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How to remember a place to forget? The semiotic design of deep geological nuclear repositories, from long-term communication to memory transmission

Original study

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Abstract: Drawing on the field of nuclear semiotics, this article critically discusses the classic problem of marking the location of a deep geological repository to communicate – in the distant future – its presence and potential threats to intruders. The article is divided into two parts. The first part reviews some site-marking solutions that have been proposed in the nearly 40 years of nuclear semiotics' existence. These solutions are analyzed through the lens of semiotics of space and memory, highlighting different ideas about the purposes of site-marking, ranging from the idea of communicating a warning message to that of transmitting a memory. The second part addresses these strategies of memory transmission by examining some recent "speculative experiments" that use art to convey information about nuclear repositories to future generations. This part of the article examines artistic proposals submitted to a competition organized by ANDRA (the French Agency for Nuclear Waste).

Keywords: nuclear semiotics, nuclear waste, design of nuclear repositories, cultural memory transmission, art and memory

1. SEMIOTICS OF NUCLEAR SITES: HOW TO MARK SPACE TO WARN FUTURE INTRUDERS?

This article moves from our experience of collaboration in the framework of the "Project Memory" conducted by ANDRA (the French agency for nuclear waste management) and a group of semioticians led by CeReS, a semiotic research centre at the University of Limoges (see Dumont, Charton, Boissier 2015; Mitropoulou 2015, 2016a).[1] The project was related to *Cigéo* (Industrial Centre for Geological Disposal), a deep geological disposal facility for radioactive waste to be built in France (in the department of Meuse/Haute Marne). Our specific research aimed to envision a solution for the design of an effective system of spatial markers to be implemented on the repository site to communicate the presence and potential hazard to future generations. In other words, our work for this research (and all other research activities associated with the broader project) can be considered an experiment in speculative semiotics, as we were called upon to find a possible answer to the most classic enigma of

1 Although conceived and discussed together, the writing of the paragraph can be attributed as follows: Francesco Mazzucchelli is the author of paragraphs from 1 to 4, while Nanta Novello Paglianti is the author of paragraphs from 5 to 7.

"nuclear semiotics",[2] the conundrum that characterizes this area of study: how to design a message that can last for travel across centuries and warn people not to enter a place where radioactive material is buried?

Since our research explicitly addresses the "environmental design" of the geologic repository for nuclear waste, we reformulated the general question as follows: how can the presence, functions, and associated risks (in case of intrusion) of the Meuse/Haute Marne (Cigéo) radioactive waste repository be signalled to future generations through the spatial design of the site? How can be made "visible" on the surface what is "invisible", i.e. both the contents of the repository (which is underground) and its features (the hazardousness of which cannot be detected by human senses but only by special instruments)?

According to our hypothesis, since the marking system is supposed to last thousands and thousands of years, the design of the site has to cope with three classes of problems, related to 1. its *materiality*, which must not deteriorate and crumble over time; 2. its *legibility* as something man-made and built, capable of informing about the site itself; 3. its *legitimacy*, that is, its ability (the message conveyed by the markers) to be "trustworthy" and considered reliable. But can the hypothesis of a "perpetual message" with such characteristics be considered realistic? And if not, what measures should be taken with respect to the spatial aspects of the site to ensure effective intergenerational transmission of the memory of the emplaced waste?

In what follows, we propose a reflection based on some surveys and a report that we wrote together during our collaboration on this project.[3] In the first part, we discuss some of the semiotic principles that have guided our work and that we have applied in reviewing some of the solutions proposed in the past to the problem of spatially labeling the location of a deep geological repository for nuclear waste disposal. In the second part, we analyze a recent initiative of ANDRA aimed at finding a solution to create a permanent reminder of the presence of the deep repository: an art competition. In this way, we can show to what extent nuclear semiotics has reconfigured its objectives, from the design of long-term warning messages to the elaboration of strategies for the "heritagization" of nuclear waste.[4]

2. PRINCIPLES FOR SEMIOTICS OF NUCLEAR WASTE DISPOSAL SITES

As a starting point, we identified four general theoretical principles from which we derived a framework for defining the open questions of a "semiotics of nuclear sites" in which the spatial organization should communicate some hazards associated with the site (and deter some behaviors, such as intrusion).

1. *Space is a language* capable of expressing, signifying, and communicating organized meanings, in other words, it "speaks of something else and not just itself". This position is widely shared in semiotics, especially in structuralist and generative spatial semiotics (Greimas 1976; Hammad 2006), which considers space as a language. This view is also well expressed by Lévi-Strauss in the spatial analysis of the Bororo village, in which a spatial organization of the elements that make up the village (circular layout, central vs. peripheral houses, arrangement of practices) is associated with a dualistic social organization (dominant men vs. subjugated women; sacred vs. secular spaces; higher and lower social classes, etc.). Levi-Strauss describes what in semiotics is called the relation of signification: the Bororo community projects its social structure onto this spatial structure (relation of "signification"), and this very structure is readable and interpretable by an external observer who can more or less correctly interpret the relationship between the space and its inhabitants (Lévi-Strauss 1958). According to this principle, the question of conceptualizing and designing an effective system of site marking can be understood as the problem of developing an appropriate strategy of "spatializing memory," that is, a strategy that translates a certain knowledge (relating to the site itself, but also to the knowledge system associated with the nature of the site) into a durable spatial language that can both endure for a very long time and, more importantly, be correctly decoded and interpreted.

2 Nuclear semiotics is a specific and interdisciplinary field of study that aims at envisioning solutions to warn about the possible dangers of deposits of radioactive materials through message that are supposed to be correctly interpretable at distance of tens of thousands of years. The most famous contributors to the field have been the American semiotician Thomas Sebeok, who has coordinated the Human Interference Task Force (cf. Sebeok 1984) and the couple of French and Italian semioticians Françoises Bastide and Paolo Fabbri (Bastide, Fabbri 1984). See also the Special Issue of *Zeitschrift fur Semiotik* devoted to this theme (Sebeok 1984). For a summary of the recent debate, see Ogorzelec-Guinchard (2019).

3 Mazzucchelli, Paglianti 2018. The note/report was never published, and this article moves from some argumentations proposed originally there. Some of the considerations discussed in this part of the article have been presented in a paper by Francesco Mazzucchelli and titled "Exegi monumentum? Stratégies de marquage du site de stockage entre spatialisation d'une mémoire et diffusion d'indices", delivered at the workshop CeReS/ANDRA "Pictogrammes ou la robustesse des signes à travers le temps et l'espace", June 8 th , 2017, Université de Limoges, CeRES/ANDRA.

4 This view has been developed, among others, especially by Holtorf and Högberg (2021, 2022). For a semiotic formulation of the issue see Treleani (2016).

