

Article

Other Intelligences: Investigating the Plant-Human Relationship in Domestic Spaces

Alfredo Ramos ^{1,*}, Maria Castellanos ² and Ernesto Ganuza ¹

¹ Instituto de Políticas y Bienes Públicos, CCHS, Superior Center for Scientific Research, 28037 Madrid, Spain; ernesto.ganuza@csic.es

² Independent Researcher, 33213 Gijón, Asturias, Spain; maria@mariacastellanos.net

* Correspondence: alfredo@redconvoz.org

Abstract: In recent years, numerous artistic experiments have emerged that engage Critical Plant Studies in dialogue with various forms of artistic creation. The role of plants in these processes, their capacity to influence them, and their impact on human imaginaries are currently subjects of debate. This text aims to analyze these questions within the context of a specific artistic project. The piece *Other Intelligences* by the artist duo Maria Castellanos and Alberto Valverde introduces novel features regarding the role of plants and the space of encounter between humans and plants. We will analyze this artistic device by applying concepts such as plant agency and performance, opacity, and some considerations related to ethics and care. Additionally, we will present observations of certain plant behaviors and the results of six interviews conducted with project participants.

Keywords: critical plant studies; performance; art; botanical life; plants



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1. Introduction

Various artistic disciplines, ranging from theatre and visual arts to literature, have historically relegated plants to the background. This tendency has simultaneously reinforced the dichotomy between the human and plant worlds and contributed to the subalternization of plants, positioning them merely as backdrops for human interactions, symbols of human emotions, or objects for contemplation [1]. However, this subalternization is undergoing a transformation. In recent years, the interdisciplinary field of Critical Plant Studies has emerged, aiming to alter the representation of plants and recognize their agency and world-building capabilities [2].

Through engagement with Critical Plant Studies, art has become a privileged domain for intervening in the representation of botanical entities, redefining interspecies relationships, and making visible and articulating new or previously subalternized knowledge associated with plants [3]. This evolving dialogue highlights art's capacity to challenge traditional representations and expand our understanding of plants beyond their conventional roles.

While there has been significant development in artistic practices linked to new scientific advances in plant intelligence, not all of these projects contribute to the construction of multispecies imaginaries of justice. In some instances, these projects may have contrary effects, such as when they serve as “a stepping stone for use in the fields of design and innovation such as in the manufacture of plant robots” [4] (p. 88). Such practices align with “the long history of modernity’s instrumentalization of ecology” [5] (p. 15). Additionally, other forms of utilitarianism are evident in hybridization projects between plants and technology, which are primarily aimed at enhancing human well-being [6].

In contrast to the aforementioned utilitarian practices, this article focuses on an artistic project aligned with artistic experiments aimed at reconstructing the relationship with the plant world [7]. These experiments seek to develop a thinking-sensing framework for reconceiving plants [1] (p. 4) and generating new knowledge about them [8]. This

project, created by Maria Castellanos and Alberto Valverde, is titled *Other Intelligences (OI)* (2022) [9]. It involves the creation of a neural network of house plants, connected to other plants in other houses via the internet. In each home, the plants are monitored by sensors that measure their reactions to environmental interactions and potential interactions with other plants, with which they share a communication network despite the physical distance. The artistic project is founded on the premise that plants can learn to use technology to communicate with other plants.

Many of the artistic practices that signify the transition of plants from mere artistic objects to subjects capable of co-creation have taken place in conventional exhibition spaces, such as museums, galleries, and gardens [1]. The work analyzed in this text deviates slightly from this tradition, as it is primarily developed within the domestic space. In her work *When Species Meet*, Haraway began to highlight the potential of domestic spaces to analyze and construct multispecies relationships [10]. We can assert that “the home is a site of social reproduction for humans. But it is also a site for more than human reproduction” [11] (p. 911), in other words, it is a place where diverse practices, shaped by various imaginaries, actively construct more than human relationships. Most studies analyzing these relationships focus on human-animal interactions, covering a wide spectrum from animals commonly regarded as companion species, such as dogs [12], to those whose presence in homes is less frequent, such as bats [10].

Research on plants in domestic spaces has examined their benefits for human health, particularly in relation to improved air quality and mental well-being [13]. Beyond these types of proposals, we highlight two lines of research on the relationships between plants and humans in domestic spaces, with which *OI* shares certain affinities. First, Carabelli’s research analyzes the care relationships between houseplants and humans within the context of confinement [14]. Second, Aloi’s proposal of speculative phytopoetics suggests that the perspectives offered by contemporary art can help develop different regimes of attention, enabling us to redefine our relationships with plants, particularly those we share our homes with [15].

