

An artistic exploration of African Intelligence

The Pathway Ngamba across African knowledge systems

'I want to allow African youth to dream', Hadassa Ngamba, artist



Cartography of minds and 'empty spaces':

Cerveau 2 (2019), Hadassa Ngamba, Lubumbashi, DRC.

Material: malachite, cobalt, cassiterite, tar, and chalk on coffee-tainted cotton.

Dimension: ~120cmx250cm.

The artist's long-term project, **Trajet Ngamba** (Pathway Ngamba), is an ongoing effort to reanimate and engage with ancient African knowledge systems, covering areas from rituals and craft to mathematics and trade. Initiated in 2020 in the Democratic Republic of Congo (DRC), the project builds on her early work on colonial **cartography** (chapter 1).

As the philosopher Mary Midgley noted, we live by “*many maps, many windows*” – we need “*many independent forms and sources of knowledge*”. Hadassa Ngamba champions **African Intelligence** as another window, an epistemic alternative to Western thinking. This thinking emerged from the reductionist impulse of Cartesian dualism, ‘**I think therefore I am**’; African Intelligence is captured by ‘**We are, therefore I am**’ (chapter 2).

This alternative scaffolding is rooted in ancient African knowledge systems that champion holism, relationality, reciprocity, and emergence. It insists that all entities—body, spirit, matter, and community—are inseparably related via a web of relationships (chapter 2). The strong insistence on community resonates with the concept of **reciprocity**, dear to the artist. For Ngamba, this is not merely an academic exercise; she wants to ‘allow African youth to dream’ of a future full of promise.

Far from being only spiritual, **African knowledge systems** are characterised by rich and varied forms of expression, ranging from the symbolic to the semantic, from rites to trade, and demonstrate a deep understanding of mathematical and scientific concepts (chapter 3).



Hadassa Ngamba in her London Studio (2025)

Ore Pigments as historical markers

Hadassa Ngamba's artistic practice firmly asserts materiality as a site of historical consciousness. In her paintings, such as *Cerveau 2*, she replaces oil paint and acrylic with pigments derived directly from ground ore—including malachite, copper, cobalt, and coltan—extracted primarily from the Congo. These pigments function as living archives carrying the memory of territories, bodies, and the geopolitical violence that permeates them. Her practice resonates with ancient traditions, such as the Egyptian use of Malachite, positioning her technique within a millennia-old tradition.

Ngamba directly opposes functionalist modernism, inherited from the Bauhaus school. There, material is reduced to a vector of industrial production, which strips the act of making from its spiritual and historic dimension. In contrast, Ngamba's ore pigments in her paintings become the palpable remnants of history. They simultaneously symbolise the modern desire for digital progress and embody the bloody trace of the Congo's mining wars and colonial exploitation.

Expanding the Palette: In 2025, during her stay in London, Ngamba began expanding the variety of ores used to include **heterogenite, aragonite, cobalt-bearing calcite, and pink cobalt salt**. She also applied new binding techniques, yielding colours that range from almost transparent washes to very dense hues.

In *Trajet Ngamba*, the artist explores the large variety of African Intelligence(s) with a wide artistic spectrum: In her performances, she re-stages ancestral rituals to reconnect with and reanimate ancient forms of knowledge sharing; utilizing Extended Reality (XR) she makes the history embedded in former colonial architectures accessible to African youth, reclaiming these spaces digitally; she works with local dignitaries on reanimating old trade routes.

In her paintings and sculptures, Ngamba confronts the damage of colonial history by dissecting colonial maps (chapter 1) but also by putting forward the materiality of rich Congolese natural resources and the virtuosity of ancient African craft. She uses **Congolese ore as pigments** to express the ambivalent status of these resources, caught between their tragic history of exploitation and their fundamental beauty.

Hadassa is fascinated by quantum physics ever since her visit to CERN in Geneva and by network science ever since her study of colonial extraction networks and cartography in Congo. She wants to develop her own art-based theory of African Intelligence and is planning to collaborate with computer scientists, physicists, and complex systems scientists to expand her research horizon.

She sees potential links between the “**two AI's**”: AI - **African Intelligence** - critically reframes the AI - **Artificial Intelligence** - discourse. Her idea is to move beyond Western-centric models and instead integrate in particular young Africans into the digital discourse. A Western AI (like a neural network) is a “black box” that processes data points extracted from their context. An “African AI,” inspired by African Indigenous Knowledge Systems, would be a Relational Engine, where a data point is meaningless without its “lineage” or connection to the whole.

Manthia Diawara in ‘AI: African Intelligence’ was one of the first to explore the “contact zones” between Artificial Intelligence and African rituals of possession, the Ndeup ceremony of the Lebu tribe—a healing ritual practiced in fishing villages in Senegal. He questions the Western-imposed elimination of everything that is not rationally understood.

Hadassa imagines a collective ‘Denkraum’, a **Makutano** (Swahili, meaning meeting place, junction, or confluence) that she sees as a pathway through African knowledge systems; it will allow exploring links between the past and the present, between different regions and different forms of knowledge (chapter 4).

In depth art view: Enlarging the Ore Palette



Untitled (2025)

Hadassa Ngamba, London, UK

Material: heterogenite, aragonite, cobalt-bearing calcite, pink cobalt salt, and cassiterite on cotton

Dimension: ~ 125cmx250cm

Ambivalence and the Color of Conflict

Hadassa Ngamba spent her initial months in London in Hampstead, finding enjoyment in the local parks. Her paintings from this period capture the joy and tranquility of these walks (note the detail featuring the dog). However, during her time in Hampstead, she was simultaneously confronted with news of the tragedy unfolding in Goma (East Congo).

This emotional collision is reflected directly in the artwork. The use of an unusual red - made mainly from pink cobalt salt - for what might otherwise be a landscape signifies the profound ambivalence between the peaceful environment of the London park and the bloodshed in Goma. This intentional duality forces the viewer to reconcile the contrasting realities. The Nkisi statue (see detail below) incorporated into the painting also hints at this ambivalence, drawing a connection between ancestral spiritual power and contemporary conflict.



