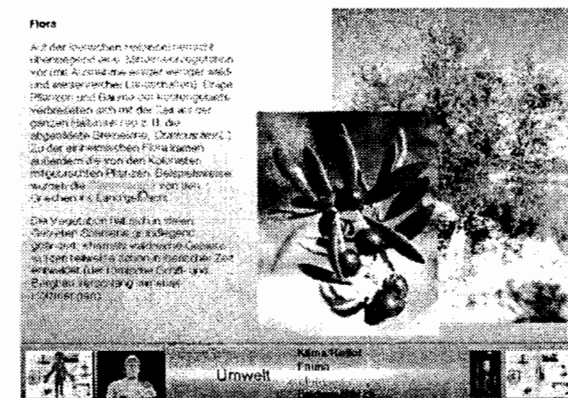


Figure 18. Topic "Environment", subsection "Flora" with olive tree and detail photo

The menu bar contains a time scale combined with a row of small blue lights, representing events of Iberian history. Touching an active light



enlightens it and the related event is represented by media like (hyper-) texts, animations, and pictures. An animated sphere indicates the respective location on the map.

## Environment ("Umwelt")

Related subsections are climate/relief ("Klima/Relief"), fauna, flora and mineral resources ("Bodensch tze").

While the climate did not change much in relation to our times, the rich gold and silver resources of Iberian times are more or less exploited today. The Southern areas provided many agrarian goods, too. Greek legends, and probably the Bible, talk about the delightful Tartessos behind the piles of Hercules (Gibraltar). Plants like the olive tree were imported by Greek colonists (see Figure 18).

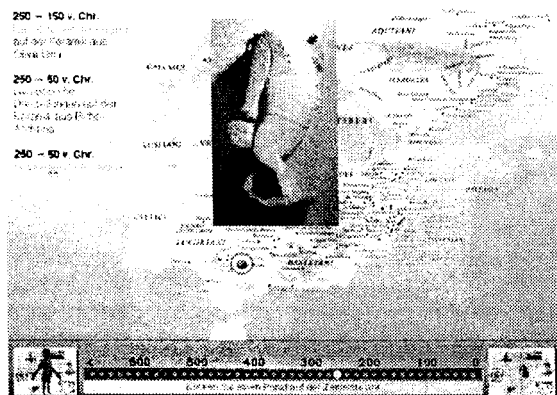


Figure 19. The time line, actually showing events around 250 B.C.

## Daily Life ("Alltag")

The subsections of this topic are named introduction ("Einführung"), clothing ("Bekleidung"), food ("Ern hrung"), language/writing ("Sprache/Schrift"). Among other things, reconstructions and paintings of clothing and a weaver's loom are provided. Written documents and their transcriptions are shown (whereas the syntax of the mysterious Iberian language is known already, their semantics is not deciphered yet except some personal and geographical names).

## Art ("Kunst")

The appropriate. subsections are called sculptures ("Skulpturen"), statuettes ("Statuetten"), ceramics ("Keramik") and jewelry ("Schmuck").

The Iberians made impressive stone sculptures (presented in tombs and sanctuaries). Hyperlinks provide examples for different stylistic forms, probably belonging to different workshops.

Found at sanctuaries were small statuettes made of bronze, obviously offerings. The screen provides 8 examples (see Figure 20). Touching them enlarges the chosen statuette and shows further information.

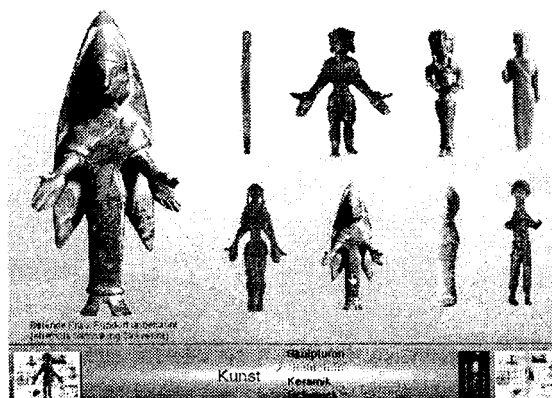


Figure 20. Topic "art", subsection "statuettes": an enlarged statuette made of bronze.