This article emerges from the encounter between (anonymized) and (anonymized) with the work of Castellanos and Valverde. We are currently conducting research into the possibilities of incorporating non-humans into deliberative processes. As part of this investigation, we examine artistic practices that critically explore the relationships between humans and more-than-humans. In this research context, this article explores how human participants in the artistic initiative *OI* altered their perceptions of plants as well as the affective bonds and modalities of human-plant encounters generated by this installation. To achieve this, in addition to analyzing the functioning of *OI*, six interviews conducted with participants in this process will be examined. The initial section of the article will discuss the concept of plants performance [16] in the context of plant agency, together with the establishment of plant-human encounter spaces. The second part of the article describes the functioning of Castellanos and Valverde’s installation. The third part analyzes, from the framework established in the first part, the interviews and the results of measurements from the installation to observe the effects on people who interact with the plants and the effects observed in the plants themselves. The fourth section will focus on some of the ways in which plants perform during *OI*. Finally, the conclusions will attempt to respond to the objectives of the article.

2. Agency, Performance, Ethics and Encounters with Plants

2.1. Plants Performance

The question of whether plants can perform necessitates several considerations. Firstly, it requires a departure from the anthropocentric view of performance, which traditionally associates performance exclusively with specific forms of language and movement. Simultaneously, it involves discarding stereotypes that portray plants as passive and reactive entities, suggesting they are incapable of performance [17]. In this context, Critical Plant Studies provides an alternative perspective by highlighting various aspects of plant

behavior, such as their modes of movement, decision-making capabilities, and plant intelligence [18]. A possible dialogue is established between plant actions and artistic creation. Jacobs defines this possibility as phytopoetics. “Phyto” (relating to or derived from plants) and “poiesis” (creative production or making) [19] (p. 1) Moreover, the concept of phytopoetics further enriches this discourse by emphasizing the potential for performance inherent in poiesis—“the dynamic transformation of vegetal life over time, through the seasons, and grounded in places” [20] (p. 118). Secondly, beyond mere artistic representation, phytopoetics facilitates an intermediary role where diverse artistic expressions serve as a vibrant medium for dialogical exchange between intelligent subjects [20] (p. 118).

The integration of performance and phytopoetics relies on efforts to de-anthropomorphize performance and move beyond viewing plants merely as objects or decorative elements in artistic creation. This approach seeks to recognize the creative agency of plants [21] (p. 1117). The use of the term agency in the field of the vegetal world has sometimes been considered as a risk of anthropomorphism [22] (p. 206). In her work on new materialism, Bennett argues for the use of these concept as a means of advocating careful and strategic forms of anthropomorphism [23]. Building on this suggestion, Ryan highlights several illustrative examples of this approach [24] like: “percipience (plants as intelligent, responsive, and agentic beings), [or] corporeality (plants as embodied individuals located in time and space)” [25] (p. 99).

For Gibson and Sandilands, acknowledging the agency of plants requires moving beyond the idea of passivity and mere adaptation to the environment. Instead, it involves understanding plants as “performing”, acting according to their distinct modes of sensing, feeling, and moving [16] (p. 2). Marder describes this inherent performative dimension of plants as follows:

their mode of being in the world — their affecting and being affected by the places of their growth. Plants are the artists of themselves: they create themselves and their environments all the time: losing parts and acquiring new ones, changing the landscape and the airscape, moulding themselves and their world through forms inseparable from vegetal matter. [25] (p. 28)

Gibson and Sandilands [16] (pp. 2–3) delineate three modes of plant performance: (a) instead of passively adapting to environmental changes, plants exhibit agency and responsiveness; (b) they perform in the presence of and for humans; (c) they fulfill specific biopolitical functions. Their performative capacity is inherently relational, “as part of a multispecies network of performativity in which, for example, showiness, smelliness, and eventfulness combine in specific ways to bring about desired ends such as pollination” [16] (p. 2). Performance cannot be isolated from the multispecies relationships that create “spaces of engagement, collaboration, and communication” [26] (p. 103). This relational aspect of plant performance hinges on their ability to influence and be influenced by their environment [27] (p. 28).

This influence also affects humans, including the ways in which humans think about themselves and their relationship with plants. Jacobs analyzes the impact of plants “on the imaginative capacities of humans” [28] (p. 603). In her research on vegetal eroticism and vegetal violence in literature, Jacobs argues that the ways in which plant sexuality has been imagined have influenced how human sexuality is understood. This influence extends beyond artistic disciplines and “permeates scientific and everyday discourse” [28] (p. 603). Thus, the performance of plants also has to do with “plants changing the way humans think, talk, and write about vegetal beings and, by extension, about themselves” [28] (p. 603).

In the field of Critical Plant Studies, plant performance is sometimes analyzed by examining its impact on specific spaces. For instance, infrastructure plays a significant role, with particular focus on how its use is redefined by non-human practices [29]. Maurer, in examining street tree stewardship practices, provocatively asks what plants can contribute to humans, moving beyond utilitarian perspectives [30]. Instead, Maurer considers how the agency of plants can engender unforeseen scenarios that prove beneficial from a multispecies perspective. Gardens also appear as a relevant space to analyze the agency of plants

and multispecies relationships. Works such as Elton's highlight that gardens are not merely human-dominated environments but are co-created spaces where the agency of plants significantly influences spatial dynamics beyond human control [31]. Recognizing the agency of plants in such contexts prompts a shift in understanding human responsibility—from commanding and controlling nature to acknowledging and yielding some control to the plants themselves [32].