Detail (dog)



Detail (Nkisi statue)

1. Colonial Maps and Marginalised Indigenous Knowledge

Colonial Cartography: Beginning in the late 19th century, colonial powers established rigid state borders and linear city plans that often inadequately reflected identities and economic dynamics. These arbitrarily drawn borders continue to instigate conflicts over territory and resources, as demonstrated by the recent conflict in East Congo.

In the Berlin Conference of 1884, King Leopold II of Belgium presented a misleading narrative of bringing “progress” to Africa. He referred to the continent as an “empty space” to justify his exploitation of the resource-rich Congo. Leopold II leveraged H. M. Stanley’s explorations and detailed cartography of the Congo to further his exploitative agenda.

Hadassa Ngamba’s artistic practice directly confronts this history; she “literally dissects colonial maps of Congo”. By creating “mental cartographies” in works like *Cerveau 2* (2019), she highlights how these colonial borders fragmented her country.

Cartography of an ‘empty space’

Hadassa Ngamba literally dissects colonial maps of Congo. The colonial map was never a neutral document; it was a tool designed to frame Africa as an “empty space” to be appropriated, erasing indigenous histories to justify exploitation.

Cerveau 2 functions as an abstract map of a space that is simultaneously “mind and land”. By intentionally deforming the rigid configurations of colonial space, these distorted grids become new maps of the land. She deconstructs the narrative of the “empty space” by scattering green spots of malachite across abstract terrains, representing people and reclaiming agency within the rigid configurations of colonial space.

See article [New York Times](#) and [Observer](#)

The Colonial Library and digital fragmentation: Colonial powers attacked and marginalised indigenous knowledge, effectively liquidating the shared history that bound Africans together. This historical erasure - creation of an ‘empty space’ - is captured by V.Y. Mudimbe’s metaphorical “colonial library”. This “library” devalued indigenous epistemologies as “primitive” through anthropological studies, missionary sermons, and exoticized art.

This epistemic domination went of course hand-in-hand with material exploitation, extracting African ore to fuel European industries. Today, a “digital echo” of the colonial library persists, as the digital economy remains reliant on ore mined in Africa. Colonial patterns are further perpetuated by non-reciprocal data collection and infrastructure financing from global powers like China, which reduces African nations’ capacity for independent technology and trade policies.

What is more there is a tendency in today’s digital ecosystem to encourage intellectual isolation. The initial promise of the Internet was utopian: a universal digital repository akin to an “Alexandrian Library” or a global “Greek Agora”. However, the contemporary reality is an ecosystem drowning in decontextualised information. This challenge is “digital fragmentation,” an intellectual isolation caused by algorithmic curation—such as Google’s text-based search—which strips knowledge of its essential context, reducing it to mere ‘data’.

Trajet Ngamba is a call for epistemic justice. Her focus on African Intelligence stands as a necessary challenge to the digital fragmentation that threatens—as a digital echo of the colonial library—to render profound, holistic African knowledge isolated and decontextualised. Just as Ngamba replaces oil paint with pigments derived from ground ore to assert “materiality as a site of historical consciousness,” she seeks to prevent African knowledge from being reduced to isolated data points.



Detail: *Cerveau 2* (2019), Hadassa Ngamba

Kate Crawford & Vladan Joler’s *Anatomy of an AI* provided a comprehensive mapping of the hidden costs associated with a single consumer device, the Amazon Echo. Their infographic traced the full scope of extractive processes—materials, labor, and data—involved in production, going beyond the typical hardware stack. The work exposed the complex chain of production, including humans, minerals, and ecosystems. This collaboration argued that a new form of global extractivism has taken hold, one that penetrates the farthest reaches of the biosphere and the deepest layers of human life.

2. Ontological holism: relationality and reciprocity

African Intelligence represents an alternative to reductionist Cartesian thinking for organising reality. It is fundamentally driven by **ontological holism**, best captured by the Ubuntu dictum '**We are therefore I am**'. This philosophy insists that an individual's existence is tied to the existence of others, and that spiritual and material components are never viewed in mutual isolation. Mind, body, and spirit are entwined in a "**web of relationships**" via social bonds, ancestors, the environment, and 'the divine'. The philosopher I. Asouzu puts forward the concept of "missing links," arguing that every entity exists because it serves as an essential component of the irreducible whole.

Semantic Holism is important in AI (use in word embedding in contemporary AI) but is limited to semantic aspects of defining meaning of a word in the context of other words. Meaning and concepts are shaped by their relationship to all other words and concepts (reminiscent of Wittgenstein's 'meaning in use').

This interdependence implies inherent social obligations towards the community and a sense of collective responsibility: 'bonds' of **reciprocity** constitute a core tenet of communal life in Africa. Hadassa makes reciprocity an essential element of Trajet Ngamba. She is inspired by a practice in Central Kongo where the community decides to attribute land to persons based on their merit in using the land. Those given the land then initiate others in their practices (see Identity Simulacra). This communal reciprocity extends to the whole of economy: **reciprocal economy** means rethinking trade and investment so that local communities gain sustained benefit.

Identity Simulacra: Reclaiming personal memory

In this 2021 performance ([see video](#)), Hadassa directly confronted the bureaucratic erasure she discovered in her grandmother's 1960s identity card, which reduced her occupation to a single, limiting word: "*married*".

This official record stood in stark contrast to her grandmother's life in the 'Bas-Fleuve' district, where she was a respected dignitary endowed with important functions under Congolese customary law. She was actively involved in the reciprocal economy: cultivating the soil, raising goats, and negotiating with merchants, and sharing her breeding expertise with her employees.

Ngamba viewed this as a powerful example of the "colonial library's suppression of identity". To counter this historical flattening, the artist embodied a new, empowered identity through ritual gestures, showing that personal memory cannot be confined to written records.



12 Fungi miniature sculptures (2023)

Hadassa Ngamba, Brussels and Ghent, BE
ceramics and crystal; height varying from 5cm to 12cm

Reciprocity finds its conceptual glue in Hadassa's work in the metaphorical use of **sympiotic fungal networks** and plant life. She integrates fungi as a central element in her sculptural creations, positioning them as symbols of interconnectedness and entangled identity.

Hadassa is fascinated by Complex Systems Science (CSS), a **holistic method** that focuses on how parts interact to form the "irreducible whole" in systems as diverse as financial, social or biological: the brain, urban transport, stock market, cells, or ant colonies.