2. *The "senses of space" (the meanings that can be attributed to a particular spatial configuration) are always produced and then interpreted by a "subjectivity"*. Space can be considered as a "constructed object" that acquires meaning only from the point of view of a "subject" that produces and consumes it (Greimas 1976; Greimas, Courtés 1979; Hammad 2006). Since the point is to imagine a spatial configuration capable of communicating across centuries, it is important to emphasize that both subjects involved (the producer of the message and its interpreter) have a relationship to the spatial message that is both "pre-personal" insofar as it depends on the way our bodily schemas are involved in our experience of space (which is also a perceptual, proprioceptive, motor, and psychophysical one),[5] and "supra-individual," insofar as it involves social and cultural codes about spatiality. Therefore, these subjects-simulacra of sender and receiver, both involved in the semiotic configuration of place-are at the same time "somatic and social, natural and cultural subjects" (Marrone 2001, 304, our translation). In other words, on the one hand, it is true that our perception of space coincides with the proprioception of our bodies and their schemata, but on the other hand, different cultures and languages assign very different meanings (such as up/down; left/right; front/back, etc.) to the same spatial semantic categories derived from our bodily experience of space. Thus, it is worth repeating the distinction already introduced between communication and meaning: a given spatial organization can take on different meanings beyond its communicative intentions, depending on the subjectivity it occupies and the sociocultural codes it encloses (Violi 1991; Cavicchioli 2002; Marrone 2001). In any case, it could be said that the pre-personal component (associated with the sensorimotor and proprioceptive structure) ensures a weak degree of stability of a certain "semantic salience" (a kind of "communicative affordance") provided by the spatial morphology of the place.

3. *The spatial signifier is characterized by its syncretic character* (Hammad 2006). This means that multiple semiotic systems are involved in the process of transmission of the message through the spatial organization of the place. Planning a "significant" spatial organization implies the need to coordinate all the systems involved (graphic, acoustic, visual, verbal, architectural, …) in such a way that their compilation results in a homogeneous and coherent ensemble, free from self-contradictions that could lead to potential misinterpretations. The surface markers should then fit not only with the other forms of textuality used and placed at the site (pictograms, verbal texts, visual elements, etc.), but also with the totality of the other discursive production of the institutional subject managing the site (and with the other circulating discourses about nuclear waste). To this end, we use the notion of "semantic isotopy", introduced by Algirdas Greimas and Joseph Courtés (cf. Greimas, Courtés 1979, ad vocem), to describe the recurrence of semantic categories that guarantee the interpretative homogeneity and uniformity of an enunciated discourse (in the case we are considering, the totality of semiotic elements disseminated through the site). The design of the site managed by ANDRA must guarantee an adequate "isotopic uniformity" between all the texts produced by this institution (including their "positioning" on the site and their topological configuration).

4. *Space has also a narrative structure*, and the subject-object relationship in space can be formalized by the narrative models proposed by Greimas (Greimas, Courtés 1979). On the basis of a combination of Greimas' canonical narrative scheme with Umberto Eco's narrative theory (Eco 1979), Gianfranco Marrone (2001) proposes to distinguish between three possible levels of subjectivity that can be inscribed in space: 1) the "enunciated subjects", i.e., the portions of the space that perform certain actions or "programs of action". These are "delegated subjects" (to use Latour's expression) that have a specific "actantial role" and a "modal endowment": an information sign, for example, is endowed with the cognitive modality of /knowing/ (insofar as it conveys information and then a certain knowledge); similarly, an elevator embodies a /being-able-to/ modality (the ability to do something) that is transmitted to its user and enables him or her to reach a higher floor; 2) the "enunciational subjects," i.e. the "Model User"[6] implied by a given spatial structure, in other words, the ideal visitor to whom the site is addressed and who is envisaged in the structure of the site itself; 3) the "empirical subjects", i.e., the real visitors, who can also subvert the "enunciational pact" proposed by the structure itself and do something that is not envisaged (and reshape the site by creating new, unexpected uses for it).

The hiatus between the last two subjects is precisely the main problem in designing the site as a spatial message: when we send a message through the site, it means that the position predicted by a possible future visitor does not necessarily coincide with the effective behavior adopted by the actual future visitor. In fact, this articulation of subjects proposed by Marrone proves useful to introduce our approach to the problem of marking geological repositories, at least for two reasons. First, it clarifies the difference between enunciated and enunciational space: while the enunciated space concerns the meaning (the content) of the message to be conveyed through a certain system of spatial markers (as well as the narrative structures that are entangled by their composition), the enunciational space refers to the projection of "simulacra" of the subjects of enunciation into the structure of the place (both the sender of the message, who may or may not be recognizable in the place, and its receiver, who must recognize the semiotic position to be taken to

5 See Violi 1991, 1997.

6 Marrone here elaborates on the notion of Model Reader proposed by Umberto Eco (1979).

interpret it correctly). According to this theoretical model, the meaning of the spatial markers of place (within the larger spatial configuration that contains and connects them) depends on the one hand, on the narrative function that these spatial elements assume as actants, and, on the other hand, on the recognition of the "enunciational pact" between the addresser (the subject who speaks through the space of place) and the addressee.

This means that it is not just about what is communicated through the website, nor just about how it is communicated (with what kind of perlocutionary effect: informing? Frightening? Keeping away? Preventing intrusion?), but more importantly about who is communicating and talking through the site, and how that addresser manifests itself on the site. All of this relates to the potential recipient of the information conveyed by the site itself (and the identification of the Model-User is then a crucial moment in the design of the site), but also to the sender: for the transmission of information to be effective, it is necessary to imagine an effective enunciational strategy. Indeed, it is crucial to be clear about who is speaking through the site: an institutional subject? A "guardian of the site"? The company/institution that produced the nuclear waste? An impersonal subject? A voice coming from the past? The human race? Depending on how this axis of communication is realized and incorporated into the design of the site, the "trust pact" between the producer and the receiver of the message varies considerably, leading to different modalities of communication transmission of the communication.

3. A SPATIAL LONG-TERM MEMORY

Starting from these premises, we have tried to rethink the problem assigned to us, starting from the central question of the "robustness" of the site's informative marking system. ANDRA's memory project focused heavily on the issue of the durability of a message that would endure for centuries. Based on the previous considerations, "robustness" has to do not only with the *materiality* of the medium (which must nevertheless last centuries), nor exclusively with its *legibility* (for which the place and the artifacts it contains must be interpreted, even in the future, as man-made objects with communicative intent), but above all with its *reliability*. The signs that mark the presence of the site must be *durable*, *legible*, and above all *reliable*; they must be believed, not merely understood: the information transmitted must be received and correctly understood, but also "accepted" and assumed as trustworthy. There is an example that is very often cited when talking about nuclear semiotics: the "Tsunami Stones" on Japan's coastline. These traditional marker stones (the oldest is more than six centuries old) were put up to warn residents not to build a house below this marker because of the area's exposure to severe tsunamis. These marker stones have survived the centuries and have come to our time undamaged. They are perfectly legible, which means that those who found them were able to correctly interpret the meaning of the stone, its warning message, etc., but they generally went "unheard". People found them and understood the message, but in no way did they consider them trustworthy or reliable. In many cases, houses were built near these markers, and these houses were damaged by tsunamis, as the stones had predicted and warned. This little story is about the difference between what in semiotics is called "received" and "assumed" communication. The distinction was proposed by Greimas and Courtés, who claim, "Communication is seldom, as is often mistakenly assumed, for telling someone something, but rather for persuading someone to believe and do something" (Greimas, Courtés 1979, our translation).[7] Semiotic robustness is thus based on the durability of the materiality of the medium and the code (which is not only linguistic), but also on the enunciational contract proposed by the site itself and the semiotic systems used: It is not only about informing, but also about persuading.