This perspective aligns closely with the notion of decentralizing agency found in new materialism and assemblage thinking [24]. According to this distributed view of agency, the capacities for action within an assemblage arise from the relationships among its components rather than from individual entities acting independently [33]. These capacities are emergent, not pre-existing, and result from the interactions and properties of the entities within the assemblage [34]. Just as Gibson and Sandilands emphasize the relational nature of plant performance and advocate for its analysis within this context, assemblage thinking encourages us to consider plants within the framework of their interactions.

2.2. Encounters and Care

Human-plant encounters can serve as laboratories for envisioning “what a nature of human and more-than-human togetherness and solidarity may look like” [35] (p. 277). However, even direct engagements with the sentience or agency of plants do not consistently lead to ethical considerations [4] (p. 89). Pitt advocates for a critical examination of these encounters, which are often characterized by closeness and perceived connection [36]. Such encounters must enable us to question existing hierarchies [37] and reveal the interdependence of all participants [38].

In the context of plants, interdependence challenges us to reconsider our ethical frameworks and practices of care. It requires acknowledging that an ethical and caring approach to plants is inherently multispecies, multi-scalar, and ‘multi-elemental’ [2] (p. 640). This perspective encourages us to critically examine our practices in relation to the elements we share with plants, such as soil, water, and air. On the other hand, care is ambivalent; it can reinforce oppressive logics, but it also holds the potential to foster more emancipatory frameworks, where affective networks are created [14] (p. 6).

To analyze the connection between care and artistic practices, it is useful to engage in a brief dialogue with Crip theory. While the interaction between critical animal studies and Crip studies has been developing over recent years [38], this is less prevalent in the realm of Critical Plant Studies. Nonetheless, frameworks exist that address shared exclusions, such as the passivity often associated with the concept of the vegetal [39]. This dialogue can be enriched by considering the care practices defined by Simplicitarian: (a) Creative: This involves enabling new relationships and spaces of interaction that challenge conventional segregations. (b) Disruptive: This confronts stigmas about the capacities of “the others”, fostering shared futures. (c) Playful: This approach opts for joyful and pleasant practices, countering the paternalism often associated with care [40] (pp. 8–9).

In this context, artistic projects centered on plant performance aim to craft new narratives that challenge “the artistic institutions, cultural conventions, and perceived settled historical narrative” [41] (p. 326). The installation, as a space for encounters, has the potential to alter existing hierarchies and foster new relationships [39] (p. 69). However, these projects can encounter problems, as they may include practices that harm plants or reinforce new forms of subordination, as when plants must be cut for an exhibition, displayed in a cabinet of curiosities, or when a work of art continues to confine plants to a decorative role in relation to human activity [16] (p. 7).

2.3. Opacity and Expanding Sensory Engagement

The potential for building new relationships must address the question of opacity, of not fully understanding what is happening to others. As Tischleder points out, the formation of more-than-human solidarities “requires both empathy and the recognition that

there are many dimensions of the other that are in fact beyond our apprehension" [42] (p. 14). The realization that we cannot fully understand what we encounter is a central theme in non-human ethics [43] (p. 42) and becomes even more intricate when dealing with the plant world. Plants have often been defined as representing a radical otherness to humans, particularly within Western philosophical frameworks [44]. Critical Plant Studies addresses this perceived impossibility of fully understanding plants through various strategies. Aloï introduces the concept of the speculative, which acknowledges the impossibility of fully accessing non-humans but suggests that this recognition can create opportunities for building creative bridges between humans and non-humans [15] (p. 71). Vieira critiques the Enlightenment's legacy of complete translatability, arguing that it is unrealistic and limiting [22] (p. 206). Ryan supports the adoption of Glissant's concept of opacity, which embraces the inherent unknowability of the other as a valuable and respectful approach [25]. It is from the relationship that Glissant thinks about opacity. Rather than from the colonial, modern and self-referential framework of transparency, which seeks to understand in order to hierarchize, Glissant proposes to understand the possibility of the relationship through the prism of opacity. Acknowledging the impossibility of fully understanding the other liberates us from attempts to reduce them to pre-established, often hierarchical frameworks for interpreting otherness [45]. Opacity allows us to "promote exchanges based not on hierarchy, but on networks that abolish the prominence of a single center of understanding" [46] (p. 92). The commitment to opacity as the foundation of human–more-than-human relations suggests the preservation of the indecipherable aspects of these interactions. As Wilson asserts, this is a necessary condition for enabling "oneself to be affected and to put one's knowledge at risk" [47] (p. 14).