CSS tells us *how* complex entities behave, African holism tells us *what* a true "whole" must include – i.e. the inseparable unity of people, nature, and spirit.



Identity Simulacra (2021),
performance at
Biennial Sonsbeek, NL

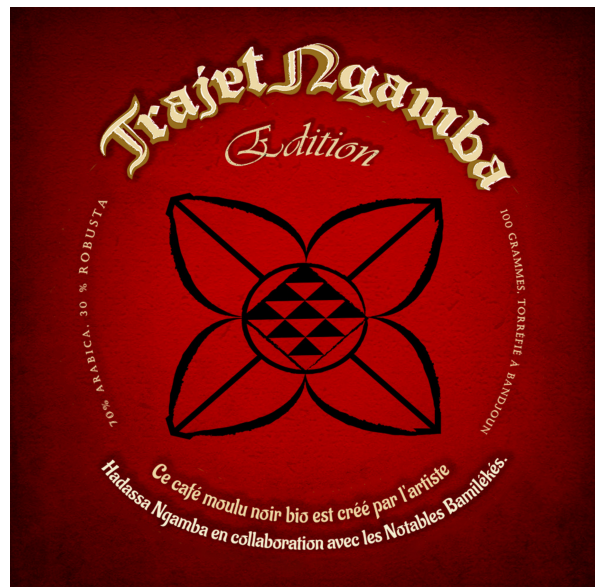
In depth art view:

Reanimating Ancient Trade Knowledge

A pillar of Trajet Ngamba focuses on the sophisticated pre-colonial trade routes that once defined the commerce of the Kongo kingdoms. A 40-day journey in Kongo-Central (2019) revealed a sophisticated legacy of trade networks established by postcolonial Congolese pioneers, a legacy which includes her own father.

Ngamba engaged with local dignitaries (chef Coutumier) who detailed the mechanics of the National Route Number 1 (RN1). They explained its major nodes, operational systems, and the original trade incentives that led to its creation of these trade networks in Kongo with nodes like Malebo and Mbanza-Ngungu serving as established trade centers.

By demonstrating that the RN1's longevity stemmed from its alignment with older trade nodes and its foundation in reciprocal commercial interactions, the project reclaims both the route's symbolic and functional ownership.



Ngamba translates the abstract concept of reciprocal exchange into tangible economic practice through **Trajet Ngamba: The Edition Cafe (2024)**.

By collaborating with traditional Bamiléké dignitaries in Cameroon, Ngamba directly revitalizes pre-colonial trade routes. The project is positioned as an artistic work—the Edition Cafe will be sold as an artwork—intended to foster reciprocal trade across Africa and the world.

This commercial gesture is also artistically encoded in bronze sculptures. Ngamba created larger fungi sculptures—linking back to the symbiotic metaphor—and imprinted them with stamps from the Edition Cafe (see also in depts art view: Bronze Fungi).

In depth art view: Reanimating Ancestral Rituals:

Pathway Ngamba performance at Liverpool Biennial (2025)

As part of the Trajet Ngamba project, this performance transforms the body into a 'living archive' focused on ancestral rituals. By enacting these rituals in public space, the artist demonstrates that ancestral wisdom resides not in written records but in physical gestures and the body itself. The artist's work often involves anointing herself with materials like palm oil, sandstone, and red pigment extracted from 'Tukula' wood. She views the substances used in ancestral rituals not just as artistic media, but as a sophisticated "technology" for transmitting knowledge across generations.

The Liverpool performance was specifically inspired by the Kikumbi ritual, an ancestral fertility practice from the Kingdom of Kongo. Kikumbi is more than a spiritual event; it's a profound social knowledge system that initiates young women into essential family and social structures. Ngamba integrated this ancestral tradition into a transnational context by posing in a suit of a successful business women while at the same time covering her body with a mixture of palm oil and sandstone—specifically, sandstone used in the construction of the Liverpool Cathedral. Sandstone was chosen as a foundational material of Liverpool's geology, architecture, and colonial history. Palm oil functions as a dual signifier. It is both a sacred ritual balm for protection and blessings (used on babies' spines) and a violent colonial commodity that historically connects the city to the Congo.

During the performance, the artist embraced members of the public. This gesture signified the historic Congolese entanglement with Liverpool while simultaneously proposing a symbiotic future interaction with the city's citizens.

see [video](#).



Reanimating Ancestral Rituals: Pathway Ngamba performance at Liverpool Biennial (2025)

3. Indigenous Knowledge Systems: Embodied and Relational Memory

For Hadassa Ngamba, African Intelligence fundamentally reframes ancient African craft, rituals, and artefacts as sophisticated, context-aware "technologies" for organizing social structure, transmitting knowledge, and performing memory restoration. They immerse memory into the fabric of society, rather than offloading it to isolated texts. African communities keep memory through communal, **embodied memory practices**.

Knowledge lives in 'multi-sensorial' archives:

In **oral tradition and rituals** - stories, myths, and teachings are shared through songs, dances and initiations. Ritual ceremonies (for birth, coming-of-age, death) are *acts of communal remembering* that reinforce social bonds. For instance, **Kasala** of the Luba Empire is free-verse, eulogistic oral poetry recited to dramatize public events, praise important figures, and convey collective emotions.

Also **artefacts** - carved masks, painted fabrics, and ceremonial objects - encode history and connect the wearer with ancestral stories. The **Kongo Nkisi statue** exemplifies this; it is viewed as both, visible matter and a nexus of spiritual force.

Indigenous knowledge systems cover a variety of forms ranging from sophisticated mathematical concepts over symbolic systems to encode meaning to forms of non-lingual communication:

Visual Logic: Adinkra Symbols from the Akan people of Ghana function as visual shorthand for complex knowledge. There are hundreds of symbols, for example, the crocodile symbol (Gye Nyame) indicates dependence on the divine, while the *Sankofa* symbol (a bird looking backward while moving forward) represents the wisdom of

"Africans carry their Instagrams in their heads and bodies."

integrating the past to build the future. These symbols provide a visually rich medium for encoding meaning that contrasts with purely textual rules. Similar symbols inspired the interface for the first Apple computer by Steven Jobs. The physicist Jim Gates reflected on use of these symbols to get new ideas in supersymmetry.