## "Religion"

This topic covers an introduction ("Einführung"), sanctuaries ("Kultpl tze") and burials ("Bestattungen"). Here, one of the most interesting sanctuaries is the site called "El Cogul" (see Figure 21).

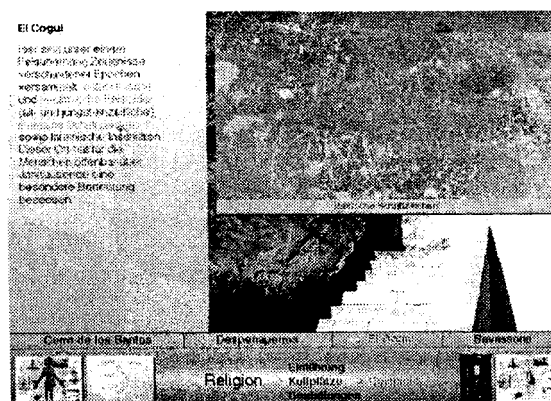


Figure 21. The site "El Cogul", actually showing Iberian inscriptions.

This abris obviously was used for cultic purposes since Paleolithic times, indicated by Paleolithic and Neolithic rock paintings as well as Iberian and Latin inscriptions. Respectively hyperlinks show those details on demand.

**Economy ("Wirtschaft")**

This topic consists of an Introduction ("Einführung"), agriculture ("Landwirtschaft"), handicraft ("Handwerk") and trade ("Handel").

The subsection "trade" provides three examples of Iberian coins. Their presentation normally is difficult because of their small size. On screen both sides of these coins are shown (see Figure 22). Touching them enlarges the chosen coin. So the visitor can see details, which otherwise are getting lost.

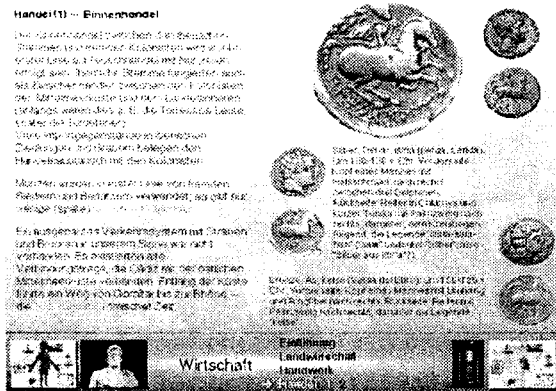


Figure 22. Topic "economy", subsection "domestic trade": Iberian coins with enlarged example. Foreigners ("Fremde")

The subsections are called introduction ("Einführung"), Phoenicians/Carthages ("Phönizier/Karthager"), Greeks/Romans ("Griechen/Römer") and "we" ("wir").

This topic not only covers ancient colonies like those of Carthaginians, Greeks and Romans but also modern "foreigners" - e. g. German tourists visiting Spain. Therefore actual tourist data of Spain are available, providing information about the tourist's country of origin, favorite destinations, age and sex distribution and organization of leisure time.

A photograph taken in Catalonia, showing a menu with typical Bavarian food (written in German and French) should provoke some laughter (see Figure 23).

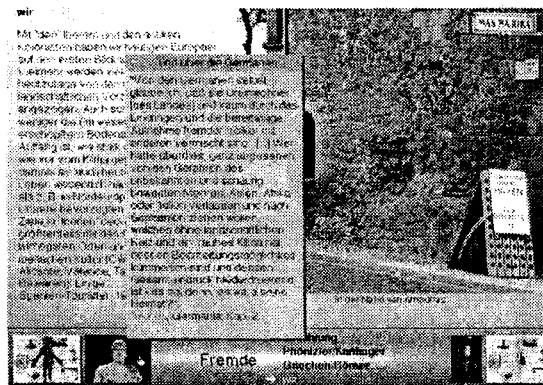


Figure 23. Topic "Foreigners", subsection "we": typical Bavarian food in Catalonia ...