Understanding and relating through opacity requires more than just partial knowledge; it necessitates a "phenomenological immersion in the material worlds that we are part of—its textures, smells, sounds, sights, and movements" [48] (p. 8). Ryan emphasizes the importance of engaging with the complexity of sound, taste, touch, and smell in relation to plants [25] (p. 102). This new sensory openness can enable us to appreciate fundamental aspects of plant otherness, including their distinct temporalities, modes of movement, and spatial relationships [49]. By expanding our sensory engagement, we can cultivate a deeper understanding and appreciation of the unique ways in which plants interact with their environment.

3. Other Intelligences

Maria Castellanos and Alberto Valverde have been exploring the intersection of plant intelligence, new technologies, and AI for several years. Alberto Valverde is an artist and technologist who has developed robotics and programmed audiovisual elements in artistic projects. Maria Castellanos is an artist with a PhD in Fine Arts, with a thesis on body interfaces.

Their work has resulted in various installations and creations that investigate the perceptual overlaps between humans and plants. Examples include *The Plants Sense* (2018) [50], a garden-like installation where a group of plants transmits its electrical activity to robotic plants using a self-organizing map (SOM) algorithm, causing the robots to move accordingly. This electrical activity is also relayed to two types of tactile interfaces: a wearable device and various sponge-like objects that can be held in the hands. These interfaces enable humans to perceive the plants' changes through vibrations, allowing them to physically feel the plants' responses on their skin. Another example is *Beyond Human Perception* (2020) [51], a video installation that compares human and plant perception. In this work, a group of plants and humans are exposed to the same stimulus—a concert. The perceptual effects of this experience are visualized on a screen, highlighting the similarities between plant and human responses to the same stimuli.

This type of artistic practice is comparable to works by artists such as Špela Petrič [52] and the Electrobiota Collective [53]. These projects are heavily rooted in DIY technology, and are built around the agency and capabilities of plants. These works position plants

as co-creators, using technology to enhance their abilities or as a means of facilitating interaction with them.

OI draws inspiration from Simard's analysis of communication and care networks in the plant world [54]. *OI* goes beyond organizing an installation around plant sensations; its fundamental performative material is the relationship between perception and communication. The installation is structured as follows:

Each home participating in the project houses a plant that is connected to other plants via the internet. The project begins with 25 interconnected plants located in Norway, Spain, Mexico, Belgium, the United Kingdom, and Denmark. Based on the artists' previous experience and work with plant responses (particularly in assessing their reactions and measuring its electrical activity), participants are required to select one of the following three plant types: Monstera—"Monstera deliciosa", Peace Lily—"Spathiphyllum" and Swedish Ivy—"Plectranthus verticillatus".

These plants form a networked community, enabling a unique exploration of plant communication and interaction across diverse geographic locations. Each plant pot is equipped with a sensor called Chlorophyll 3.0. This sensor, developed by Castellanos and Valverde and based on plant electrophysiology, measures the electrical oscillations occurring within the plants. These oscillations are influenced by various environmental factors, such as changes in light, temperature, sound, and atmospheric pressure. A contact electrode is placed at the base of the plant and another on an upper branch, measuring the potential difference between the two points. This setup allows for the observation and display of variations in the plant's electrical activity, which is represented on a computer as a graph of curves. The sensors are created using DIY tools and Arduino-based electronics, with a core principle of respecting the plant's well-being. For this reason, Castellanos and Valverde opt for contact sensors, which are less invasive compared to other types of plant sensors.

The Chlorophyll 3.0 sensor has been employed in previous works such as, *The Plants Sense* (2018) [50], and *Beyond Human Perception* (2020) [51]. For the first time, this project includes a set of environmental sensors in conjunction with the Chlorophyll 3.0 sensor. This combination allows for the linking and comparison of data, providing a more comprehensive analysis of the plant's responses to its environment.

The Chlorophyll 3.0 sensor and accompanying environmental sensors (which measure changes in temperature, light, pressure, humidity, etc.) are mounted on 3D-printed supports, designed and created specifically for this project. Additionally, three types of actuators enable the plants to send signals to each other remotely: (I) A low-frequency speaker to generate vibrations in the soil; (II) Two servomotors connected to soft spikes that gently touch the plant; (III) Grow light LED. In Figure 1, we can see how these sensors and activators are placed. These components work together to facilitate a network of communication between the plants, allowing them to interact and respond to each other's signals across different locations.

The interaction of the plants follows this process: sensors monitor the plants' electrical activity (Figure 2). When a significant change occurs in the plant's environment or its electrical activity, the electrical curves shift. At this point, the algorithm is triggered, signaling to the plant that a change has occurred. The system then alerts the plant to the altered condition, enabling it to respond accordingly. The notification is delivered through a small vibration in the soil, produced by the low-frequency speaker embedded in the spike that contacts the ground (I). Simultaneously, a signal is sent to the other plants of the group. The other plants receive the signal that something is happening to the other plant either through changes in the grow light LED (III) or by the movement of thin sticks (activated by the servomotors) that rub against its branches (III). The choice of which plant receives the signal is determined by the specific electrical activity curve triggered, including its frequency and duration.