Number Theory: Ishango bone, a notched bone tool dated to approximately 20,000 BC, is

Carlos Amorales's work addresses communicating through means that are unrecognizable or not codified: sounds, gestures, and symbols. He rejects fixed symbols in favor of associative, dynamic, and relational models of knowledge creation. Amorales experiments at the limits between image and sign with an array of platforms: animation, video, drawing, installation, performance, and sound. Instruments become characters in his films, letters become shapes, and narratives unfold as non-verbal actions.

The "**Liquid Archive**", 1998, is composed of shapes, lines and nodes instead of words. He has developed other alphabets and systems that he uses to translate texts that range from museum labels to short stories.

considered to be the world's oldest known mathematical instrument. Unlike earlier theories that suggested it was merely a tally stick or lunar calendar, the detailed groupings of notches etched into its three columns are now widely interpreted as demonstrating a sophisticated understanding of arithmetic. It might even have been used as a mathematical sieve to isolate prime numbers, a concept foundational to modern number theory.

Combinatorial Wisdom (Ifá Divination): The Yoruba Ifá divination in Nigeria and Benin, is based on 256 'binary' *Odù* signs, selected by casting an instrument called, the opele, consisting of eight palm nuts. Each of the resulting $2^8=256$ *Odù* corresponds to an extensive corpus of wisdom, verses, proverbs, and stories (*ese*). The result acts as a reference point but meaning is ultimately generated through dialogue between a diviner and the querent, aligning the wisdom with the person's specific context. Ifá serves as a metaphor for empathic computing that emphasises human responsibility over outsourcing decision-making to an opaque machine.



Embodied Knowledge: Pygmy Cartography of tribes at the equator is a highly sophisticated form of spatial knowledge, not confined to maps but expressed through lived, somatic memory, vocal performance, and ritualised journeys. Environmental reference points— trees, rivers — function as nodes, while the paths connecting them are constantly reconfigured based on external conditions, including hunting patterns and seasonal changes. Collective movement is synchronised through techniques like polyphonic chants.

The **Kongo Cosmogram** (also known as the Dikenga or Yowa cross) maps the four stages of life and nature onto a circle - birth, maturity, death, and rebirth aligned with sunrise, noon, sunset, and midnight. The circle spans both physical and spiritual realms, encoding a continuous, cyclical path rather than a single, linear trajectory.

Egyptian Hieroglyphs form a complex and highly flexible script that combines symbolic, phonetic, and semiotic components. It's often described as a mix of ideographic, logographic, syllabic, and alphabetic elements: Phonograms representing specific sounds, similar to letters or syllables; signs, functioning like an alphabet, representing a single consonant, logograms (Ideograms) representing an entire word or concepts directly, often depicting the object they signify, and determinatives - non-pronounced signs placed at the end of a word- , not for phonetic value, but to clarify the meaning or semantic category of the preceding word.

Dédoublement - 'spiritual doubling'- refers to the belief that an individual (often a sorcerer or spiritually powerful person) can project a spiritual double or phantom self to another location while their physical body remains stationary. In a metaphorical way you might link this idea to the concept of superposition, one of the most counterintuitive aspects of quantum physics.

The **Kongo *Nkisi* statue** serves as a sophisticated installation—simultaneously visible matter and a nexus of invisible forces. Its central component is the *mooyo* (belly), a cavity often sealed by a mirror, which houses *bilongo*, substances selected for their "linguistic, metaphoric, and symbolic" properties. In this dormant state, the spirit exists in "superposition" within the invisible realm (*Ku Mpemba*), simultaneously capable of multiple contradictory states—healing, hunting, or protecting—without being fixed in any one of them. This infinite potential collapses only when the *nganga* (operator) performs the ritual act of *koma* (driving a nail); his act serves as the "observation" or "prompt" that forces the invisible probability to manifest as a single, tangible effect in the visible world of *Ku Nseke*.



Mangaaka Power Figure (Nkisi Statue)

Yombe-Kongo artist and nganga (ritual specialist)
ca. 1880–1900

TheMet, New York, US

African Pharmacopoeia serves as the written and scientifically validated standard for using plants for medical and healing purposes in Africa. This represents an indigenous intellectual property system—a profound understanding of the identification, sustainable harvesting, preparation, and therapeutic application of medicinal plants in the vast and unique biodiversity of the continent, often passed down orally through traditional health practitioners.

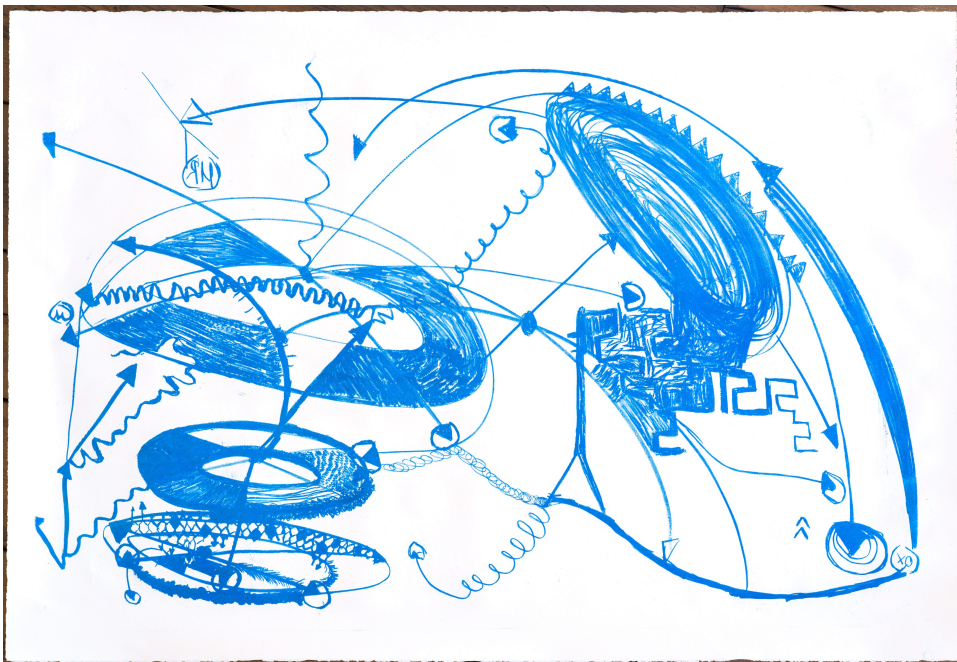
In depth art view: Feynman Series of Lithographies (2024)

A dialogue of ancient and contemporary symbols

This series of lithographies - created at centre Frans Masereel - combines Feynman diagrams - known from elementary particle physics - with symbols - royal "Mphoo" headdresses - of ancient Kongo kingdoms. The artist reflects on the use of symbols across time: she opposes the symbols representing the most advanced equations of physics that mirror reality in unprecedented precision to symbols of power from ancient times that created a reality of power relations.

