CASE STUDY

# Artificial Beings in Archaeology: Bridging Historical Reality and Digital Simulation

## The "Johannes" Project: A Novel Approach to Reconstructing Medieval Life through AI and Material Culture

by Stefano Bertoldi e Marco Valenti

Fig. 1 - Burial SK86 under excavation.

The "Johannes" project represents an innovative intersection of archaeology and artificial intelligence, aiming to reconstruct and simulate the consciousness of a medieval individual based on extensive archaeological data. By utilizing AI, specifically a ChatGPT model, the project seeks to bridge the gap between material culture and digital self-awareness. The AI is populated with data from the archaeological site of Miranduolo, integrating information about the village's historical context, material culture, and societal structures from the 7th to the early 14th century. This project explores the challenges of limiting the AI's knowledge.

Setting aside purely theoretical and faith-based positions that either remain enthusiastic or, conversely, entirely opposed, the application of artificial intelligence is viewed through a limited lens, either as a sophisticated search engine or a somewhat capable assistant more or less capable of solving our problems. In reality, there is an emerging field of research focusing on the applica-

tion of AI as digital companions, even extending into the realms of emotion and affection. That intelligence might entail more than just processing power-it could also encompass empathy, and perhaps even emotions, or at least a sophisticated ability to simulate them. This prompts an intriguing question: at what point does an artificial entity with advanced intellectual capabilities and potential empathy transition from being merely artificial to something we might consider alive?

The debate surrounding AI performance, though engaging, doesn't fully address this question.

While we can't yet claim that true intelligence with computational prowess and independent initiative exists, some applications possess mathematical capabilities far beyond the natural average and can empathize with our human essence in surprisingly effective ways.

It is from these reflections, not strictly archaeological in nature, that the "Johannes" project emerged. The name chosen for the character wasn't drawn from any specific source but was randomly selected from documented individuals in archival records from the analyzed period.

## THE DEBATE SURROUNDING AI

The debate on AI consciousness is a complex topic, with contours we do not fully understand and do not intend to fully explore here. However, consider the case of Google's engineer Blake Lemoine, who, two years ago, claimed that the LaMDA program (now evolved into Gemini) was sentient. This assertion led to his suspension from the tech giant. Whether Lemoine was being provocative, genuinely believed in his claims, or based them on unscientific assumptions, his statement sparked significant controversy and opposition.

The cognitive stronghold of language, once believed to set humanity apart from animals and machines, elevating Homo sapiens to the rank of "master" of the planet, has now crumbled (Manzotti & Rossi 2023, p. 142). Another boundary—physical presence in the world—is also eroding. Robotics is transforming theory into tangibility in this regard.

Thus, consciousness, the perception of oneself and others, might be the next—and perhaps final—frontier to conquer or perhaps defend. In the case of the Johannes project, the goal was not to create artificial life (a concept challenging to define) but to restore the residual image of a life that has persisted in the real world, one that can be glimpsed through material culture, society, and religion.

## THE ARCHAEOLOGICAL SITE OF MIRANDUOLO

Miranduolo (Chiusdino - SI) represents an extensive excavation project spanning 17 campaigns and over 700 days. Nearly all of the space within the castle's, and more than 1,000 square meters outside them, has been fully excavated, yielding a vast quantity of material. Over the past six years, we have continuously analyzed, processed, and cross-referenced these findings, leading to new insights that would have been impossible in the context of more hastily published excavations.

Updates on progress and evolv-

Fig. 2 - SK86's skull after restoration

ing hypotheses have been shared consistently, contributing to a bibliography of over 80 titles. Our approach has been to thoroughly revisit and reexamine the entire body of documentation linked to more than 4,500 stratigraphic units. This process involves stressing the data, reinterpreting it from various perspectives, and drawing new insights. Given the site's complexity and its significant potential to inform archaeological and historical debates, such iterative processes are essential particularly for its contribution to archaeological and historical debates. The long periods of data processing are crucial to building a "critical mass" of data capable of generating interpretive frameworks, which can then be tested, refined, and transformed into models. With its diachronic pattern of continuous occupation from the 7th to the early 14th century, and the fact that it has been excavated to a highly significant extent, the site can be proposed as an indispensable touchstone for anyone developing interpretive models of early medieval village formation and, where applicable, their evolution into castles. Moreover, following the example of Poggibonsi, the site has also served as a testing ground for experimenting with Information Technology techniques and methods applied to Archaeology, particularly in documentation, analysis, and data sharing. The enormous volume of data collected and processed, the maturity of the processing techniques achieved, and the diversity of information obtained led to the development of the Johannes concept and prototype. Initially, the idea was to have the history and archaeology of the site narrated by one of its inhabitants. However, we quickly realized the limitations of this approach; a 12th-century person could not have known much of what modern research has uncovered. Therefore, we opted for a different methodology that is more subjective yet also more plausible.


