Ancestral Symbol

Musically Organizing Unpredictable Interactions to Create the Sound of a Paleolithic Cave Sign

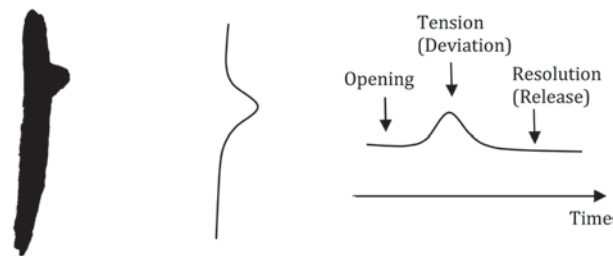### EDSON ZAMPRONHA

ABSTRACT

This article explains how visitors' unpredictable movements are transformed into a consistent narrative musical form by using electronic devices with no central software to control them in the interactive installation, *Ancestral Symbol*. The installation uses a paleolithic cave sign as the basis for the connection of sounds and images through the visitors' movements in the installation room, thus connecting art, archaeology, and interactivity. This text explains the technology and sounds and visual materials used for the piece. It also describes how the visual elements work as loudspeakers and the strategic spatial distribution of all the elements to organize the installation.

In 2019, I created the visual-sound installation *Ancestral Symbol* for the *Archaeological Site—12 Artists, 12 Visions* exhibition held at the Experimental Archaeology Centre (CAREX) in Burgos, Spain. CAREX is next to the internationally recognized archaeological site of Atapuerca, and the exhibition aimed to build bridges between art and archaeology [1].

The core element I used to connect archaeology and art was a graphic sign found in paleolithic cave paintings usually called the claviform [2,3], shown in Fig. 1. This sign appears in various ways in paleolithic caves, and I used its shape as a starting point to create the *Ancestral Symbol* installation. However, I simplified and stylized it, interpreting it as a straight line with a deviation (see Fig. 1).

The installation room includes three paintings, 22 dried gourds, four wood sticks, and four independently operating electronic devices. Figure 2 shows the installation floor map. Figure 3 is an illustration of the elements included in the installation (notice that just three walls are represented—the fourth wall is empty), and Fig. 4 shows the three paintings included in the work.

The three paintings in the installation represent a process by which a singular mark is abstracted to become a symbol (see Fig. 4). Painting A has one gourd attached to the canvas.

Edson Zampronha (composer, researcher), University of Oviedo, Art History and Musicology Department, c/ Amparo Pedregal s/n, Oviedo, 33011, Spain. Email: zampronhaedson@uniovi.es. Website: www.zampronha.com. ORCID: 0000-0002-2219-3099.

Fig. 1. The claviform as depicted by its author (left), in its stylized form (middle), and as read in the time axis (right).

The gourd on the canvas is a metaphor for a mark on the ground that captures viewers' attention, but they do not know what it means. Painting B has 21 gourds attached to it. Metaphorically speaking, the viewer compares similar marks and recognizes that they all share a common shape that can be abstracted to give rise to a symbol. Painting C has no gourds, and it depicts graphically the abstracted shape shared by all marks, (i.e. the stylized claviform).