The problem of signaling the presence of a nuclear waste repository has been formulated for years as equivalent to erecting a quasi-eternal marking system, capable of communicating for centuries without ambiguities. In other words, a monument *aere perennius*, to use the famous poetic expression of the Latin poet Horace: "I have erected a monument more lasting than bronze". In this framework, what does it mean to erect such a monument, in semiotic terms? It is clear that the question is not only about the endurance of materiality, nor only about the possibility of perpetual and universal legibility (although these are already major problems). There is also the problem of the transmission of a form of memory that is considered "legitimate" and also capable of "changing in translation," of undergoing transformation, maintaining a "semiotic identity," stability of meaning, in this process of change. However, this vision of an everlasting, permanent, enduring memorial (or something equivalent) seems to be the main strategy followed in most of the designs already proposed, at least in the beginnings of nuclear semiotics.

In a sense, given the general problem of effective site marking over a long period, it is normal to turn to a "monument logic" because the monument is the most typical form of preserving memory in time through space. We could define a monument as a particular semiotic strategy for transferring a value into the future, using space as a medium. A monument is thus a project of memory, a "voluntary memory", but to use Gilles Deleuze's term, there is also a *mémoire involontaire*, a processuality of memory that can in some way alter the intentionality of the monument project (Deleuze 1964). In what follows, the efficacy of the "monumental logic" that has driven

7 In French: "la communication est moins, comme on se l'imagine un peu trop vite, un faire-savoir, mais bien plutôt un faire-croire et un faire-faire"

some solutions will be questioned when applied to the problem we have, which is how to design, prepare, mark, and arrange the surface of the site so that future generations can understand the existence, functions, and risks of the site simply by reading the landscape.

3.1. THE SITE AS A PLACE OF FORGETTING

The first question that arises is whether a spatial marking system is necessary at all, or whether it might even be counterproductive: Should we draw the attention of possible future visitors (with the risk of inadvertently confusing them and inducing them to enter), or would it be better to let every possible trace disappear as far as possible and trust that no one will accidentally stumble upon a geological repository located 500 meters below ground. If there is no danger of intrusion at depth, why bother at the surface?

The Onkalo site in Finland appears to have adopted this strategy. After a period of active monitoring, the site will be left to oblivion in the belief that given the vanishingly small likelihood that someone might find the site by accident, deliberately leaving signs may increase the possibility of intrusion if they are misinterpreted or considered unreliable. In this case, forgetting is not an obstacle to disclosure, but an ally in the "nuclear waste protection" program. But is it possible to consciously choose to forget something? Deciding not to mark something is not enough, of course: It would be necessary to destroy and remove all unintended traces left by the long and complex process of transforming the site, irrevocably marked by intensive human activity. In other words, a site without intentional markers is not the same as an unmarked site, and the anthropic traces left by human activities may attract the attention of future visitors who will not have an explicit message to decipher the reasons for these activities. The question should therefore be rephrased: Is it possible to create and impose oblivion? The problem has been extensively discussed and debated in other fields in the context of the problem of "imposed forgetting" (Ricoeur 2000). Umberto Eco has shown that an *ars oblivionalis*, i.e., a method for inducing active forgetting, is theoretically impossible (Eco 1988, 2007). Indeed, an *ars oblivionalis* would be the opposite of an *ars memoriae*, a method of assisting memory that aims to make the absent "present" through signs that replace the absent. It is impossible to imagine an anti-semiotic technique that instead makes the present absent. This means that forgetting cannot be chosen: forgetting cannot be intentionally produced, but functions as an impersonal (and uncontrollable) mechanism of selection and filtering on which any cultural system is based. For Eco, the erasure of traces is not a reason for forgetting, which is rather characterized by a state of latency in which some information is "temporarily forgotten" but can always be reactivated.[8]

However, the Onkalo site seems to have a different view on this, at least according to the director of the company that owns the site, who was interviewed in the documentary *Into Eternity*:[9] The solution is to think of it as "the place we should always remember to forget". No mere forgetting, then, but an active effort, a "work of forgetting," similar to the "work of remembering" discussed by Paul Ricoeur (2001), which aims at a kind of intergenerational transmission of a "pact of forgetting".

3.2. THE SITE AS AN EXCLUSION ZONE

Since, as we have seen, we seem doomed to remember, and since the traces and memories of the site, invisible today, may be reactivated tomorrow, other solutions have been proposed. The most banal one is to demarcate the territory of the place to keep possible visitors away from it. There is not much to say about this model, although it is important to consider it as a kind of zero-degree marking of the place. In the exclusion zone, active surveillance deters outside intrusion into the site, warns of the dangers associated with being in the zone, and actively prevents intrusion. The most classic example of this model (although it does not apply to a nuclear waste repository) is the zone of alienation at the Chernobyl nuclear power plant. Despite the differences with the sites considered in this article (the Chernobyl exclusion zone is not a nuclear waste site, but the site of a nuclear incident), it is interesting to note how the "radioactive character" of the site led to its transformation into a destination of "dark tourism" that can be visited through guided tours (Yankovska, Hannam 2013). This heritagization of the site represents an interesting practice of constructing a "radioactive cultural memory" rooted in popular cultural representations.[10]

3.3. THE SITE AS AN "INFORMATIVE MONUMENT"

The most classic plan for marker design is the one proposed by the Human Interference Task Force for the Yucca Mountain repository in 1984.[11] The plan, presented in a technical report entitled "Reducing the likelihood of future human activities that could affect geological high-level waste repositories" (H.I.T.F. 1984), envisions a spatial system (admittedly inspired by the design of the ancient menhir at Stonehenge) consisting of a few

8 Further important reflections on the topic of forgetting can be found in the books by Connerton (1989), Weinrich (2000) and Assmann (2016).

9 Directed in 2010 by Michael Madsen, *Into Eternity* is a Danish documentary about the construction of Onkalo repository on the island of Olkiluot in Finland, touching many issued discussed in these pages.

10 Another interesting example is the heritagization of the site of the first atomic tests in the States, at Trinity Site (see the website of Atomic Heritage Foundation).