**Settlements ("Siedlungen")**

Besides an introduction ("Einführung") and examples ("Beispiele"), the other subsections are building of homes ("Hausbau"), water supply ("Wasserversorgung") and stockpiling ("Vorratshaltung").

Besides topics with general information about Iberian life and culture, a main object of this application was the photorealistic and interactive visualization of important archaeological sites. From a medial point of view the subsection called "examples" is the most attractive part of the program. Hitting the appropriate button ("Beispiele") shows a distribution map. The user can choose between six typical Iberian settlements, situated in the Spanish provinces of Aragon and Catalonia.

These examples present small and large settlements as well as a completely reconstructed site.

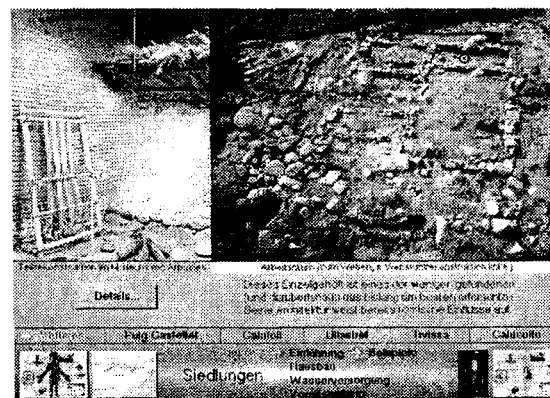
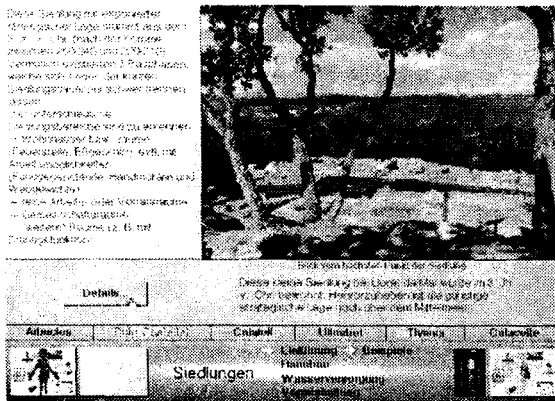


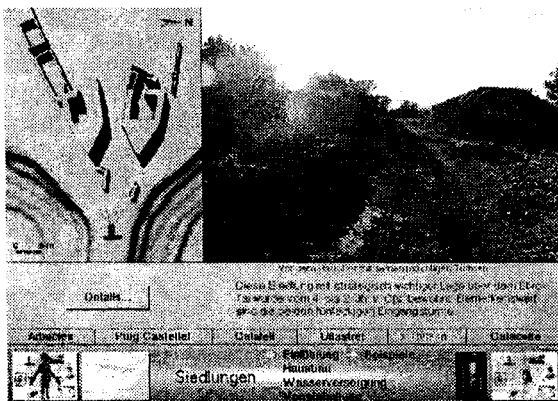
Figure 24. The Iberian site "Arbucies".

The first one, Arbucies, shows the first well excavated Iberian farm (see Figure 24). The user can explore an aerial photo of this archaeological site and its structures. When he touches a "hot" region of the photo, the mouse cursor changes and a short description of the respective region is given (like "fireplace" or "workshop room with weaver's loom"). The photo on the left side of the screen shows a partial reconstruction of the excavated house in the museum of Arbucies. All screens of the subsection "examples" ("Beispiele") contain a "Details" button which yields a more detailed text with information about the excavation and its results (see Figure 25).



**Figure 25. The Iberian site "Pulg Castellet". (Lloret de Mar) with its detail information**

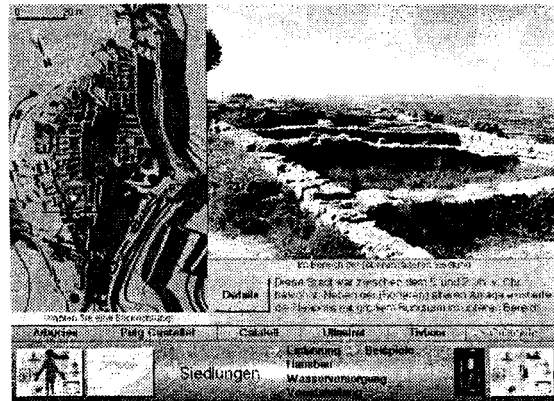
Each of the other five settlements is visualized with interactive panoramas on the upper right side of the screen (see Figure 26). These QTVR-panoramas (see below) are controlled by pressing and moving the mouse. The user can turn himself virtually around 360°.