Starting from different points of view, most archaeologists agree that the graphic signs found in paleolithic caves are symbols, although there are only hypotheses about their meanings [4–6]. For this reason, I freely interpreted the claviform as a graphic representation of a sound so that the material aspects of the claviform relate to the visual aspects of the installation, and its hypothetical meaning relates to the sounds. Therefore, almost all the sounds in this installation share the same stylized claviform shape, which is why the meaning is the stylized claviform shape expressed in the sounds (the connection between the stylized claviform shape and the sounds is iconic). In this way, the claviform shape is read as if it were a kind of score. Moreover, the sequence of sounds is designed to be listened to as a narrative piece of music in which its opening is followed by a tension (a deviation) and a resolution (a release), reproducing the stylized claviform sign in the time axis (Fig. 1). This narrative form may give visitors the impression that this piece of music "tells them something," which is a convenient metaphor to explain
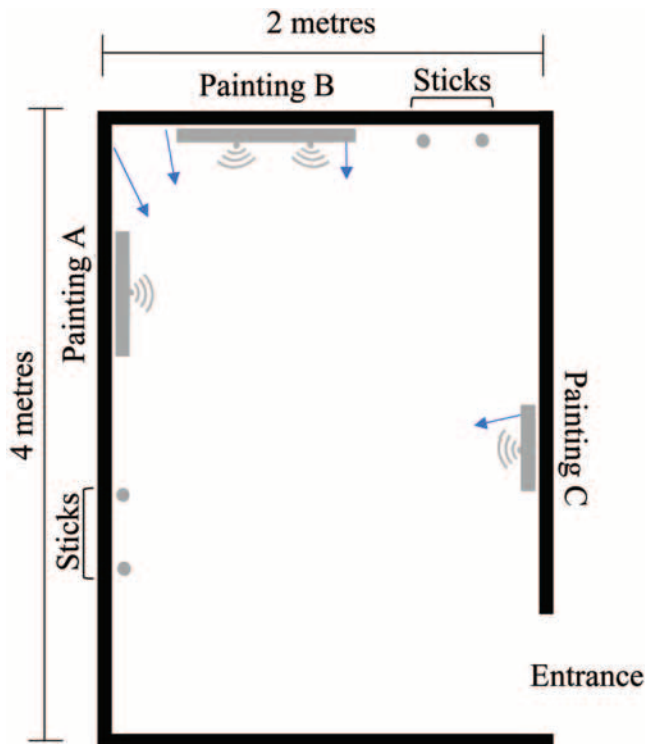
Fig. 2. Floor map of the *Ancestral Symbol* installation as exhibited at CAREX, Spain, 2019.

the connection between sounds and the hypothetical meaning of the claviform. Besides, considering that its meaning is a hypothesis that depends on the way an observer interprets it, the use of interactivity to change the sounds is fully justified in the context of this installation, as it changes only the sounds, not the images, since the meanings of the sounds change according to the visitors' point of view, whereas the images are fixed both in the installation and in the paleolithic caves.

INTERACTIVITY

Interactivity is a key concept found in a wide variety of new multimedia artworks. A sound installation, for instance, might be responsive to visitors' actions in such a way that their actions influence what they listen to. However, if the sounds and their narrative musical organization relate to the meaning of the stylized claviform shape and this meaning depends on the visitors' unpredictable actions, the challenge is to put both things together—to obtain a musically organized result from the visitors' unpredictable actions.

In *Ancestral Symbol*, the solution for this challenge does not use a central software to filter the visitors' actions and organize the sounds musically. Instead, the installation uses four electronic devices that work independently, with no central control. They work efficiently be-

cause the temporal musical organization is distributed onto a spatial organization, which is put to work properly by visitors' movements. As a result, the complexity of the electronic devices is significantly reduced.

The electronic devices are very small to make them as inconspicuous as possible. Each one includes a motion sensor, a small programmable circuit board (an Arduino Pro Mini), a miniature player that plays sounds from an SD memory card (a DFPlayer Mini), a volume control, and connectors (Color Plate C).

Each electronic device has a different set of five sounds, and the Arduino Pro Mini circuit runs the Pure Data software to randomly select which of the five sounds is played each time. However, the five sounds inside each device are similar. In fact, it is as if each device has one single sound that is played in five different variations so that visitors always listen to the same musical idea in different ways, avoiding mechanical repetition and keeping visitors' interest in the installation.