11 The repository was later shut down for an incident due to leak of radioactive material.

tall peripheral markers delineating the outer perimeter of the site and a central "monument plaza" with a monolith and other large markers conveying more detailed information about the site (carved into the stone of the markers). The spatial system as a whole is more sophisticated than this synthetic description given here; importantly, however, it basically proposes a model of "distribution of information" through the space of the site that identifies its extent by indicating the boundaries, but more importantly the purpose and some characteristics of the site, and adds indications of possible risks related to its misuse. Different semiotic systems (verbal and visual/image) are used according to criteria of redundancy, which is ensured by the use of seven different languages, different iconic codes, and also a kind of "in situ" archive with archival documents, where information is provided at increasingly complex levels, not only related to the site, but also to the concept of radioactivity and the harmfulness of nuclear waste. I would just like to point out here that it is basically a system of cognitive manipulation of a generic (almost "universal") visitor, based on syncretic spatial semiotics that distributes "cognitive objects" at different levels in space.[12] The spatial complex does not act as a "transmitter" (in the Greimassian sense), but as a system of informative actants. The manipulation aims to convince the visitor of the dangerousness of any activity in this place.

Similar projects have been proposed, all based on the same philosophy, namely the idea that an effective marking system must create and prepare an informative space where different knowledge about the camp is scattered in a syncretic spatial structure. The spatial architecture is also developed according to a model that could be called an *informative monument* due to its design principles, functions, and appearance.

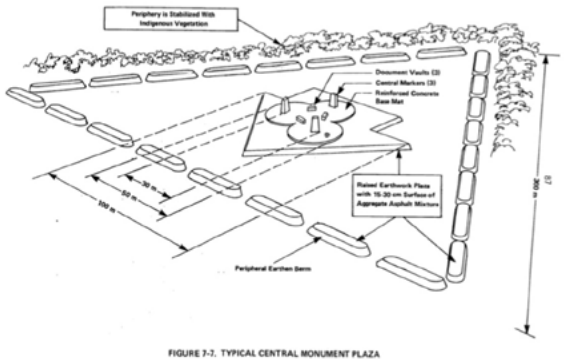

Figure 1 – Informative monument: The Monumental Plaza in a figure of H.I.T.F. report (HITF 1984, p.87

The narrative structure of the informative site/monument is based on a strategy of cognitive manipulation of a generic visitor (characterized by a kind of "universal" features) who does not know the nature of the site and must be accompanied in gathering information that eventually leads him away from the site itself. The spatial markers, not fulfilling the function of a manipulative Sender (in Greimas' terminology), should rather be considered as "cognitive objects" (at different levels of complexity), as a kind of informative actants that allow the Subject to start an essentially negative program of action, i.e. to leave the site or to take all necessary precautions. From a narrative point of view, one could say that this model presupposes a Subject who is also "modalized" (according to his will and duty) to this particular course of action.

The outstanding problems are: what will guarantee both the material and semiotic durability of the topological (centre/periphery) structure of the site? How can we be sure that all the information will be preserved, readable, understandable, and reliable after centuries? And most of all how can we be sure that this specific spatial structure (that resembles other similar ones, man-built as well, but with different functions) will not be interpreted as ambiguous, in case the information will be not readable or not de-codifiable? If signs are not recognizable or if the code is not available, the spatial structure could lead towards wrong abductions related to the actual function of the site.

3.4. THE SITE AS A "NEGATIVE MONUMENT"

The solution related to this other model is derived mainly from the proposals in a 1992 report entitled "Expert judgement on markers to deter inadvertent human intrusion into the WIPP" (Trauth et al. 1992), prepared in connection with the Waste Isolation Pilot Plant in New Mexico, USA. The theoretical proposal is very clearly stated, but also in this case we will focus particularly on some of its features, which can be summarized as a proposal for a pronounced reshaping of the surface of the repository site through the construction of a series of gigantic (and clearly man-made) monuments aimed at evoking dysphoric emotions and basically "scaring" and discouraging the potential visitor. As with the Yucca report, different types of texts (verbal texts of varying complexity, pictograms, diagrams, maps, and other documents) are accessible and distributed around the site to maximize the possibility of finding them. But here the goal of the spatial design is different: to alarm, to frighten, or in any case to generate a strong emotional dysphoric response aimed at keeping the visitor away, or at least creating a sense of danger, through "threatening" and seemingly hostile architectures.

The report describes in detail the various projects and solutions. At this point, it is sufficient to highlight the difference with the typology previously analysed: While the previous model (the "informative monument") was inspired by a "cognitive strategy", in this model (the "negative monument") one could speak of a strategy of "passional manipulation". The site as a whole can be considered a unique and monumental marker

12 This solution could be effectively analysed by a cognitive semiotic approach interested to the paradigm of "distributed cognition" (Fusaroli, Granelli, Paolucci 2011).

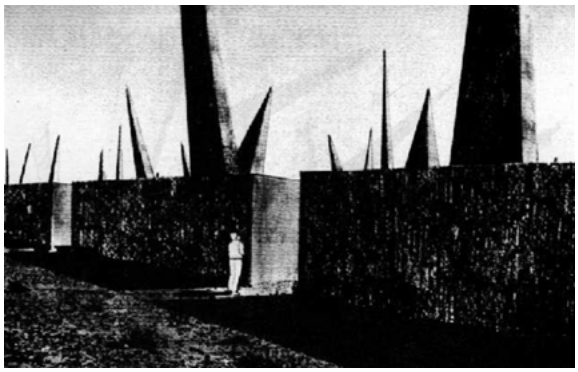

Figure 2 – Negative monument: The Landscape of Thorns imagined by the architect Michael Brill and drawn by Safdar Abidi (Sandia National Laboratories)

Figure 3 - The institutional site: an ANDRA facility in Cigéo that hosts exhibitions open to the public

(even if it is internally divided into different elements). This site/marker functions narratively as an "Anti-Sender" that gives negative Value to the Object of the site (making it an Anti-Object of value to the Subject who stumbles upon it). This narrative feature is also evident in the tone of some of the messages that the plan calls for to be disseminated on the site (see the first warning message, "This is not a place of honour…" etc.). The proposed design of the marker has inspired many similar plans based on the attempt to create a kind of negative affordance, a "disaffordance": an invitation to future generations to leave the site and not use it.

The most evident objection to a model like this has to do with the remark that such monumental and stylised architectures have probably high chance to attract attention: considering the possibility of a loss of information or of the unavailability of the semiotic code that allows a correct interpretation of the encompassed information, the architectonic forms of the markers could paradoxically provoke interest towards the site and then weaken the intention of avoiding external intrusions or another kind of manumission.