**Figure 26. The Iberian site "Tivissa".**

These interactive panoramas are impressive, but sometimes spatial orientation is not easy. To avoid a "lost in space"-feeling, each scene was combined with a site map on the left. The site map itself contains the actual point of view (indicated with a small camera symbol) and other optional points of view (indicated with blue balls). Besides interacting directly with the panorama, the visitor can use the camera symbol instead to control the movie.

Touching the zone around the camera symbol shows different sectors. Each of these blue marked zones represents one of six possible view angles. Clicking on one of them accordingly changes both the view angle of the panorama and the direction of the camera symbol (see Figure 27).



**Figure 27. The Iberian site "Calacelte".**

## The panoramas were produced as follows:

1. 16 pictures were taken (using a wide angle lens in portrait mode mounted on a SLR camera, positioned on a tripod) 360° around.
2. The slides were digitized with a high quality film scanner.
3. Apple Inc.'s "Quicktime VR Authoring Tool" allowed the seamless integration of these single pictures into one interactive movie, a so-called Quicktime Virtual Reality (QTVR-) panorama. The software to produce these movies is Macintosh only. Meanwhile tools exist for Windows with similar features. QTVR panoramas are playable on Windows 3.1, 95, 98, NT, too.

A digital camera was not used for the following reasons:

At the moment SLR cameras still offer better quality and more possibilities than digital cameras. Compared to their digital counterparts, SLR cameras generally provide a broader range of high quality system equipment (lenses, flashes, etc.).

Film material is a cheaper mass storage than digital storage media.

Nevertheless, I want to mention one big disadvantage of analog photography: the scanning process and further retouching procedures are very time consuming.

### **Presentation**

Running on three desktop computers with 17" monitors, "Iberians interactive" was shown in an information room inside the exhibition area. The mouse driven application was fully embedded into the so-called "Studiolo-Concept". Developed by Hanns-Ulrich Mette (leader pedagogical services of the KAH), this means an information room ("Studiolo") integrated into the exhibition, providing a small freehand library and new media (like video, audio-cd's and kiosks, depending on the exhibition). Besides these media, a person, the so-called "Cicerone", helps using the media and answers questions related to the context of the exhibition, too. In addition to these additional information sources the "Studiolo" is a space of relaxing and reflecting the exhibition.

### **Used authoring software**

Because of its cross platform possibilities, the authoring tool of choice has been Apple Media Tool 2.1. It produces executable applications running under Mac OS and Windows 3.1/Windows 95. Apple Inc. stopped the development of this software in 1997. The former developers founded a new company (Tribeworks Inc.) and developed a new free authoring software from scratch (iShell). It allows the development of hypermedia titles under Mac OS (System 8.1 and above) and Windows NT. Players are available for Mac OS & Windows 95/98/NT (<http://www.tribeworks.com>).

### **System requirements**

#### **Apple Macintosh**

- Processor: 68040, Power PC recommended
- 9 MB of free RAM
- System 7.1 (or higher)

- Quicktime 2.5 (or higher)
- CD-ROM drive (4x speed)
- Monitor/graphics: millions of colors, resolution 800 x 600 pixel

#### **PC (IBM-compatible)**

- Processor: 486, Pentium-class recommended
- 16 MB of RAM
- Windows 3.1 or Windows 95
- Quicktime 2.1.1
- Sound Card
- CD-ROM drive (4x speed)
- Monitor/graphics: True Color, resolution 800 x 600 pixel

## **4. Thoughts concerning hypermedia and (archaeological) exhibitions**

Excavating an archaeological site means getting information by destruction of the original context of finds. The remains are finds and structures (e. g. walls) on the one hand and the documentation, including information about the objects' context on the other hand.