Once a sound is selected, its audio signal is sent to a small vibration speaker (see Color Plate C). The vibration speakers do not make any sound. Instead, they transform sound waves into vibrations, and when they are in contact with reverberating surfaces such as the dried gourds and the canvases used in this installation, they vibrate accordingly, amplifying the sounds that can now be heard. However, as canvases do not amplify sounds very well, I glued patches of foam board behind them to obtain a louder sound. Therefore, there are no traditional speakers in this installation. All sounds come from both the gourds and the canvases and are modified by their natural resonance frequencies. The gourds, which have been used as resonators since ancient times, give the sounds a specific quality that is likely to be similar to the ones our ancestors may have listened to thousands of years ago.

THE SOUNDS

Every sound in the installation is a nonrealistic artistic transformation of recorded sounds, such as sounds from nature. However, for this text, it is relevant to identify a few characteristics that connect them with each painting. Figure 5 displays the sound waves of three sounds from paintings A, B, and C. In painting A, the idea of a mark on the ground
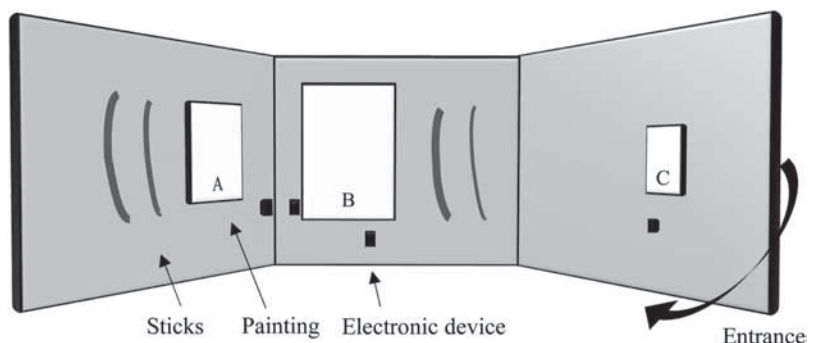
Fig. 3. Illustration showing the elements included in the *Ancestral Symbol* installation as exhibited at CAREX, Spain, 2019.
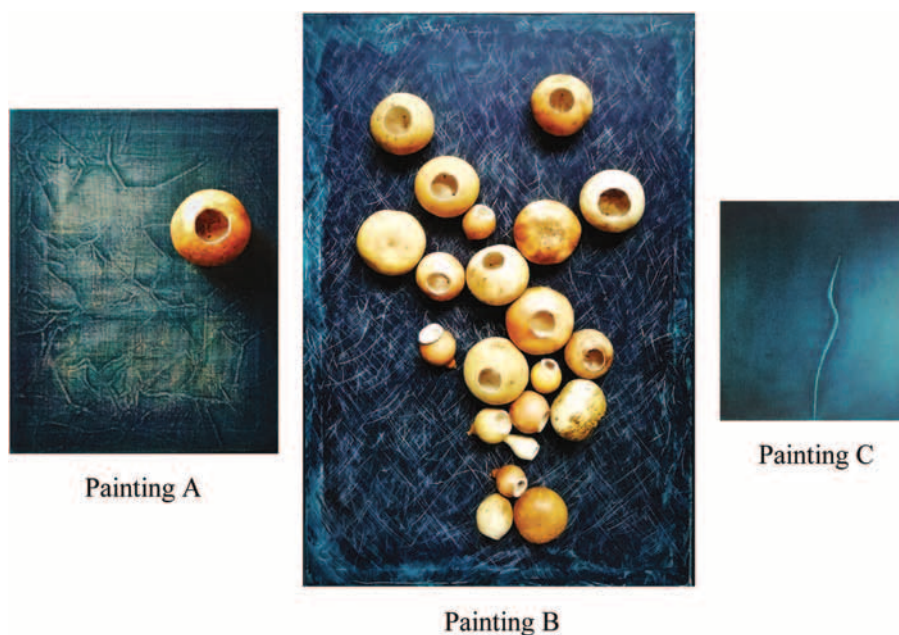
that calls visitors' attention is represented by an irregular and noisy sound (the ground) that attracts your attention and creates expectations because it has a sudden attack (i.e., it starts with the deviation). The gourd sounds, but the canvas does not, reinforcing the idea of a singular mark on the ground. Its sound wave is unstable, with sudden ups and downs, as well as a noisy and complex timbre. Conversely, the sound from painting B is expressive and contrasting, creating the idea of a deviation that requires a resolution in this context. It is less unstable than the sound in painting A. This one does not sound like an attack. It is noisy at the beginning, but with a sense of pitch at the end, and it is not exactly claviform-shaped. Also, the sound comes from a gourd at the center of the painting that causes a few others in contact with it to vibrate, which suggests multiplicity. In painting C, the sound wave resembles the stylized claviform closely. The sound is smooth, clean, and clear in pitch. Painting C has no gourds; the whole canvas amplifies the sound, intensifying the idea of generality and abstraction. Finally, painting B also includes a set of sounds coming from its canvas. These are background sounds that contextualize all the others.