3.5. THE SITE AS AN INSTITUTION

In a sense, the precursor to this model may be found in Thomas Sebeok's proposal of "atomic priesthood," in which the semiotician imagines an elite guarding the site through a kind of religious cult dedicated to spreading myths and legends about the site and making it taboo to enter. However, while the quasi-religious institution proposed by Sebeok would only convey a ban/taboo on access to the site, many other proposals along these lines have been made recently (see, e.g., Pescatore, Mays 2008)

These new models envision active control of the site, entrusted to secular institutions and inspired by a mission of transparency and transmission of knowledge to future generations, who will share in the responsibility of caring for the site according to an idea of a "rolling future" The next generations will then be the generic addressee of the messages inscribed on the site and will also be involved as active subjects (and not just passive recipients of the message) in an ongoing process of cultural transmission ("stewardship model"). In the stewardship model, the problem of spatial markers and spatial organization of the site is seemingly less central, but it is not: the role and semiotic presence of the institution (its territorial signs disseminated in the site) is itself the most important part of marking the territory, along with the activities carried out. The material presence of the institution at the site must be carefully planned, paying particular attention to the effects of meaning generated by the architecture and the other buildings of the institution at the site, including its activities and functions: Museums, archives, information and exhibition spaces, laboratories and research centers, etc.). Recently, new visions are emerging that assume that the site should not necessarily be considered as separate from the human environment, but that, on the contrary, its functioning should be based on the involvement of the communities (especially the local community). The facility and its premises should encourage human activities at the site and support the participation of local residents to enable the gradual reopening of the site. In this sense, the participation of other stakeholders must also be envisaged as part of the site concept, in order to contribute to the construction of the territorial identity and the transformation of the site into a "lived place". Such an approach naturally implies a narrative model that envisions a clear transmitter function for the institution, charged with the task of guarding the site. The institution becomes the guardian of a value to be left behind and passed on. In this framework, nuclear waste is no longer a useless leftover (a residue), but an object with a value that can also be seen as positive (at least at a narrative level), to be passed on to future generations as a collective memory, whose knowledge (all concepts related to this waste and its disposal) constitutes a cultural heritage that must be preserved to limit certain risks to the environment.

3.6. THE SITE AS A "LIVED LANDSCAPE"

Recent approaches, sometimes inspired by the research of artists interested in the subject of temporality, assume that the surface space of the nuclear repository could

recover a dimension of a "lived and living landscape." In this vision, it is considered essential to reintegrate the surface space into the "natural landscape," in the expectation that in the future the natural element will resume the traces left by human activity and make the site an open, habitable, and "practicable" place. In this way, the site is converted into a complex space where nature and culture, natural elements and anthropic layers coexist and are in constant semiotic dialogue with each other. Among the artists who have embraced this view is Cécile Massart, who has worked on the concept of temporary marker structures to be changed from generation to generation. In the second part of this article, we will focus on recent contributions by artists who responded to a call for ideas issued by ANDRA for the Bure Depot: Many of these installations aim to mark the exceptional features of the site, but to enhance its appearance as a natural landscape. Many of these proposals envisage the transformation of the site into a landscape "disseminated of traces", that is both natural and anthropogenic, and makes available to visitors some indexes informing on the nature of the site, which is safe on the surface but dangerous in-depth, without precluding the possibility of the normal use of the surface space, with restrictions on some programs of action, such as digging

Figure 4 - Nature tacking back on the spatial markers, according to the artistic elaboration entitled "Forest" by Pierre Laurent, "les nouveaux voisins"

Usually, these solutions foresee the use of biological detectors (or of other materials that react to radiation), as in the famous proposal of Stanislaw Lem with the atomic flowers or the "radiation cat" proposed by Paolo Fabbri and Francoise Bastide (1984), although in this last case the most important part of the proposal concerns the mechanism of cultural transmission of the information. All these ideas insist on the effectiveness of a signalling system capable of reproducing itself biologically without human intervention. More importantly, the proposals that belong to this model aim at site-marking solutions that fit into a natural but at the same time highly anthropized landscape, since this landscape bears the traces of its transformation. Nevertheless, such a marking strategy is focused on the memory of the site, since the markers will give it a precise identity, also aesthetic.

4. THE MULTIPLE SEMANTICS OF SITE-MARKING

The comparison of these different typologies points to different strategies of "mise en forme" of space, which can be summarized in the following figure (Fig. 5). Sites are distinguished according to how they attempt to prevent people from entering (keep potential visitors out) or allow them in, including also sites that do not explicitly prevent people from entering and those that do not fully allow entry.

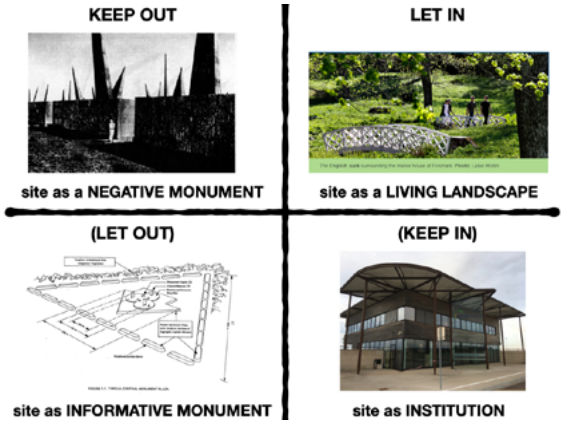

Figure 5. Typologies of nuclear deposits sites

On some of these sites, there are devices designed to deter, repel or definitely keep potential visitors away from the site itself, while others aim to inform the visitor about the risks. The most interesting solutions, however, are those on the right side of this figure, as they move from the idea of packaging a warning message to that of building and transmitting a cultural memory as a form of anti-heritage.

These different typologies of sites also entail different understandings about:

1) the type of "semiotic act" the site is supposed to perform: inform, frighten, warn, convey knowledge, etc...;[13]

2) The degree of openness or closedness of the site itself: some of these spatial models aim to alienate and remove the visitor by keeping him away from human activities, but we have also shown models that provide for forms of "inclusion" of human activities in the place, considering it to some extent as a place of assembly and under conditions of security;

3) The types of subjectivity that the site addresses and the voices with which it speaks to potential visitors;

4) The narrative roles played by the markers and other objects of the site: informative actants, Senders, anti-Senders, Pragmatic Subjects, Objects of Value, etc.

5) The level (pragmatic, cognitive or passional) on which the spatial-narrative strategy of the site is predominantly focused.

13 The suggestion to identify the linguistic acts to be linked to alarm systems is proposed by Mitropoulou (2016b), who focuses on four typologies: re-assuring, alarming, preventing and warning. I elaborate on her proposal in the following.