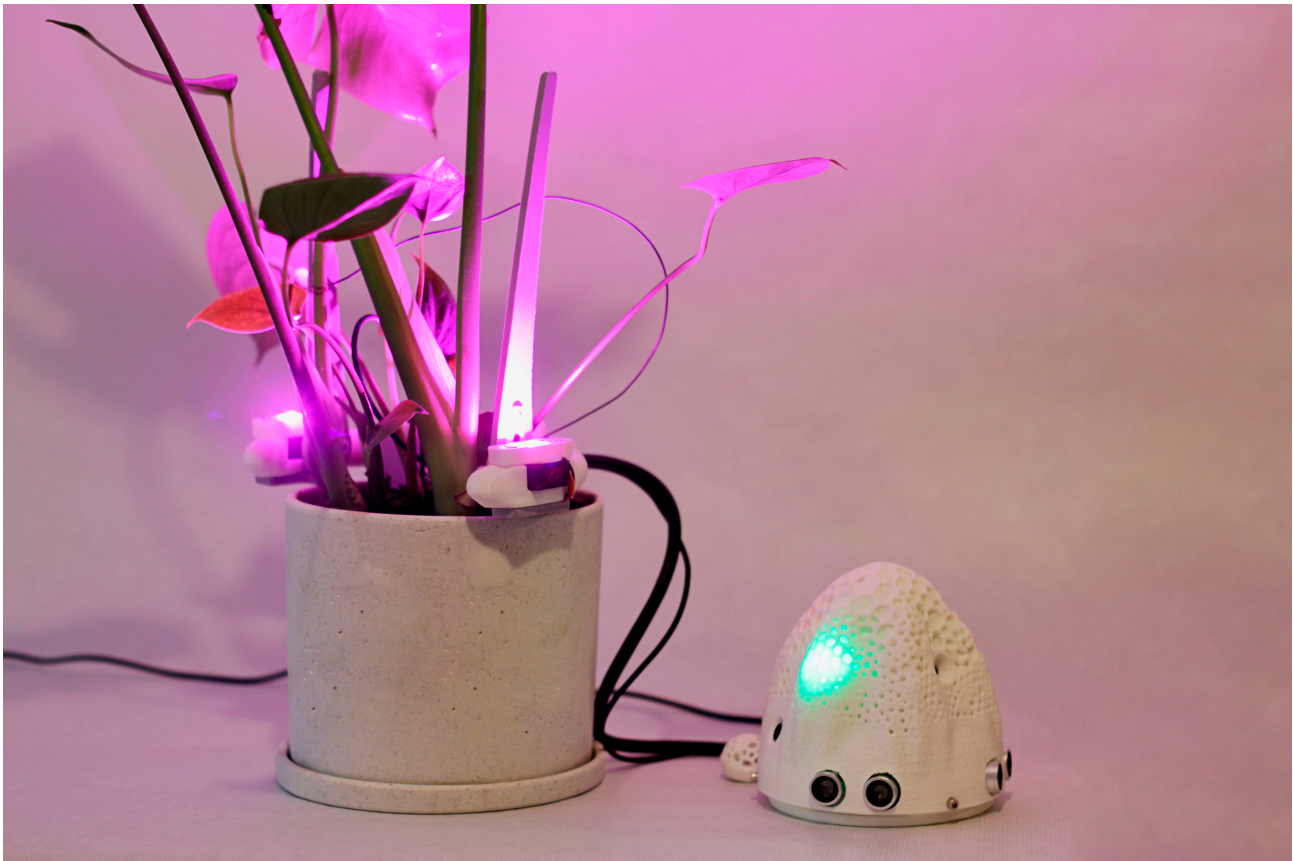


Figure 1. Other Intelligences, sensors and actuators. Source: Maria Castellanos and Alberto Valverde.

Figure 2 provides a summary of how communication functions: (1) sensors measure changes in both the plant and its environment; (2) once the analysis system developed by Castellanos and Valverde detects a significant change in the plant's activity or environmental conditions, (3) a speaker activates a vibration, and (4) a signal is emitted to other plants or another plant in the form of light or sound (plants b and c in Figure 2). The other plants can then choose to respond to this stimulus. Given that each plant has a distinct electrical curve, they can learn to recognize which plant is sending the signal, as the frequency of the flashing lights, the duration of the signal, and the movements differ with each interaction.

Recent research demonstrates the capacity of plants to make decisions [55]. Building on this finding, the communication system is designed around the ability of plants to choose whether or not to respond to a given signal and establish some form of communication with the other plants of the network. Castellanos and Valverde define "communication" as occurring when a plant receives a signal and responds to the same plant within the network in under two minutes.

In addition to decision-making, research has also demonstrated the ability of plants to learn and remember [56]. Communicating, responding to environmental stimuli, making decisions, and learning are key components of plant performance in *OI*. Castellanos and Valverde base their work on the hypothesis that plants can learn to use the communication system to make decisions about which other plants they wish to connect with, forming relationships within the network.