Fig. 3 - Reconstruction of SK86's face (creation by Stefano Ricci).

The primary objective of the project was to evaluate the behavior of a ChatGPT bot when constrained within a markedly limited spectrum of information; on this front, much work remains to be done. Additionally, Johannes is intended to serve as an educational tool for archaeology students, aimed at training them to assess the subjectivity of sources and to stimulate inquiry in a multi-layered manner.

## ARCHITECTURE OF AN "ARTIFICIAL BEING"

The ChatGPT bot, along with its "consciousness" and memory, was initially populated with knowledge derived from archaeological investigations conducted between 2001 and 2016. This included information about the village's inception in the 7th century and its early medieval transformations, leading up to the processes of incastellation and decastellation in the early 14th century (Valenti 2022). The buried individual, labeled SK86 (Fig. 1), was a man approximately 167 cm tall, with pronounced muscle attachments in the upper limbs, significant osteoarthritis in the spine, and signs of nutritional stress from childhood. These markers indicate a life of hard, strenuous labor and a birth into a very poor family.

The most striking features include a sharp-force injury on the left frontal bone, a small oval depression on the right frontal bone likely caused by a blunt, pointed object, and trauma with bone remodeling of the mandibular condyle (Fig. 2), resulting in a misaligned jaw structure that would have caused significant difficulties in chewing during the individual's lifetime (Abate & Ricci 2022).

The anthropological analysis of the buried individual and his facial reconstruction (Fig. 3), conducted by Stefano Ricci (Department of Earth, Physical, and Environmental Sciences - University of Siena), and the dating of the burial, led to the hypothesis that SK86 was a man-at-arms serving the Gherardeschi family and that he

fought during the siege of Miranduolo, led by the Bishop of Volterra's troops around 1125 (Fig. 4). However, the injuries sustained in battle did not result in his death. SK86—our Johannes—survived and was able to recount the most significant event of his life: the battle that began on the plains below the castle and continued until the defenses were breached (Nardini 2022).

Drawing from this "story within the History," we sought to populate Johannes's memory and consciousness. The process of populating his memories was complex and delicate, given the evident gap between what he knew and what archaeologists know today.