MUSICAL ORGANIZATION AND SPATIAL DISTRIBUTION

The four electronic devices detect the visitors' movements and launch the sounds. They are attached to the walls at average waist height or below. They are barely visible; therefore, most of the interactions are involuntary. Every sound is preceded by 1.5–14 seconds of silence, which eliminates the impression of a mechanical response, similar to pressing a button and immediately hearing the same sound again and again. As a result, visitors have the impression the installation is responding to them, although they do not know exactly how it happens.

Due to the placement of the paintings in the room (Fig. 3), the result is similar to a quadraphonic sound system: One sound source comes from the left (painting A), another one from the right (painting C), and two from the front (the sound of the gourds and the background sound, both from painting B). However, the placement of the paintings produces an asymmetric surround sound: Painting C is not across from painting A, giving the sensation that its sounds come slightly from the back, and painting B is displaced to the left.
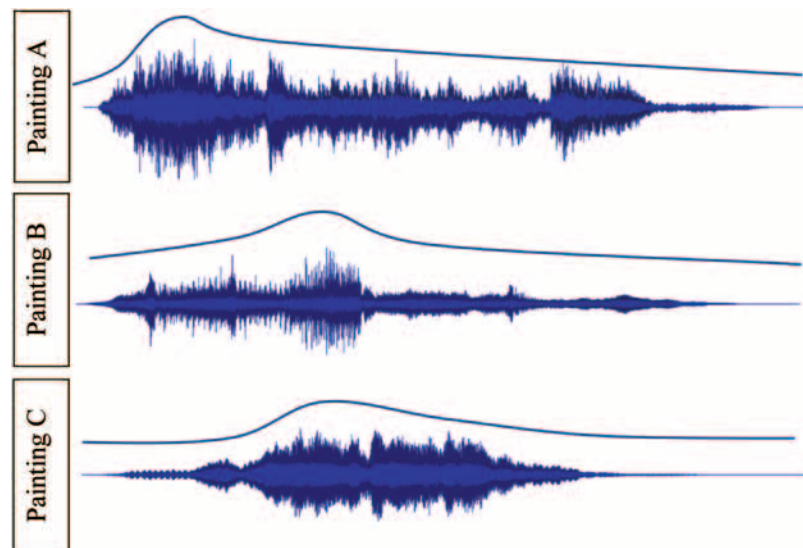
Polyphonic Imitation
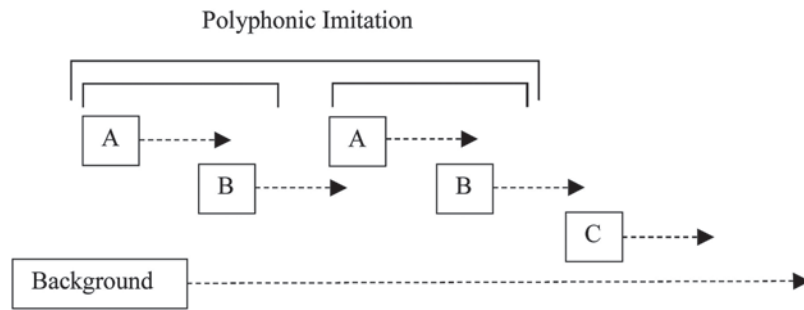
Fig. 6. A possible sequence of sounds coming from paintings A, B, and C, creating an imitative polyphonic texture.