A semiotic square could help to track these different narrativizations of the space of the nuclear repository:

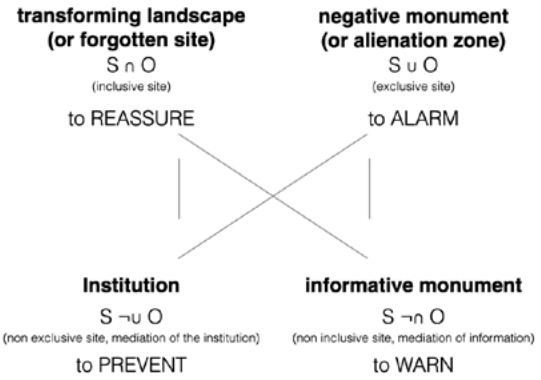

Figure 6 - Semiotic square of strategies of inclusion/ exclusion of human subjects from the site

Although some of the proposals discussed earlier cannot be assigned to only one position of the square, the purpose here is simply to articulate the semantic space that encompasses the different forms of spatiality presented. The axis of contrasts contains the places that try to establish a relationship between the subject-visitor and the object-place (as in the model of the lived landscape, where the place is "given back to nature"), in contrast to those based on a relationship of disjunction (the exclusive places, as in the case of the negative monuments or for the zones of alienation). The axis of subcontrasts shows the contrast between the places that deny the connection between subject and place (as in the case of the informative monument that informs but to prevent intrusion) and those that deny the disjunction (as in the case of the institutional places that allow access under certain conditions and the mediation of an institution). Each position of the semiotic square is characterized by a semantic dominant that refers to the type of action performed: reassure, prevent, alert, or warn. A clear distinction emerges between the positions on the right and left sides (deixis) of the square: On the left side, the square indicates "euphoric" strategies of including the subject in the place, while on the right side, the "dysphoric" strategies of exclusion are found. Moreover, the models of the two (left and right) deixis of the semiotic square respond to different formulations of the theme of the spatial marking of place by addressing different forms of temporality: a processual temporality in the case of the site institution and the landscape lived in a place, in contrast to the linear temporality of the two forms of monumental marking. At the same time, the models on the left side of the square seem to tend toward the hypothesis of continuity of cultural transmission, while the models on the right side consider a more radical version of the problem, for which it is not possible to anticipate any hypothesis about the continuity of cultural transmission in a long-term temporal perspective.[14] Following this model, in the next sections, we will analyze some initiatives sponsored by ANDRA that can be attributed to the "heritagization" of radioactive legacy.

5. THE "*ART ET MÉMOIRE*" COMPETITION, A SOCIAL COMMUNICATION STRATEGY

In this part of the article, we will focus more extensively on the use of art and artistic reflection for experimenting with new possible forms of memorialisation of the repository site that overtake the original issue of site marking as a problem of designing a long-term warning message. We will focus especially on the strategies and projects adopted recently by ANDRA.

Among the various institutional communication actions by ANDRA, the "Art and Memory" competition has caught our attention in a particular way. After its inception in 2015, the competition returned every year until 2019. It calls on artists from various horizons and disciplines, challenging them to "Imagine the memory of radioactive waste storage sites for future generations", as per its title[15]. It aims at attracting creations on the theme of nuclear waste to generate proposals and "realistic or utopian ideas to collectively impress the imagination for several millennia".[16]

The participants are artists and creators (artisans, photographers, visual artists), a specific social category (Heinich 2005) that should be able to show the social and visible dimension of memory transmission from a novel point of view. As sources of inspiration and innovation, artists should take an "aesthetic" look at a millenary time scale.

This analysis will consist of two parts. In the first part, we will question the meaning of this competition from an institutional point of view. This ANDRA initiative was perhaps unexpected; understanding its appeal for both parties is a communication concern. We wish to comprehend why ANDRA decides to use art and its forms of expression as a means of memory preservation.

In the second part, we will analyse some entries to understand what artists gain from participating in this

14 Based on this analysis, we finally proposed a solution to spatial marking that follows a multilevel strategy, emphasizing in particular two "marking regimes": an active and procedural heritagization aimed at a cultural transmission of the place itself and of the associated knowledge, and a strategy of dissemination of traces that could overcome a break in continuity in the process of cultural transmission.

15 Our translation. Original French: "*Imaginer la mémoire des sites de stockage de déchets radioactifs pour lesgénérations futures*" (see "ANDRA – Des œuvres d'art et de mémoire" in the sitography).

16 Our translation. Original French: "*idées réalistes ou utopiques afin de marquer collectivement les esprits à une* échelle *plurimillénaire*" (see "ANDRA – Conserver et transmettre la mémoire" in the sitography).

competition – which, is worth remembering, stems from an institution outside the usual artistic circuit.

5.1. HOW THE INSTITUTION EMPLOYS ART

We will start by mentioning a core issue, long emphasised by sociologists and culturists: our contemporary civilisation belongs to a "trans-aesthetic era" (Lipovetsky, Serroy 2013, 25). The notions of beauty and aesthetics are part of the most varied aspects of our ordinary life. Lipovetsky and Serroy conceive beauty as a desire to make users experience sensible things and, more specifically, sensations. Beauty has become "a tool for legitimising the brands and companies of capitalism[17]" (2013, 28). According to other theories (e.g., Boltanski, Esquerre 2017, 11), we may speak of an "enrichment" in the sense not only of monetary accumulation but as the investment of already existing symbolic forms or the creation of new ones. The latter aspect seems embodied in the current cultural consumption industry, which pushes the consumer towards creativity, self-expression, and symbolic investment. This premise is the background that drives production and service companies to invest in symbolic goods previously ignored as not economically appealing.

While necessary, this condition is not sufficient to understand ANDRA's competition centred on "*Art et mémoire*". The event was proposed as part of a 2010 research project entitled "*Mémoire pour les générations futures*", which includes members of civil society, university researchers and artists. The questions posed are of great scientific ambition: "How can future generations be informed of the presence and content of radioactive waste storage centres?", "How can the memory of places be preserved on a multi-millennium scale?[18]". The various participants in this research were divided into professional categories[19] but never worked all together. As for the artists, the competition was open to all media and practices (photography, sculpture, painting, digital art, etc.). The project stemmed from ANDRA's duty to preserve the memory of the site and the procedures for storing nuclear waste established by the ASN (Nuclear Safety Agency), which since 1 June 1991 charged the institution to gather information on the storage of data and its transmission to future generations.

The competition is one of the ways that ANDRA devised to answer the following questions: "How can we ensure that the message we want to convey is readable and comprehensible for our distant descendants, whatever their culture?[20] What have we managed to preserve? What understanding do we have of it? In what media has this heritage been preserved and how has it survived wars and revolutions? Who was its custodian?"[21].

The competition entails no obligation for ANDRA to realise the winning projects, presented as drawings, dossiers, and prototypes. Two prizes are awarded directly by ANDRA, the third by the public participating in the memory project and living near the nuclear waste storage sites. We will analyse a few submissions in the last section of this paper.