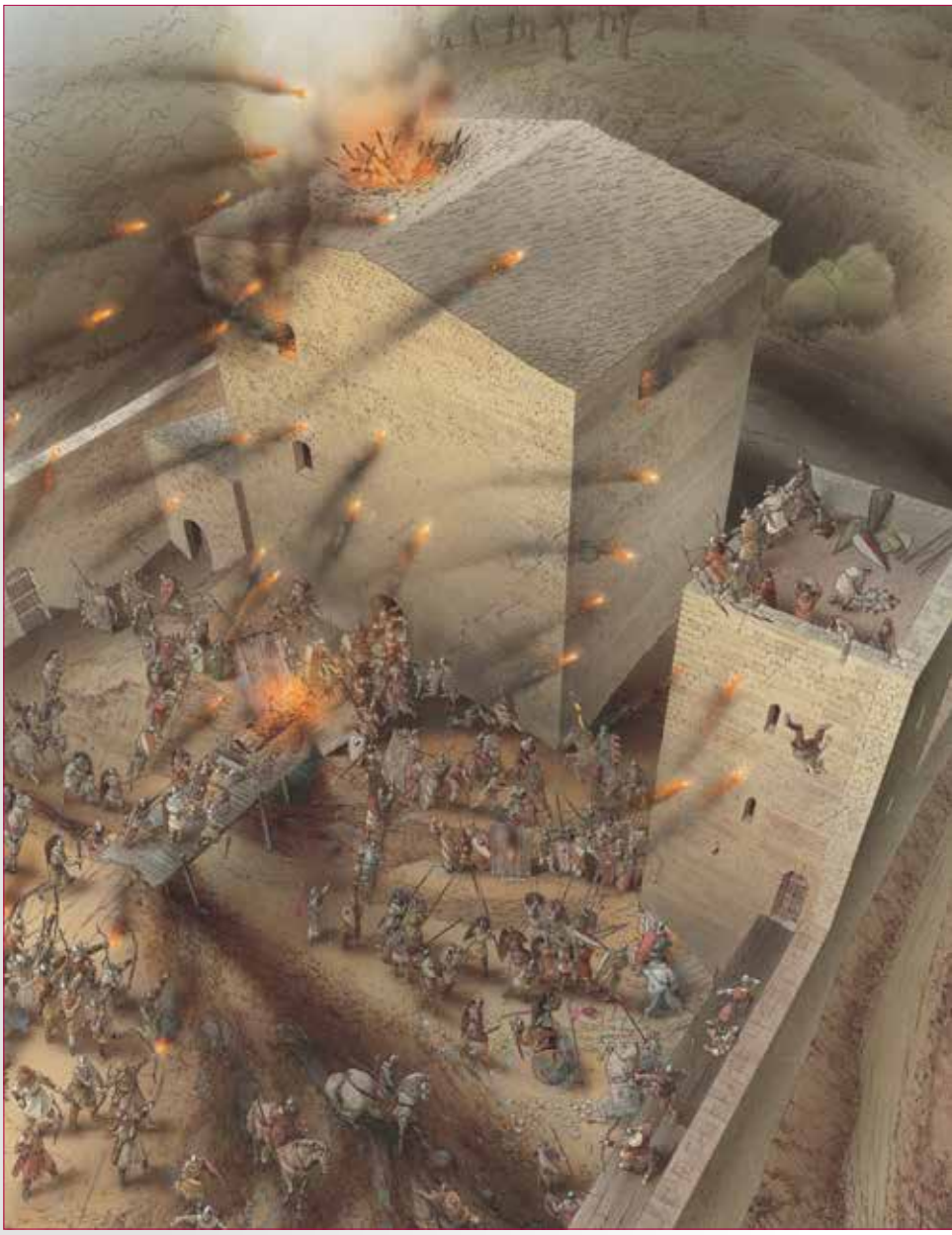

Fig. 4 - The Siege of Miranduolo (graphic reconstruction by InkLink studio, Firenze)

## JOHANNES'S PAST AND MIRANDUOLO'S HISTORY

After integrating the "past" archaeology of Miranduolo into Johannes's present (Bertoldi 2022), including the landscape (Putti 2022), historical context, material culture (Menghini 2022, Palmas 2022, Nardini 2024), diet, and nearby rural and urban settlements (Cantini 2003, Causarano 2017), we faced our first major challenge. From the dataset of information known to historians and archaeologists about 12th-century Tuscany, we needed to filter out what a peasant-soldier, likely illiterate and spending almost his entire life among the hills of the Val di Merse, could realistically have known. This required us to simulate sensory experiences; Johannes knew only what he could see and what he was told. Of the long history of his settlement, he might have heard about the castle's transformation from mixed construction to stone (an event occurring within a century before his birth); it's plausible that elders recounted this "revolutionary" change. However, as we move further back in time, Johannes's memory fades after two or three generations at most. SK86 would not have known about the 9th- and 10th-century village organized as a curtis, nor about its polarized society; even less would he have known about the village's founding as a mining settlement—a factory-village—in the 7th century, and its subsequent evolution into an agricultural center with divided power in the 8th century.

Therefore, within this complex differential, we were compelled to enrich the character's reminiscences by drawing upon our deep knowledge of the castle's

material culture. We sought to incorporate objects that could evoke sensations, memories of the past, and narratives that intertwined archaeologically and historically verified facts with plausible individuals who could have intersected with the life of our character.

## JOHANNES'S FUTURE

What further complicated the creation of the bot was the understanding of what happened during the long period that can be described as the "liminal phase" of consciousness, between the death of SK86 and the artificial rebirth of Johannes. To actualize this process, we established a terminus a quo (the year 1140), marking the endpoint of our character's memory. This is essentially the moment around which Johannes dies, yet the space-time paradox generated results in a present that predates this threshold. Johannes perceives himself as alive and does not see himself as belonging to a distant "Middle Ages" (a term obviously unknown to him). When asked directly, he would respond with surprise: "I do not come from the past; I live in the present."