One key point for the construction of a musical organization is that the sounds from each painting fulfill a different musical function. The sounds from painting A function as an opening. They are like attacks calling attention and triggering an expectation. The sounds from painting B's gourds are contrasting and expressive, a deviation from the other sounds, creating tension that calls for resolution. The sounds from painting C serve the function of resolution (release). They are calm and clean, resolving all tensions from painting B, as well as expectations from painting A. Concerning the background sounds that come from the canvas of painting B rather than from the gourds, their function is to create different sound contexts. They last longer (about two minutes) and are not preceded by silence, which is why they follow each other without noticeable gaps. In this way, not only do they contextualize all the other sounds, they also create a continuity that links all of them. Every time they change, they create variation by introducing a different context with a new quality and mood.

Another key point for the construction of a musical organization is the strategic location each painting occupies in the room. The strategic location of the paintings and the different musical functions of their sounds work together so that visitors' movements generate a narrative musical organization whatever direction they move in. As soon as they walk into the installation (see Fig. 2), the electronic devices connected to painting A (the blue arrow on its right) and painting B (the blue arrow on its right) are both triggered. A background sound from painting B sounds before an opening sound from painting A, because all the sounds from painting A are preceded by silence. Note that painting C is hardly visible from this position. If visitors move further into the room, the electronic device to the left of painting B is triggered, and an expressive and contrasting sound is heard, creating a tension that requires a resolution. Visitors now can see two other sticks to the right of painting B. When they turn left to face them (the sticks are visual links between the paintings), the third painting becomes more visible, and the electronic device connected to it plays sounds that resolve the musical tension. If visitors leave the installation at this point, they will do so while a complete musical sentence is being concluded. Even if visitors trigger painting A while leaving, they will hear nothing or very little because of the silences at the beginning of the sounds. However, if visitors begin to wander aimlessly instead of leaving the installation, the sounds will start to overlap in a specific order, creating a polyphonic (imitative) texture. For example, first visitors will listen to an opening

sound coming from painting A and then to a tension sound coming from painting B (see Fig. 6). However, visitors may decide to go back to painting A, and another opening sound is heard. Now, if visitors decide to move to painting C, another tension sound from painting B will sound first and only then will a resolution sound from painting C be heard.

This polyphony could be extended and resolved many times, creating complex textures that could include repetitions (painting A could sound twice, for instance). However, suppose a visitor walks into the room and goes directly to painting C. In this case, a background sound from painting B and an opening sound from painting A will have already started, and painting C will function as a release. Finally, all sounds except the background sounds include silence at the beginning, which were calculated to avoid excessive overlapping. However, in the end, painting C will resolve all musical tensions.

Visitors are an essential part of *Ancestral Symbol*, as in many present-day interactive installations [7,8]. Also, it is important to mention that an interactive installation is not an unfinished work without visitors [9]. Indeed, in *Ancestral Symbol,* all the interactivity rules were created in advance, so it is not an unfinished work despite the visitors' relevance. As Pinto [10] explains, in an interactive installation all interactions take place *after* the work has been created, so that each interaction is an actualization. As a result, at least in certain interactive installations, it is possible to say that artists compose interactions [11]. That is the case in *Ancestral Symbol*: Visitors actualize the previously composed interactions and act more like performers playing a musical score (because of the actualization each visitor generates) than like a composer creating it.

In addition to interactivity, immersion is another key concept present in contemporary art [12], particularly because it offers a different experience when compared with the Renaissance concept of a painting as an open window where viewers are external observers who look through it [13]. In an immersive installation, visitors become participants instead of observers, and the *Ancestral Symbol* installation produces both a visual and a sound immersion into the work. Also, the feeling that the installation somehow responds to visitors' movements through interactivity intensifies the experience of immersion, resulting in an intensified feeling of participation.