The first direct consequence of the competition is the cultural valorisation of the domain of creation. In some cases, we even have the "cultural consecration" (Jeanpierre, Roueff 2014, 37) of a project on the artistic level – and, therefore, of its creators. The institution conceives the creative act as innovative and original, a possibility to change the perception of its production process or its purpose. The artistic project makes it possible to blur the division between cultural-aesthetic, typical of art, and functional-industrial, typical of productive work. From the single act to the production chain, the idea of the art competition increases the patrimonial value of ANDRA's assets into symbolic goods thanks to the investment in (non-productive) creativity. There is no better way to offset an activity with a negative connotation than covering it with one with an opposite sign and added value. The whole semantic axis is revisited to attribute other tasks to the institution – such as competition, selection, evaluation, and award attribution – which give ANDRA a new and different symbolic legitimacy. Even if these activities are not, strictly speaking, ANDRA's spheres of competence, they still stem from the institution, thus causing the positive legitimisation of the proposed operations. It is a sign of openness towards the territory, a concern for future generations, which brings the institution closer to those social concerns considered primordial today: the environment, integration with the surrounding area, etc. In this initiative, ANDRA is engaged in a dialogue with local authorities and citizens living in neighbouring municipalities, who become an integral part of the memory process. In this regard, in 2012, ANDRA created groups devoted to memory work in the three towns of Manche, Meuse-Haute-Marne, and Aube.

17 Original French: "*un instrument de légitimation des marques et des entreprises du capitalisme*".

18 French: *"Comment informer les générations futures de la présence et du contenu des centres de stockage de déchets radioactifs ? De quelle manière conserver la mémoire des lieux à des échelles de temps plurimillénaires ?"*(see "ANDRA – Des œuvres d'art et de mémoire" in the sitography).

19 In this regard, I would like to mention the contracts that ANDRA has signed with various French universities for research on the theme of memory and its transmission to future generations.

20 Original French: "*Comment s'assurer que le message que l'on souhaite transmettre sera lisible et compréhensible pour nos lointains descendants, quelles que soient leurs cultures?"*

21 Original French: "*Quelle part avons-nous réussi à conserver? Quelle compréhension en avons-nous? Sur quels supports ce patrimoine a-t-il été conservé et comment a-t-il franchi les guerres et les révolutions ? Qui en a été le dépositaire?*".

ANDRA's memory strategy relies on three different entities. First, inscribing digital documents on sapphire discs and indelible paper to be kept at the National Archives and in the municipalities surrounding the waste storage site. The necessity, here, is to safeguard essential information, useful in case of a nuclear accident at one of the sites. The inscription of documents on resistant materials and their preservation pertain to the institutions, believed to be long-lasting.

The second method concerns "living memory" linked to the collective. It involves organising both conferences on the theme of memory, already in force after the 2000s (2006), to inform the surrounding population about the ANDRA work, and the creation of memory groups, as mentioned above, made up of inhabitants living near the storage sites, former ANDRA workers, associations, and local political figures. It aims at transmitting memory through initiatives, commemorative rites, testimonies, and even comic strips. It also aims at involving civil society in the historical reconstruction processes theorised by Paul Connerton (1989), which are necessary even if it already actively remembers events (*e.g.,* with public gatherings etc.). Transforming memory into text, in the form of deeds, documents, and supports, or acting it out in rituals such as ceremonies and tributes is also necessary to reformulate what in our specific case could be defined as "negative heritage" (Wahnich 2011). Perhaps relying on what Y. Lotman (1985, 1990) described as the normal process of evolution of culture – from the centre to the periphery and vice versa – might help to understand the continuous cultural reformulation that concerns Western forms of textuality. Thinking about inter-semiotic forms of reformulation or translation (Marrone 2014) could make us rethink culture not only as a set of beliefs, rituals, and monuments but also, as Geertz (1973) points out, "a system of signs" or "a set of structures of signification". The anthropologist specifies that culture is less "a set of customs and institutions than the interpretations that the members of society give of their experience, the constructions that they establish on the elements they live with. It is not a question of understanding how people behave but how they see things". In short, the traces of memory would also contain how memory is conceived and thus transmitted.

The third method used is the use of art in all its forms (drawing, photography, sculpture, etc.). The competition is aimed at a specific social category: the artists, seen as producers and creators of visibility (Heinich 2012) and charged with the task of creating or inventing, thanks to their know-how, a new aesthetic point of view and proposing long-term solutions. The proposal of ideas at various levels of feasibility would allow reflection on the problem of memory and its transmission to future generations. The intention is to leave to art and its multiple resources the possibility of thinking differently or in a "new" way about communication solutions for the future. The first reflection we propose concerns the idea assigned to art, or rather the expectations that the institution wants to attribute to art. The idea that art has the task of immortalising a moment or situation, of fixing a process in history, seems obsolete. Following this viewpoint, art should "stop time" by sublimating it with universal and comprehensible visual forms. This concept of art was refuted by H. Belting. He claims that "*la forme artistique est une forme historique*" (1989, 63); therefore, it must be read as a trace (Jeanneret 2013) of a historical moment and not a "pure form" outside its context of origin. Any artistic expression chosen by ANDRA is an expressive form that will be understood by reconstructing its interpretative conditions and not an abstract element out of its context. The interpretative conditions of artwork are always understood and transmitted in a given culture that needs continuous readjustment, persistent reformulation, and social fruition. Endorsing the idea of culture as identity, as a legacy from the past and a solid transmission to the future, would today risk the exclusion of a series of expressive and social dynamics still under construction.

A second consideration concerns the definition of art. As C. Geertz explains, the definition of art is embedded in the social domain, which also defines the aesthetic domain. All cultures circumscribe what defines the artistic domain, which includes the most diverse social practices. In the contemporary age, the domains of artistic production – and, more globally, the cultural industries – are complex social phenomena where the boundaries between artistic and non-artistic are difficult to separate.

6. ART AS A MEANS OF MEMORY CONSTRUCTION

Let us now look at the relationship between artistic production and memory. Why would art have the power to stop time to transmit memory? And what memory? In the singular or plural form?

We will start with a caveat: ANDRA storage sites cannot be defined, at least for the moment, as "sites of memory". By this term, UNESCO designates "a specific place that possesses convincing architectural or archaeological evidence, or certain features of a landscape that can be traced back to its memory aspect. It must be considered in its multi-community and/or global perspective. It is considered an object of various interpretations that can also be conflicting[22]". The storage centre in the Marne has been operational since 1969, and the one in the Aude since 1992. The last one, in Meuse/Haute-Marne, opened in 2000 but is not yet operational for waste storage. The complex definition provided by UNESCO emphasises the diversity of these sites, ranging from natural disasters to tombs, from epidemics to the affirmation of human

22 "Interpretation of Sites of Memory", study commissioned by the UNESCO World Heritage Committee and funded by the Permanent Delegation of the Republic of Korea, 31 January 2018.

rights. Above all, it highlights the living aspect of heritage, conceived as an affective symbol, an object of value for different communities, and a conflictual resource. What ANDRA might aspire to is the "memory feature" of the place: the creation of a series of values linked to the site but not considered essential. The significance of the place can be suggested, for example, by its proximity and financial investment in the territory, a condition that is not sufficient to trigger a social dynamic of discussion and exchange between individuals. We must consider that the values linked to the conservation of storage sites can be a source of divergence rather than cohesion. Art projects the institution and its activity (the storage of radioactive waste), into an imaginary long-term vision to appeal to "universal values" promoted by art itself. For example, the relationship to nature in the artworks by Stéfane Perraud et Aram Kebabjian "La Zone bleue", first prize in 2015)[23]. The use of broad and generic themes aims at communicating with visitors and reassuring them, but not always at conveying a memory. Indeed, the collective aspect of this memory (which for us is the object of value) is not always well defined. The work of art is a living element that dialogues with the public in a continuous process of reinterpretation whose codes are learned and transmitted. Therefore, working on the living memory (or, rather, on the memories of the institution, the territory, and the human beings) by appealing to different and complementary symbolic systems would perhaps become a textualisation closer to social reality. The advantage would be to work on a memory not only linked to the past, experienced as immutable, but to project a living heritage into the future. Indeed, the forms of memory are textualisations in action created for the present society and its future descendants.