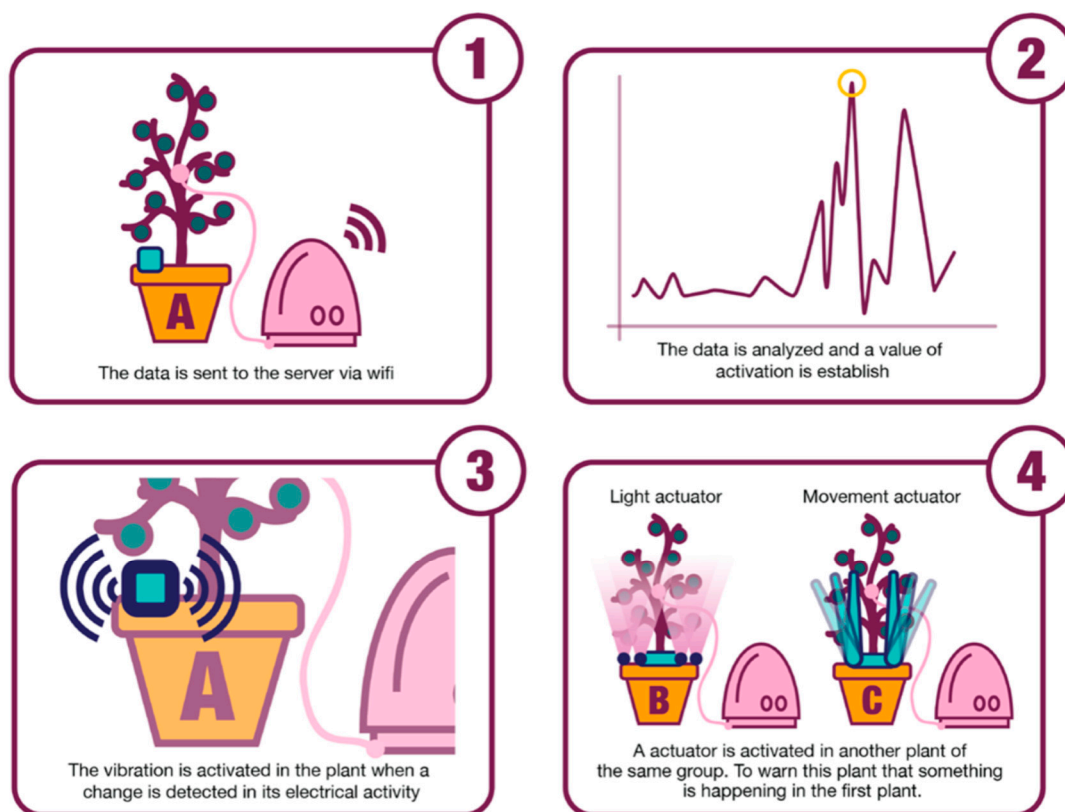


Figure 2. Operating diagram. Source: Maria Castellanos and Alberto Valverde.

4. Changes in Relationships with Houseplants: Findings from Participant Interviews

To analyze how the humans participating in *OI* have altered their perceptions and relationships with the plants involved in the artwork, we conducted six interviews with the 24 participants who still have their plants. The selection criteria were as follows: (a) maintaining the existing gender balance among the *OI* participants, resulting in three men and three women; (b) considering the groups of plants participants where the most significant interactions between plants had occurred; and (c) selecting participants with varying relationships to the plants, such as those with longer-term plant care or greater knowledge, compared to those with less experience. Considering the initial research design, which is based on an analysis of the state of the art regarding the topics under investigation, as well as the possibility that new themes of analysis might emerge from the development of the interviews, we did not select additional participants due to the saturation of discourse, meaning we had already gathered a sufficient diversity of themes, and no new elements emerged with further interviews or observations [57]. The six interviews were conducted between January and February 2023 and were analyzed using a dialogical approach [58], contrasting the various discourses to address the objectives of the article. The excerpts from these interviews are presented anonymously and numbered from 1 to 6.

As previously noted, the domestic space is becoming increasingly significant within the framework of critical plant studies. It serves as a setting where new modes of interspecies relations are starting to take shape. In this section, we present the results of the interviews, analyzing whether the encounters facilitated by *OI* have led to the development of new forms of human-plant relationships within the humans and the plants involved in the artwork.