Feynman diagrams represent elements of equations describing elementary particles as studied for example at CERN in Geneva. While on the one hand a shortcut to write equations, that allow to calculate precisely experimental outcomes, these diagrams can also be seen as representing real physical processes like collision/creation of elementary particles. The symbols of ancient Kongo kingdoms - especially the royal "Mphoo" headdresses - are a composite element of a power that has now disappeared. These headdresses once embodied and structured authority in this kingdom and even today some local leaders in Kongo rely on such symbols to affirm their power

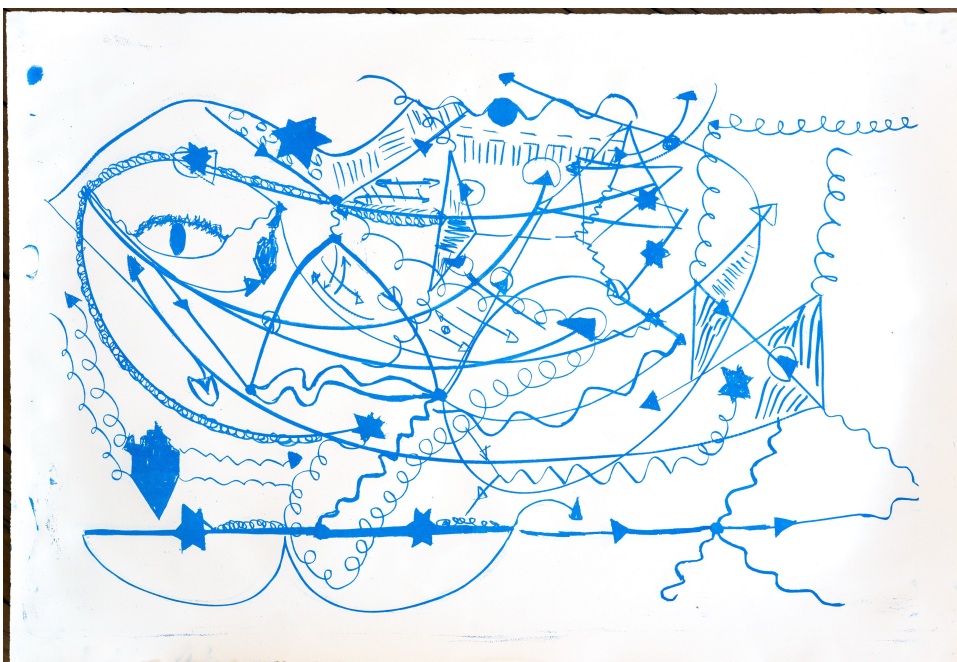
She developed a special "**Hadassa bleu**" ink, a unique blend of cobalt and palm. It links cobalt, the strategic metal of the information age, with palm oil, the historical commodity that brutally tied the Congo to the colonial trade



Feynman lithography (2024)

Edition of 10
Hadassa Ngamba,
Masereeldijk, BE

'Hadassa bleu' ink
mixture of cobalt and palm oil
dimension: 75cm x 112cm



Feynman lithography (2024)

Edition of 10
Hadassa Ngamba,
Masereeldijk, BE

'Hadassa bleu' ink
mixture of cobalt and palm oil
dimension: 75cm x 112cm

In depth art view: The Bronze Fungi Sculpture Series

Combining Symbols and Stamps

In these sculptures the artist combines her favorite symbols for reciprocity and symbiosis - fungi - with stamps for the packaging of the ***Edition Cafe of Trajet Ngamba (2024)***. The sculptures - not unlike the Egyptian hieroglyphs - become at the same time symbols (of symbiosis) and scripts (tools for stamping merchandise).

Looking ahead, Ngamba plans a series of Fungi bronze and wood sculptures, She envisions a "fantastic forest" teeming with these fungi sculptures, potentially enhanced by XR, further amplifying her message of symbiosis and reciprocity.

Bronze Fungi sculptures (2024)

Hadassa Ngamba, Bafoussam, CA

Material: Bronze

Dimension: ~70 cm height,
~40 cm diameter, ~ 40kg weight,

The prototype of the Fungi Series is
part of the collection of Zeno X gallery,
Antwerp, BE



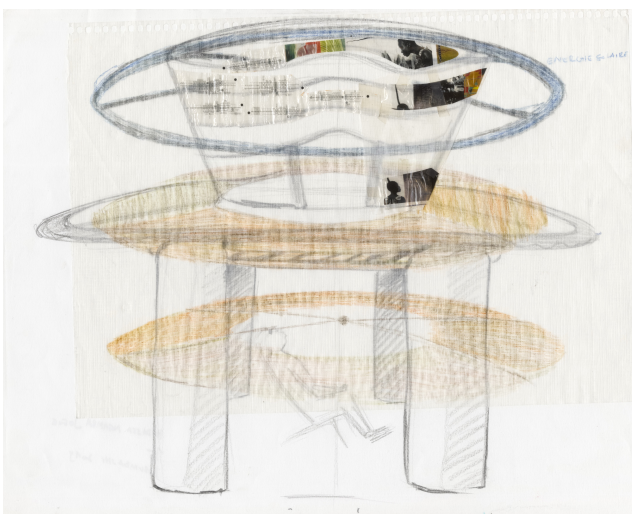
4. The Living Atlas: A Pathway across ancient African knowledge systems

The **Living Atlas of African Knowledge (LA)** is conceived as an **interactive multi-modal network** of images, videos, texts, architectural/urban (historic) data, and 3D scans of ancient artefacts. It could become a (digital) *collective* 'Denkraum', a **Makutano** (Swahili, meaning meeting place, junction, or confluence), that complements and enables human interpretation. Users might navigate the web of connections—exploring how a ritual links to a symbol, which connects to a narrative, and so on.