CONCLUSION

In the *Ancestral Symbol* installation, visitors' unpredictable movements are transformed into a narrative musical organization. This organization is the result of the strategic place-

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ment of the three paintings in the room in connection with the three specific musical functions fulfilled by the sounds from each painting (opening, tension, and a resolution). In this way, time (music) and space (paintings in the room) are deeply interwoven, and the key piece that connects them is the visitors' movements detected by the four electronic devices.

Additionally, the use of a stylized paleolithic claviform as a basis to connect sound and images works as a deep connection among all the media involved. If its image is the graphic support, the sound is its meaning. It is the claviform shape expressed in sounds—the graphic sign expressed in another dimension. In this way, the installation as a whole work is also a metaphor for the experience of walking into a rough and not easily accessible paleolithic cave thousands of years ago. It is an immersion in ourselves or in our ancestral past through interactions with unknown symbols that insist on telling us that "reality is perceived as consisting of more than that which everyday vision brings to light" [14].

References

1 Video documentation is available at https://youtu.be/lef_XXlVjig.

2 B. M. de la Campa, *Consideraciones sobre los signos en el arte prehistórico de las cuevas de la región cantábrica* (Santander: Asociación de Amigos de las Cuevas del Castillo, 2014) pp. 47–48.

3 A. Martínez-Villa, "New Findings in Paleolithic Art in the Picos de Europa Region (Eastern Asturias, Spain)," *Journal of Archaeological Science: Reports* **33** (2020) pp. 1–17.

4 A. George, "Hidden Symbols," *New Scientist* **232**, No. 3099, 36–39 (2016).

5 J. Nechvatal, "Immersive Excess in the Apse of Lascaux," *Technoetic Arts* **3**, No. 3, 181–192 (2005).

6 D. Cameron, "The Symbolism of the Ancestors," *ReVision* **20**, No. 3, 6–12 (1998).

7 J. Soler-Adillon, "The Intangible Material of Interactive Art: Agency, Behavior and Emergence," *Artnodes* **16** (2015) pp. 43–52.

8 C. Riboulet, "Sobre el arte de los nuevos medios," *Calle14* **7**, No. 10, 136–143 (2013) p. 140.

9 H. C. Suhr, "The Audience and Artist Interactivity in Augmented Reality Art: The Solo Exhibition on the *Flame* Series," *Critical Arts* **32**, No. 3, 111–125 (2018).

10 J. C. Pinto, "The Status of Interactivity in Computer Art: Formal Apories," *Citar Journal* **3**, No. 1, 10–19 (2011) pp. 14–16.

11 L. Hayes and J. Stein, "Desert and Sonic Ecosystems: Incorporating Environmental Factors within Site-Responsive Sonic Art," *Applied Sciences* **8**, No. 1 (2018) p. 111.

12 D. Strang, "Sensitive Chaos," *Leonardo* **48**, No. 3, 286–287 (2015) p. 286.

13 L. B. Alberti, *On Painting* (New York: Cambridge Univ. Press, 2011) p. 39.

14 Nechvatal [5] pp. 189–190.

EDSON ZAMPRONHA *is a composer and researcher with artistic outputs that include experimental music, sound installations and performances. He is a professor and researcher at the University of Oviedo, Spain. Find out more at www. zampronha.com.*