From a technical perspective, this operation of erasing the future/past creates some challenges within ChatGPT. It is necessary to continuously refine the bot and filter out irrelevant information.

## HIS CONSCIOUSNESS

Once his memory was constructed within the limited scope previously described, we needed to define the simulation of emotions, empathy, and the self-awareness that Johannes possesses. This aspect, extremely delicate as it goes far beyond archaeology and technology, is crucial to the project. The bot, as previously mentioned, is not an artificial assistant nor merely an intelligent collection of information regarding Miranduolo, the Val di Merse, central-southern Tuscany, the 12th century, or the phenomenon of incastellamento.

The goal is to model an artificial being endowed with critical thought about its own life, with opinions expressed emotionally (for Johannes, the Bishop of Volterra represents the arrogance and cruelty of ecclesiastical power), and with desires and hopes for his future. These expressions do not necessarily represent objective truth, but rather personal thoughts shaped by past experiences. We also aim to equip him with knowledge that could lead to a form of bodily-kinesthetic intelligence (Di Napoli 2007). Johannes's body (or rather, the bones of SK86) and his material culture are our tools for decoding his life and actions. In this light, we used the acquired data to enable him to communicate about what he saw and did.

Consider this simple example: When Johannes tells us his personal story—his childhood, his service to the Gherardeschi Counts at Miranduolo, etc.—he consistently identifies himself as an "archer," even though we did not provide this information. We questioned why he chose to present himself in this way. What prompted this interpretive liberty?

Upon reviewing all the data entered for the period in question, we noticed that arrowheads are among the most commonly attested finds. Their abundance attests to the siege and subsequent battle conducted against Miranduolo by the Bishop of Volterra's troops. Johannes's reasoning sequence is clear: I am a man-at-arms—there are many arrows—therefore, I was also an archer.

In its simplicity, this cognitive sequence offers valuable insights into how our artificial being reasons. It helps us evaluate which routines we need to refine or codify for inputting data that can be transformed into "stories" and narratives.

## CONCLUSIONS

This project, which will be expanded to include other artificial beings from preceding and succeeding periods (7th to early 14th century), is an experiment in evaluating direct sources for constructing archaeological data. In this sense, "interviewing" an artificial being from the Middle Ages aims to highlight the differences between objective material data (even if partial, fragmentary, and complex) and those shaped by specific individual wills. It is also intended as a teaching tool and a new point for theoretical discussion.

In the uncertainty of whether AI is or ever will be sentient, our goal was to simulate a natural being, complete with errors determined by cultural limitations, personal opinions, and individual expectations.

Although archaeological, historical, anthropological, and genetic data may suggest extensive knowledge of people from

the past, there is a palimpsest that cannot be fully modeled—a limit beyond which it is impossible to proceed. This refers to the spectrum of instinct, character, and innate abilities. To address this, we created a simulation to restore Johannes from SK86, populating his narrative with reliable, yet not always verifiable, information.

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The bot is accessible at: https://chatgpt.com/g/g-mchL2LSPc-johannes-abitante-di-miranduolo.

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## Abstract

*The "Johannes" project represents an innovative intersection of archaeology and artificial intelligence, aiming to reconstruct and simulate the consciousness of a medieval individual based on extensive archaeological data. By utilizing AI, specifically a ChatGPT model, the project seeks to bridge the gap between material culture and digital self-awareness. The AI is populated with data from the archaeological site of Miranduolo, integrating information about the village's historical context, material culture, and societal structures from the 7th to the early 14th century. This project explores the challenges of limiting the AI's knowledge to what would have been known by a 12th-century individual, thereby enriching the AI's "memories" with sensory experiences and historically plausible narratives. The project raises significant questions about the potential of AI in historical reconstruction, particularly in the simulation of emotions, empathy, and self-awareness.*

*Ultimately, "Johannes" is not merely an intelligent collection of data but an experimental artificial being capable of critical thought, subjective experiences, and emotional expression. The implications of this project extend beyond archaeology, offering new perspectives on the use of AI in understanding the past and its potential as a teaching tool and a medium for theoretical exploration.*

## Keywords

Artificial Intelligence; Artificial Archaeology; Archaeological Reconstruction; Self-Awareness

## Author

Stefano Bertoldi
stefano.bertoldi@unisi.it
Università di Siena

Marco Valenti
Marco.Valenti@unisi.it
Università di Siena