Examples of digital archives

The **Digital Benin project (2022)** is a database of over 5000 historical objects looted by British forces from the Kingdom of Benin (now Edo State, Nigeria), currently scattered across 139 institutions in 21 countries. The platform aims to connect these objects to oral histories, historical context -including the Itan Edo, story of Benin kingdom, provenance records, and an indigenous Edo language catalogue. It replaces generic museum taxonomies (e.g., "pottery") by a indigenous, **relational context based taxonomy** that connects objects to their indigenous Edo designations, providing crucial context about their traditional use, production, and function. Visualization functions facilitate the study of data by mapping the complex connections between people, entities, objects, and archival documents.

A recent Chinese project built a **multimodal knowledge graph of intangible cultural heritage** by crawling official heritage websites and millions of images. They obtained ~3,000 heritage entries. This required vast scraping, NLP, and computer vision effort. It shows that even for a single country's heritage, constructing such an atlas is a major technical endeavor.



'Living Atlas installation' (2025)
Hadassa Ngamba, Brussels, BE
Drawing on paper

Traditional archives favour fixed categories over dynamic association. This prevents the discovery of knowledge that transcends pre-defined boundaries, leading to an archive optimized for retrieval of the already known rather than for creative synthesis. A new, emergent category of knowledge cannot be perceived because all related elements have already been sorted into existing silos.

Current digital archives overcome this problem in some sense and allow to create different taxonomies. They abstract data into digitally curated taxonomies that can be changed. But they still reduce contextual information and make it hard to create context on the fly. But the human mind operates by association, dynamically linking concepts and memories. The value of an archive lies in the semantic linkages between disparate elements.

Contemporary work in digital humanities explicitly models its interfaces and data structures after the Warburgian system, as a series of conceptual "pathways". These pathways trace conceptual correspondences. Users often benefit from expert-curated narratives. These "guided pathways" allow to navigate the dense network, turning complex data into narratives and structured arguments. We propose adopting **contextual embeddings** inspired by Aby Warburg's associative taxonomy in Mnemosyne Atlas.

Bilderatlas, Mnemosyne Atlas of Aby Warburg

was an early attempt at "contextual embedding" to create associative symbolic taxonomies. The philosophical cornerstone of this structure was the "law of good neighbor" that encapsulates the goal of the associative archive: creating conceptual adjacency that promotes unexpected, useful connections.

The atlas is a collage 971 images (from Renaissance art to science diagrams). Instead of tracing art history through a sequence of styles, Warburg specifically focused on tracing the recurrence of movements and gestures in images, linking antiquity to the Renaissance and beyond. The selection, number, and arrangement of the 971 images were constantly changing. The primary linking principle is the **Pathosformel**. This concept identifies expression of intense emotion, typically conveyed through human pose or gestural energy.

He imagined that these **pathways**, "constellations of symbolic images", would animate the viewer's memory and reveal the "afterlife of antiquity" in modern culture. He did not organize by chronology or discipline, but by symbolic correspondences – for example, images of dance and gesturing arms that span centuries. The result is a nonlinear visual archive meant to trigger cultural memory and associations, not to catalog facts.

LA is a **knowledge network** leveraging ideas from data science and complex network theory. Imagine each node as an entry: a piece of oral history, a line from a folktale, a colonial archive entry, a symbol, or a 3D scanned artefact. Edges connecting these nodes encode meaningful relationships, including semantic similarity, historical influence, kinship ties, shared locations, or ritual correspondences, rather than simple keyword taxonomies.

David Chavalarias’ “phyloMEMETIC” methods, analogous to biological phylogenies. Inspired by network science, they reconstruct the evolution of ideas by analysing large text corpora over time. They show how ideas transform over time in scientific fields which can be applied to ancient knowledge. see “Exploring, browsing and interacting with multi-scale structures of knowledge”.

Following Warburg, establishing links (edges) will be often done via human/artistic judgement, in particular associative connections could be made by artists or users based on their intuition. LA is conceived as an **artistic pathway** (inspired by Trajet Ngamba), that is jointly constructed by artists and engineers.

The core question is **what type of data and what type of relations among the items** will be needed to make the LA work. The ‘*Copper and Urban Oxidation*’ and ‘*Serene Table*’ gives some first ideas of data from the artistic work of Hadassa.

A full-fledged LA will face a number of technological challenges related to gathering of heterogeneous data: **Intangible heritage** - oral histories, music, and rituals - requires the use of audio/video recordings/transcription using AI trained on local languages and concepts so that, for instance, emotion words in Gikuyu or Twi dialects contribute to the semantic space like English. These data might be combined with 3D scan of artefacts, geological, environmental, urban/architectural, economic, or historic data. Another issue will be addressing the language gap as a vast majority of Africa’s over 2,000 languages are not supported by mainstream models.

Important to remember that the LA is - at least initially - not conceived as a full fledged archive but as an artistic installation in close collaboration of the artist with scientists and digital experts.

The language gap in Artificial Intelligence

The language gap is not just a quantity issue. Many African languages have complex structures (e.g. rich morphology, tonal systems, non-standardized scripts) that *break* the assumptions of current NLP paradigms. This crisis of “**cognitive sovereignty**” is a known challenge of African language technology in developing models specifically for low-resource languages. If AI cannot understand a language, it cannot access the world of concepts and knowledge that the language encodes. For example, a Setswana-speaking farmer describing local agricultural wisdom will use concepts that do not translate into English.

African researchers are already building their own open data libraries and language models for African languages.

Masakhane is dedicated to advancing NLP for African languages and making language AI a collective endeavor. It builds its own datasets and tools to create more culturally representative models.

Distributed AI Research Institute (DAIR) conducts **community-rooted research** (e.g. HuniK Federation project) on the social implications of AI, like **AI harms, data exploitation, and equitable governance**.