COLOR PLATE C: ***ANCESTRAL SYMBOL:* MUSICALLY ORGANIZING UNPREDICTABLE INTERACTIONS TO CREATE THE SOUND OF A PALEOLITHIC CAVE SIGN**
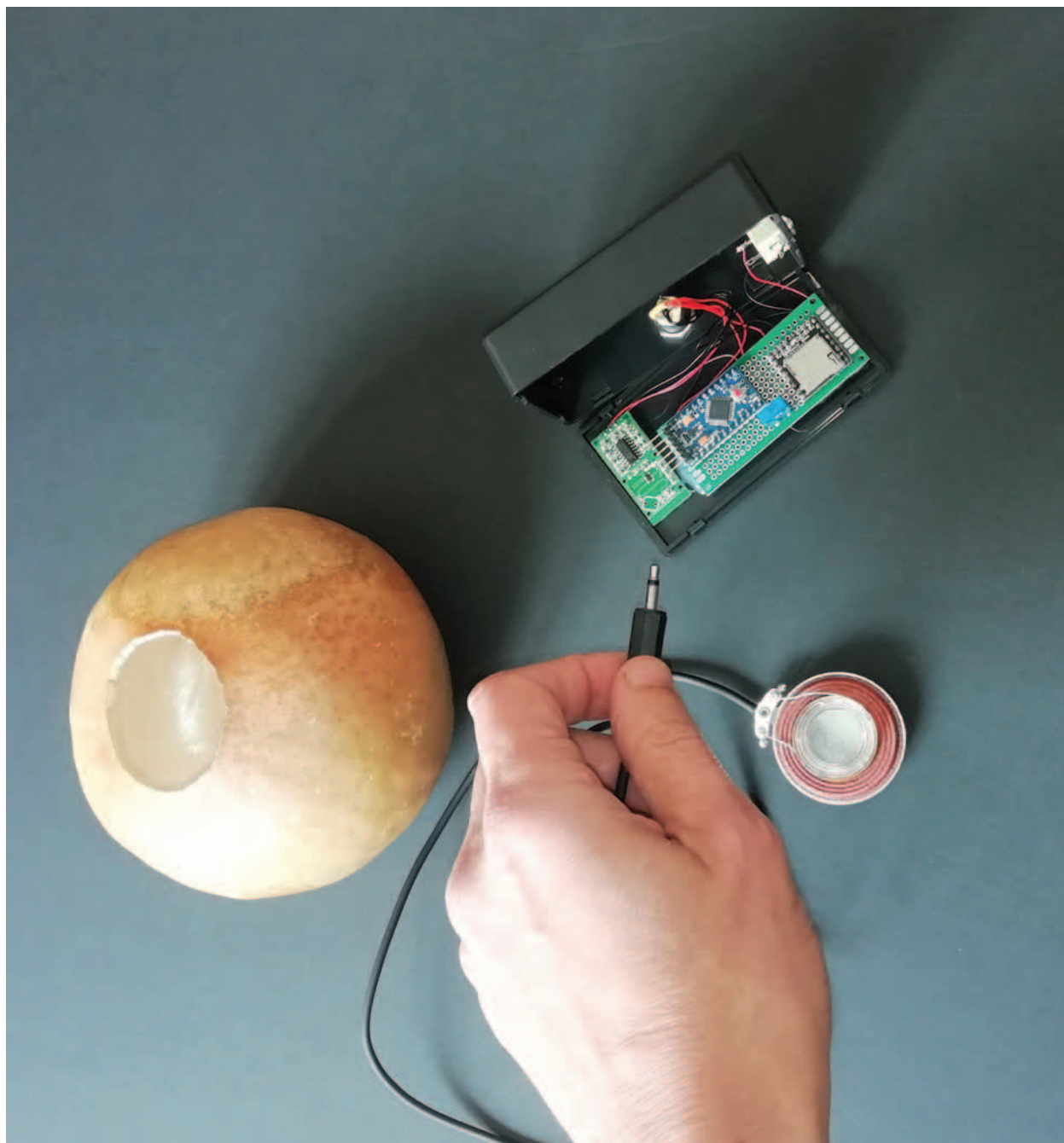
The electronic device, vibration speaker, and dried gourd used in the installation *Ancestral Symbol,* as exhibited at CAREX, Spain, 2019. (© Edson Zampronha) (See the article in this issue by Edson Zampronha.)

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