After their excavation, the objects generally come into museums, are stored in magazines and sometimes are displayed during exhibitions.

Therefore one main task for archaeological exhibitions is the reconstruction of the lost context of finds and sites. Hypermedia can support this task of recreating contexts in many, mostly visual ways (e. g. by virtual reconstructions, adding stories of contemporary authors, adding animations to reconstruct processes and incorporating "augmented reality", see Nielsen, 1995). It offers possibilities of virtual experiments, too. Concerning reconstructions, details of house construction like roofs are often unknown. Compared to "real" 1:1 models and maquettes, digital reconstructions allow the incorporation of alternative models on demand and corresponding combinations of virtual and augmented reality. Nevertheless, it must be said that each kind of artificial reconstruction offers a high grade of

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suggestion, meaning that people believe in what they see (even if the reconstruction is based on wrong data or if a few possibilities of reconstruction exist). Under those circumstances the responsibility of creators and scientists is asked.

Timelines offer possibilities to combine finds and sites with chronology and geography.

Often archaeological exhibitions are object-centered. To incorporate sites in an impressive way, technologies of augmented reality (like virtual panoramas) allow relative fast and cheap production of impressive interactive surrogates.

In general, another important task of exhibitions should be the empowering of visitors to become active. This goal can be achieved by explorative systems containing many different interactive parts. The range of "interactivity" of hypermedia systems reaches from simply choosing between possibilities to virtual experiments and VR environments. Hypertext offers different levels of information.

Game environments are further strategies to activate the respective target audience in a funny way.

Here "active" does not only mean to activate the visitors physically but to activate their brains, too. Exhibitions and applications should make them aware of research problems and provide more than one "right" solution, if necessary. Also it is possible to demonstrate archaeological methods and techniques (like comparing archaeological results with written documents).

In my opinion hypermedia in conjunction with archaeological results and problems can provide new unique experiences with discovering and exploring objects, spaces and stories.

### Conclusion

The shown programs contain very different kinds of human-machine interaction: while "Ariantes interactive" offers an experimental situation, "Iberians interactive" uses possibilities of an interactive visualization technology: the panorama.

Beside pupils, the KAH is mostly visited by families and older people, often with higher education and no or few computer experience. A member of the pedagogical service supported those visitors during both exhibitions, the "Studiolo-Concept" mentioned above worked fine.

Both interactive systems offered the following features:

A desktop computer situation with chairs around gave the opportunity to explore the programs with leisure.

Instead of touchscreens normal screens provided an accurate and sharp display.

Robustness was achieved by avoiding a keyboard.

Simple navigation, one-button mouse and missing keyboard provided the necessary ease of use.

Decent use of sound allowed undisturbed discussions among the visitors.

Some remarks concerning on-line/off-line media:

At the moment there is a hype regarding the WEB as the only possible solution to deliver hypermedia. Nevertheless, off-line media still have some advantages compared to the Internet:

No network connection is necessary (therefore no network problems like attacks from the outside and other problems can occur).

The media access can be faster.

A reliable media access is guaranteed.

Exclusive kiosks with browser-independent unique screen designs for special exhibitions are possible.

Nevertheless, tools like iShell or Macromedia Director provide the possibility to combine on- and off-line media in a single application. So I think the artificial border between on and off-line will be obsolete in the near future. More CD-ROM based titles now offer direct hyperlinks to the Internet (e. g. the Encyclopædia Britannica).

### Acknowledgements

"Iberians interactive" incorporates catalogue scans (KAH 1998) and scanned slides (one aerial photo by courtesy of Dr. Manel Rueda, Museum of Arbuscies/Spain, the other ones taken by the author).

The content is based on the catalogue and the author's literature studies.

## **Kriszat, Hypermedia in Archaeological Exhibitions**

In contrast to most interactive systems, this application was not made by a large group of people. Instead it was created by the author in collaboration with his wife Cristina.

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