Lelapa AI - meaning “community”- is building translation and speech solutions for low-resource languages. Its compact multilingual model *InkubaLM* (SLM rather than LLM) is designed to run on minimal hardware and intermittent connectivity.

Africa Next Voices, a pan-African project, has collected large speech datasets for 18 African languages (early pilots in Kenya, Nigeria, and South Africa), collecting thousands of hours of speech across numerous languages (isiZulu, Dholuo, Sesotho, etc.). See article in [Nature](#).

The **Abundant Intelligences** program is dedicated to redesigning AI based on Indigenous Knowledge systems. It explores how to build AI systems from small datasets of Indigenous languages.

In depth art view: Copper and Urban Oxidation (2022 and 2024)

XR brings to life historic architectural data and urban planning

The 2022 project, centered in Lubumbashi, investigates the historical links between pre-colonial metallurgical practices and the severe modern-day pollution caused by the industrial exploitation of metals like copper, zinc, and manganese. Hadassa Ngamba initiated this work in collaboration with university architecture faculties (UNILU and ULB) and, crucially, an ancestral copper beating workshop in Lubumbashi.

The Metaphor of Oxidation: The project uses the chemical process of oxidation as a powerful metaphorical inversion. Ancestral copper smiths employed controlled exposure to oxygen to treat and purify copper. Ngamba juxtaposes this ancient chemical mastery with the modern industrial reality, where mining results in pervasive pollution, declaring that "toxicity is the blood line of cities". Where ancient smiths responsibly mastered the material, the city's toxic mining waste signifies the catastrophic failure or intentional abandonment of this material wisdom.

Spatial Planning and Colonial Cartography: Ngamba's work also tackles colonial cartography and urban planning: Beaten copper plates physically depict the rigid, linear city plans characteristic of colonial urban design, such as early Kinshasa. This linear planning was designed primarily for administrative and extractive efficiency. The artist explicitly opposes this structure by collaborating with university students to develop an "organic" city model. The medium of beaten copper directly links the material basis of both wealth and toxicity to the spatial planning enforced by colonial map.

see [Interview TV5](#)

XR Future Cities (2024)

Solo exhibition, at Institut Francais de Lubumbashi

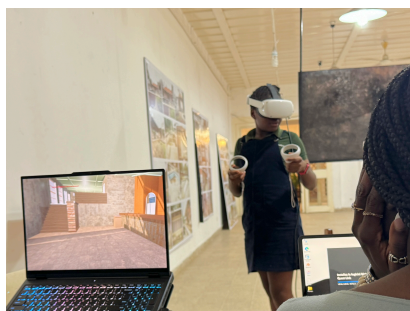
Complementing the 2022 project, XR future Cities **collects urban /architectural data to generate immersive XR** - Extended Reality - experiences of iconic sites associated with colonial exploitation, such as the emblematic buildings of Gécamines - the mining company that provided Uranium for the Hiroshima bomb.

The artist creates a virtual space that becomes a tool for appropriation of space, self-determination and community-led urban planning. She worked with local digital experts to show that Congolese know-how can create a cunning immersive experience.

see video [here](#)

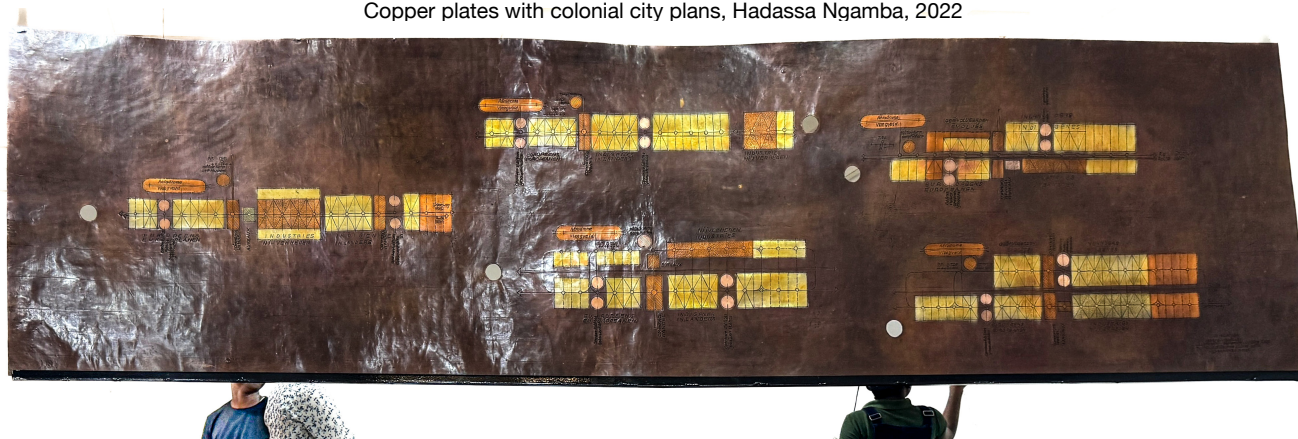


Gécamines swimming pool, Lubumbashi, Hadassa Ngamba, 2024



Young visitors at the XR installation, Hadassa Ngamba, 2024

Copper plates with colonial city plans, Hadassa Ngamba, 2022



In depth art view: The Serene Table of the Holy Thesis (installation 2021- 2022)

Diving into the complex Networks of exploitation of ' La Societe Generale'

Analysing networks of extraction

A serene table is an imagined place around which philosophers come together to find universal answers towards the further existence of the world. Any table could be placed anywhere in the world as an open invitation to find solutions that benefit humanity as a whole.

Ngamba's exploration of resource extraction and its impact on society in "The Serene Table of the HolyThesis" analyses the **extraction networks** orchestrated by Société Générale de Belgique.

It serves as a starting point for a broader dialogue about the complex relationship between resource exploitation, labor, technological advancement, and the ongoing struggle for power and agency in the information age.

It exposes the intricate entangled networks of exploitation that accompanied the colonial exploitation. The artists wants to explore further this exploitation networks.

The wooden table has been blackened by means of a firing process, an action that purifies and conserves the wood. In religious, spiritual, or animistic rituals, fire has multiple meanings. The artist embraces the many potential interpretations that certain materials or forms of choice encompass.



