Data collection methodology

Overview

The data collection methodology is described in detail in our paper 'Sonic Enhancement of Virtual Exhibits' which is published in PLoS One. We also describe the key details of the data collection methodology here.

In an online experiment, participants were shown a series of six 3D models of individual objects, each of which was paired with a particular soundscape. These pairings were pseudo-randomized across participants, and at least one pairing included a "no sound" condition to act as a control. After encountering each 3D model-soundscape pair, participants were asked to report their current felt affect, engagement, and sense of presence, and to reflect on how these were affected by the model-soundscape pairing.

Object selection and soundscape design

The 3D models were randomly selected for each participant from a pool of 13 artifacts, all of which came from the British Museum's collection of freely downloadable models on Sketchfab (https://sketchfab.com/britishmuseum). We selected the 13 artifacts for our experiment to ensure diversity across genre, historical period, material, size, and shape. We also selected objects for which we could gather additional pedagogical information (e.g., about the object's maker and social-political context). A complete list of our selected objects, including their download links, may be found in Table 1).

Table 1. Objects selected for our study.

Objects	Sources
Sekhmet	https://sketchfab.com/3d-models/sekhmet-ec3713c4fc63498d933e6403b0180109
Statue of A'a	https://sketchfab.com/3d-models/statue-of-aa-static-e4dd6d342fa044b99732b484985797b6
Parthenon Frieze	https://sketchfab.com/3d-models/parathenon-frieze-a7d8c38657794a608a4c7ed5f75f90e5
A bust of Livia	https://sketchfab.com/3d-models/a-bust-of-livia-354a04bd3d7d4e6d80cd1cdbd25715b9
Ampulla of St Thomas Becket	https://sketchfab.com/3d-models/ampulla-of-st-thomas-becket-907984c670da4456abb6ca11101698fe
Mayan Lintal (AD 725)	https://sketchfab.com/3d-models/mayan-lintal-ad-725-5483c3d1e8b4408cbe1b4da0b6553500
Virgin and Child	https://sketchfab.com/3d-models/virgin-and-child-5724bfac35974e6db2078823c66da00f
Stone figure of Xiuhcoatl	https://sketchfab.com/3d-models/stone-figure-of-xiuhcoatl-fire-serpent-eb247f805b204de384fa75cdf9781ff8

A queen from the Lewis chessmen	https://sketchfab.com/3d-models/a-queen-from-the-lewis-chessmen-af096aa7ca934f84b6d64c89a8e312d4
The Jennings dog	https://sketchfab.com/3d-models/the-jennings-dog-a3b10c4681e34440aa61ea2c9a80c233
Hao Hakananaia	https://sketchfab.com/3d-models/hoa-hakananaia-752e69d34933438d8230ac829d22300e
Conall Cael bell	https://sketchfab.com/3d-models/conall-cael-bell-bc78ff5b90b4435db1bb451c36d29822
Object journeys Somali gourd	https://sketchfab.com/3d-models/object-journeys-somali-gourd-db16cfdd51fe4e14bf921459fdd5e5e2

For each object included in our experiment, we prepared text roughly consistent in length (circa 150 words) that had three levels of pedagogical information: i) a general overview of the object; ii) details about the maker; and iii) details about the socio-political context in which the object was created. To accompany each 3D model, we created four categories of soundscapes in the spirit of affective soundscape creation. Such soundscapes are not meant to convey a specific perceptual feature of the object in question but, rather, to induce specific affective responses in participants—much like the way sound is employed as an emotional-response enhancement tool in multimodal contexts like film sound, videogame sound, or sound walks.

We produced 4 sound categories:

1. Real-world museum sounds
2. Foley-based sounds
3. Ambient sounds
4. Sounds derived from the International affective digital sounds (IADS) set.

Full details of these soundscapes are described in our paper. Additionally, we produced discrete voiceover recordings of the three levels of pedagogical information described above. These recordings could be selected by participants independently during the experiment, regardless of which specific soundscapes they encountered.

Online experiment design

Our online experiment contained a set of six trials. Two different types of trial were used. Trial type A presented an object-soundscape pair to the participant for 30s, after which the participants were asked to report their current affect (their felt emotions, rated in terms of valence and arousal) and level of engagement with the object-soundscape pairing. In trial type B the object–soundscape pairing was also presented for 30s, after which participants were given the option to hear more information about the object they were shown.

The objects were presented on screen using the ThreeJS and JPsych toolboxes for Javascript. Participants were able to rotate the object in 3-dimensions, pan the camera around the object, and zoom into or out of the object using either the computer mouse or touchscreen controls depending on

their device. Participants were given detailed instructions on how to control their view of the 3D object before the start of the experiment.

During the additional information section within trial type B, the object remained on screen and participants were still able to interact with it. However, the soundscape was not played to participants. Instead, a pre-recorded audio file was played to participants containing additional information about the object.

Three additional layers of audio information were available to participants and played sequentially in response to yes/no options that asked participants whether they wanted to hear extra information. Each additional information segment lasted approximately 30s and contained information about the construction, history, and cultural relevance of the objects.

At the end of each trial, participants were asked to report their current felt affect and engagement with the object-soundscape pairings. Standard psychology test batteries were used for this. Specifically, we used the Self-Assessment Manikins (SAM), Likert Scales (LS), and a modified version of the Presence Questionnaire (PQ).

We ran the experiment online, hosted on the University of Essex web server. Participants were recruited via a combination of “LabintheWild,” social media advertisements, and email. “Labinthewild” is an online experiment platform for recruiting participants, via a combination of social media and web adverts, to behavioural research studies with self-selected, uncompensated web samples.