4.1. Seeing the Plant Anew

The six interviewees exhibit varying relationships with plants. On one hand, some have few plants or minimal connection to them, while others maintain a more continuous relationship, possessing greater knowledge about plant care and needs. However, in

all cases, the interaction with the Other Intelligences plants constitutes “an experience I had never had before” (I.4). What does this novelty signify? Two fundamental elements emerge. The first concerns the capacities the plant develops through its interaction with technology, particularly the possibility of communicating: This ability can manifest in the plant’s interaction with the household members: “having a plant next to you that is communicating with you has a significant impact.” (I.1) Or, as another participant described: “When there is an external action, from my partner or myself, such as watering it, touching it, pulling off a bad leaf, or moving it, I notice that at that moment it emits sounds—this is my plant speaking (. . .) it’s really saying: this bothers me or I like this” (I.5). Communication between the plants themselves is also emphasized: “You become more aware that they are living beings that communicate. Before, you didn’t have that awareness that they are living beings that communicate with each other” (I.6).

The second element to highlight is the sensitivity of plants: “It makes you reconsider that they are living beings much more sensitive to all the inputs they can receive from the environment” (I.6), and “because if you neglect it—if there is too much noise, too much heat, or too much cold. . . the plant reacts” (I.4). Whether emphasizing sensitivity or communicative abilities, participants in OI highlight that they are: “seeing the plant anew, in a different light, as if acknowledging the life it possesses” (I.4). In other cases they claim that in their new relationship, the plant is “crossing the border, going from the plant as decoration to having a living being living with you” (I.3).

These observations by the participants reflect a clear shift in their perception of plants. While some cultures, such as those grounded in indigenous epistemologies, maintain a closer connection with plants and recognize their agency [2], in contexts like the Western one, our ability to perceive plants is more limited, particularly due to social and cultural factors [59]. The interaction between plants and technology in OI and the translation of plant needs through technological means allow participating humans to form new relationships with their plants. These relationships, in part, challenge and alter the traditional hierarchies that have defined human-plant interactions in Western contexts. Firstly, plants cease to be an object relegated to decoration, a backdrop for everyday life. Secondly, the passive/active division is broken and a scenario of coexistence is inaugurated based on the recognition of plant agency, which is encapsulated in the term “living being”.

Plants assume a new role that emphasizes their perceptual capacity and ability to feel. Through OI, there is a perceptual shift in how plants are understood. This process entails a modification of perception, encouraging a fresh perspective on plants. This new perspective on the relationships between humans and plants, finds a significant place within domestic settings. Creating a space for daily interaction with plants suggests that their performance unfolds within a temporal framework that enhances their perceptibility to humans.

Furthermore, the artistic project expands the possibilities of perceiving the changes that plants undergo. Their constant presence and growth make them particularly noticeable to human senses, primarily sight and hearing. However, these senses are engaged in a different manner, utilizing the potential of artistic practice in everyday life to foster “moments of unexpected emergence from the otherwise habitual routine and repetition of ordinary, everyday life” [60] (pp. 413–414).

But looking at the plant again also means reviewing what is shared with them, whether through emphasizing interdependence [38] or acknowledging a shared atmosphere [2]. Participants in the Other Intelligences project not only highlight the impact of cohabiting with these plants on daily life but also underscore how the plants’ performances and their auditory and visual effects prompt attention to the materiality of shared experiences, transcending everyday temporal boundaries. In many instances, this awareness involves recognizing that plants respond to environmental changes: “In relation to the environment, the plant captures it; it’s something you keep in mind. It can detect any change in the environment, which makes you mindful of it” (I.4).

Two key elements emerge from these shared experiences. Firstly, participants describe being part of a dialogue among plants where their actions influence the plants’ needs: “It

was challenging to comprehend that a plant interacts with others and that you are also part of that interaction, because if you neglect it, or if there's too much noise, heat, or cold, the plant reacts and communicates this information to other plants" (I.4).

The second element concerns the shared environment between the plants and the participants. For instance, one family noted that through interacting with the plant, they became more aware of the air they all breathe together. This realization shifted their perspective, as they had never before considered their relationship in terms of the air they share, leading them to reflect that "you can extrapolate that to think about everything else we share" (I.6).

4.2. *It's Almost Like Having a Pet*

For all the interviewees, the plants of Other Intelligences occupy a special place among the other plants they have: "It's the plant with which we feel the strongest connection. I appreciate plants in general, but I'm not usually so attached to them, unlike this one" (I.2), or "I pay more attention to this plant than any other. It's like the pampered child; if I notice it wilting, I become concerned and empathize more deeply" (I.5). This type of affection appears both among those who have few plants or little relationship with them, and in the opposite cases. In the latter cases, the participants also point out that "It is the special plant" (I.3)

This special relationship with the plant is linked to its role as an artistic device, where it interacts with technology to produce sounds or lights that reflect its state, and communicates with other plants. Beyond capturing their attention, this relationship has various impacts on the daily lives of the human participants, which can manifest at specific moments: "The plant wakes me up in the morning" (I.3). It may also happen that thanks to this plant, attention is paid to the needs of other plants: "It's the first one I check on, and then I remember the rest of the plants" (I.5).