Silkscreen Print after Hieronymus Bosch with additional paintings.



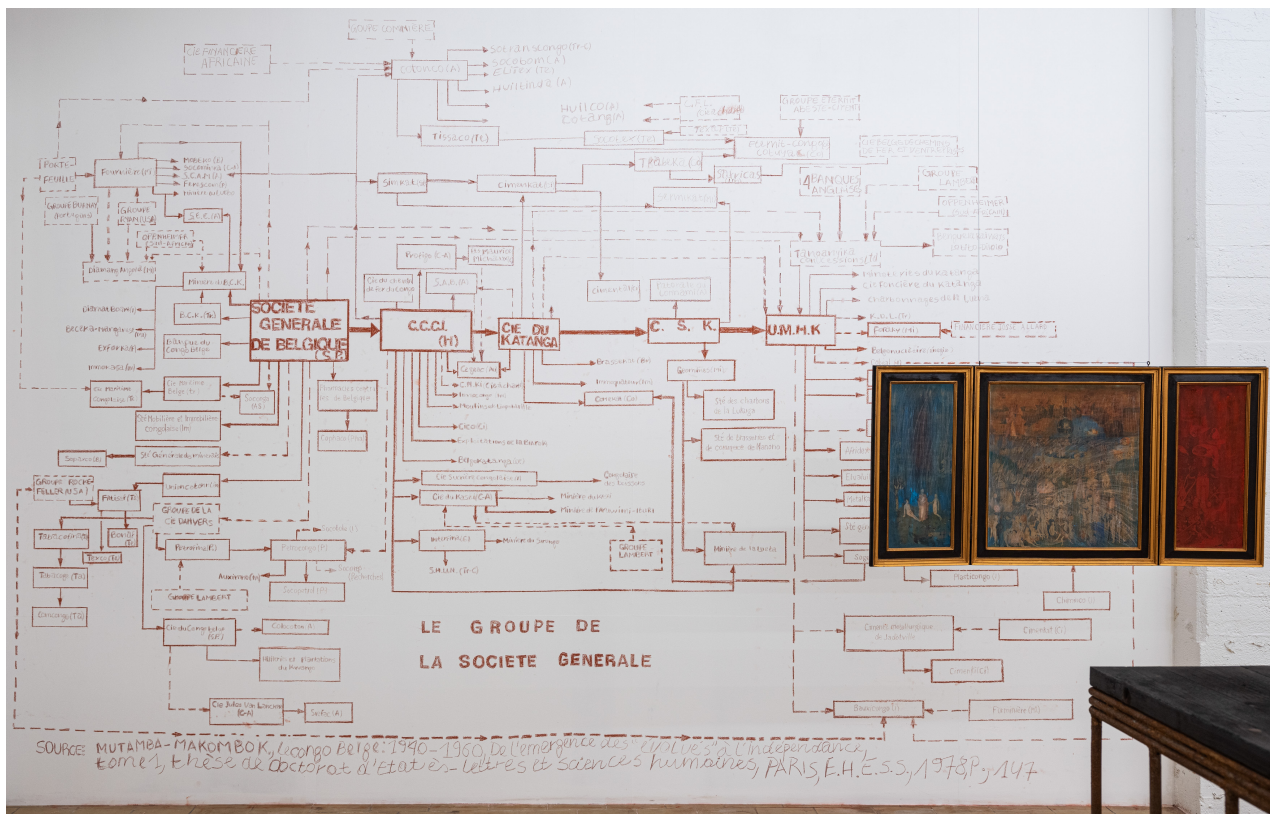
Table Sereine (2021-2012),
Hadassa Ngamba, Brussels, BE

Dimension: 400x100x110cm

Feet: steel oxidized with salt.

Top of table: scorched wood: 7,000 1 cent coins, artist's gold earrings, her grandmother's ID, glass plates coated in tobacco, a star made of colored stained glass—recovered from a 17th-century estate in Ghent.

Underneath the table: tropical herbs and leaves (leaves treated at high temperature) sourced from the Mayombe forest evokes an ancestral healing recipe, called KIOKO.



Detail of Installation:
Network structure of connections of Societe Generale.

5. The Vision: The Poetic Quantum Computer - Metaphor & Machine

Complex global challenges—such as climate change, pandemics, and inequality—require a pluralism of thought. African knowledge, with its profound emphasis on environment, community, and balance, is a rich resource for reimagining solutions. The Living Atlas (LA) concept suggests that we can weave together art, ancient knowledge, and technology into a living system of memory, into pathways across time and space. This will allow to recuperate ancient knowledge and mingle them with current practices to address for example environmental problems.

Addressing the question of how African Intelligence can help create a future for Africans, Hadassa Ngamba proposes the Poetic Quantum Computer (PQC). This embryonic idea, which the artist began developing after her visit to CERN, is inspired by quantum concepts—superposition and entanglement—to superpose multiple ‘entangled’ futures.

PQC is a metaphorical engine intended to help young Africans "dream again of a future full of promise". The PQC is conceived as an antidote to "centralized computational authority," such as the figure of Alpha 60 in Luc Goddard's Alphaville. It embraces a more nuanced and empathetic approach to problem-solving and rejects rigid, deterministic computation.

More than 150 countries, including the entire African continent, have almost no access to the computing infrastructure required to train advanced AI models. The issue is not just a hardware problem; it is fundamentally about digital sovereignty.

Advocating for a metaphorical PQC might thus seem to sidestep the urgent need for investment in digital infrastructure in Africa. The key point is that this project also serves a political agenda. It is intended as a high-profile advocacy tool designed to "visibly and effectively lobby" for computational equity and the creation of dedicated, African-led research laboratories on the continent. This confirms Ngamba's commitment to tackling the unequal access to computational power—a key manifestation of global power imbalance—by advocating for greater resource access for African researchers and scientists. The long-term success depends critically on its ability to translate its considerable conceptual and artistic capital into demonstrable material and structural power.



'Living Atlas installation' (2025), Hadassa Ngamba, Brussels, BE
Engraving on copper plate



Hadassa at 'the Gbar' in CERN (2025), Geneva, CH