7. WHAT ART ADDS TO THE INSTITUTION: THE AWARD-WINNING PROJECTS OF THE 2019 COMPETITION

In this last section, we will examine what art adds to the institution. The 2019 edition of the "Art et mémoire" competition received 23 proposals, of which 8 made it to the finals and 3 were awarded a prize. Why do artists participate in this competition? Regardless of the theme, the distribution of prizes – even symbolic ones – acts as a legitimation process in which the institution sanctions the artworks submitted. This recognition allows artists to join not so much an artistic circuit as a productive one, one of utility and consumption. It is not the aesthetic qualities that are judged but the "feasibility" and relevance of the proposals in warning future generations. According to ANDRA, artists have the arduous task of reawakening the imagery of perspective memory and "adding poetry" to industrial reality. The semantics employed here pertains to the production of artworks as well as objects, a common trait that serves to bring together two relatively distinct values: aesthetics and industry. Art should communicate, through plastic language, the immateriality of waste, which must be evoked without being shown.

We can say that artistic achievements have made it possible to see "the social frameworks of memory" (Halbwachs 1997) active in our contemporary society. As Maurice Halbwachs argues, what is remembered depends on the communication rules existing in the various social groups. Social frameworks allow individual memories to be organised. Lacking this step, individual memories could not be linked to a more global structure – and, therefore, have meaning. The dynamics of remembering and forgetting hinge on these memory frameworks, that evolve over time and across cultures.

We will now briefly examine the three finalist projects of the 2019 ANDRA competition. We wanted to gloss over the other proposals for two reasons. First, the projects are not physically realised but presented as drafts and drawings which, although complete, do not account for their actual feasibility on site. Second, we want to analyse these proposals as a single *corpus*, brought together by relatively similar visions of culture.

What social frameworks are stressed in the 2019 edition? The finalists were inspired by land art, focusing on the ability of nature to act on human beings and have meaning for them in the coming millennia. This is the case for Laure Boby, who won first prize for her work "Termen"[24]. The artist drew three adjacent hills, between 5 and 10 metres high. Each hill contains different geological layers: from clayey rock to calcareous rock and marl, all present in the Haute-Marne region. To these "natural" elements, she adds "artificial" ones, signs of industrial products such as cement, plastic, and rock aggregates. Within these layers are metal plates engraved with drawings conveying information about the storage site. The overall idea of the artwork is to create a signpost, hence the title "Termen", from the Latin word for limit, a noun that should alert us to the anomaly of these hills and the boundary we must not cross. While these creations will deteriorate over time due to the possible growth of vegetation – or, conversely, desertification – Boby's hills will remain visible even from above. The loss of memory of the storage site could be recovered thanks to the traces left in these hills, which would draw attention to the site itself.

The reference to nature and its perpetual "legibility" in relation to culture, understood here as human production, also seems to be the common thread running through the other two entries that made it to the podium:

23 For copyright reasons the images are not included in the article, but a weblink will be indicated: https://www.andra.fr/sites/default/files/2019-03/A0_PROJET_ARTISTE%20OK%20V2.pdf

24 The artworks can be found on the ANDRA website, see sitography ANDRA – Concours Arte et Mémoire.

"Implore/Explore" by Adrien Chevrier and Tugba Varo,[25] which received second prize, and "Lithonance" (public prize) by Florian Behejohn.[26]

In the case of "Implore/Explore", the contrast between a gigantic monument in the shape of the nuclear symbol (with the segments raised 60 degrees upwards) and its surroundings aims to arouse the curiosity or mistrust of the population. It is a megalith made of silicon carbide ceramic, a compound with diamond-like properties and exceptionally resistant to high temperatures. The gigantic size of the monument encloses a sample of radioactive waste covered by a highly resistant glass cube. A pictogram will point to the rest of the nuclear waste placed deep in the ground, thus alerting to the dangers of drilling the site.

From the point of view of communication, the two examples seem to oscillate between a reassuring communication in which nature will take its "biological" course and cover the dysphoric component (the waste) and a warning message and distancing, at least as far as the second example is concerned[27]. In this case, the dysphoria is visible, enhanced by an "artificial" monument, suggested by its components and proportions. Showing what is stored in the depths by placing a sample on the surface should, according to its creators, intimidate the visitor in the face of danger – exemplified, in our case, by nuclear waste.

The third work, "Lithonance" by Florian Behejohn, consists of three coloured megaliths made of synthetic rock, of different shapes, placed on the storage site. The visitor's attention would be stimulated by the sound emitted by the constructions powered by wind and water. The closer the population gets to the site, the greater the sound volume. The megaliths sport hieroglyphics about the location of the waste storage, a map of the site and other information about the neighbouring monoliths. This non-homogeneous ensemble will have openings for the flow of water and thus the amplification of sound.

This last artwork has the merit of focusing on communication that is first informative and then dissuasive, due to the harmfulness of sound in the vicinity of the installations.

All entries are based on certain categories of our current world to be understood by our contemporary civilisation. It is no longer a question of proposing a project for storing waste but a hypothesis for the construction of a new memory whose content is not revealed. We must suggest a memory for a future whose probable forms we do not know. The narratives underpinning these projects are inspired by contemporary visions: the loss of present culture in the form of archaeological remains, nature reclaiming the imagery of "natura naturans", the separation of nature and culture, the myth of past civilisations as an element of recovery and the need for memory as a feature of human civilisation. We cannot be certain that these current interpretations will be understandable in the distant future. The message created is, therefore, contradictory: the viewer possesses current semantic structures with which to interpret discursive forms to which they have, for the moment, no access.

As Aleida Assmann (2016) points out, the entries to ANDRA's competition seek to prompt a functional memory, intended to be appropriated by society in each generation. In this case, a work, a person, or a historical event is credited with a particular value and reference meaning for the future. Active remembrance work is done to continue to transmit an element of our cultural self-awareness and future orientation. This form of memory is also based on the formation of tradition and identity, aspects that have been scattered across cultures for millennia and we may simply have to forget to imagine entirely new forms for the future.

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25 See sitography, ANDRA – Implore Explore.

26 See sitography, ANDRA – Lithonance.

27 For a discussion on information types, see Mitropoulou 2016a.

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Return to front page ↑