The actions of the plants, to the extent that they generate a bond and attention different from that which is usually given to plants, lead some interviewees to speak of the plants as a vegetal companion, more exactly, like a "pet": "the movements are very slow, when it started it caught my attention, like a pet (. . .) it became a pet because it had more visibility (I.2); "it has special treatment, because you have to take it like a pet (I.3). In the following statement we see how the condition of a vegetal companion is linked to the actions of the plant:

It's almost like having a pet; the way the lights turn on, it has its moments. That's why you pay more attention to it, because it's clear when it's transmitting or receiving data. If it were performing these actions without the visual cues from the lights or vibrations, well, you wouldn't notice. It doesn't give us cuddles yet, though. (I.6)

This is one of the most significant aspects of the human-plant relationship experience within the artistic piece *OI*: the special role that plants assume within the domestic space. This role is less about the environmental or mental health benefits they may provide and more about their capacities and sensitivities. This "special" dimension of the plant is reflected in recent research on human-plant relationships, particularly since the COVID-19 pandemic and subsequent confinement. Various studies report that people have developed deep connections with plants, often referring to them as their best Friends [13] or emphasizing how plants take care of them [14]. Other research highlights the increasing practice of naming plants, which suggests a strengthening of the bond with the vegetal world [61].

This connection leads some participants to consider their plants as "pets". While we have previously discussed the strategic use of anthropomorphization to conceptualize plants, such as considering their agency, here we observe a strategic use of zootropism. The shift in imaginaries regarding plants that occurs in these homes involves moving away from conventional views of plants as passive entities. Participants recognize them as capable of action, movement, and interaction—qualities that align more closely with non-human animals than with traditional perceptions of the plant world [41]. In this

space of uncertainty, where our perception of plants is expanding, plants are beginning to be defined using a concept traditionally applied to animals: “pet”. The question arises whether we can extend the notion of companion species beyond the non-human animal world (as vegetal companions, for example), or if this new connection with the plant world necessitates the development of new concepts.

4.3. *“I Don’t Know What Is Happening”*

Naming the relationship with plants is not the sole issue to be examined within interspecies domestic ties, nor is it the only novelty that participants experience in their interactions with plants. Patricia Vieira, in a recent text on plant performance, wondered whether plants could communicate with humans [62] (p.86). Several of the interviewees respond to this question by stating that they are talking to the plants: “The plant takes on a different meaning from the others (. . .) I feel like I’m having a conversation with it” (I.4); “you initiate a conversation with the plant, which starts as a jest but eventually ceases to be a joke” (I.2). Although we cannot confirm whether this is actually happening, participants often express a strong certainty that “the plant wants to communicate with me” (I.3).

However, this dialogue has a peculiarity: despite the evident interaction between human actions and plant responses, or vice versa, all participants indicate that, with few identifiable exceptions—such as the plants’ need for water—they do not fully understand what is happening. For instance, one participant mentioned, “Things happen to it, but I don’t know what is happening to it, I don’t know what it is doing” (I.6). Alternatively, they may recognize that something is occurring but struggle to decipher its meaning, as expressed by another participant: “They communicate in a different code, which is not a code that we are going to understand” (I.3). But not knowing what is happening is never an obstacle to developing a deep connection with the plant: “It’s not necessary to comprehend what is happening to it to feel empathy” (I.3), and “It suffices for me to know that things are happening to it to recognize that it is a much more complex being than I had always thought” (I.6).

What emerges is a relationship characterized by opacity, where the full extent of what occurs remains indecipherable. However, this lack of complete understanding does not hinder the formation of a bond. On the contrary, the relationship is constructed upon the foundation of this ignorance and the vulnerability associated with not knowing everything the other (in this case, the plant) experiences or thinks. While the inherent otherness of the plant remains, artistic intervention has successfully constructed a bridge to establish a connection with it. This connection is forged through signals that humans can readily perceive, such as sounds and lights, which prompt attention towards the plant. Despite the fact that sight and hearing typically create a sense of distance from observed objects, in the case of *OI*, they facilitate a perception that events are unfolding within the plant. Each human participant, despite lacking precise knowledge of the plant’s activities, devises unique strategies to respond to the vibrations and sounds emitted by it. Interestingly, many of these strategies are collectively shared. As one participant expressed, “Everyone at home, more or less, we’ve begun to interpret its signals; we all believe it’s turned on for some reason” (I.6). This communal interpretation creates a community around the plant’s opacity, fostering discussions about its actions. For others, these signals serve as prompts or reminders. For instance, one participant mentioned, “Sometimes I forget to water it, and when it moves, I think, ‘Okay, water!’ I made that connection” (I.2).

4.4. *You Can See the Plant Start Blinking and Wanting to Join the Gathering*

The uncertainty that characterizes the relationship between participants and plants extends beyond those humans who live in the home. There is a common thread among the interviewees: the project’s potential is particularly activated when visitors come to their homes. These encounters hold a special significance, as one interviewee highlights: “It was very interesting because it gave us an opportunity to discuss the process; it’s a piece that sparks conversations about plants, whether they communicate or not” (I.2). The question

then arises: what occurs during these meetings? Firstly, there is a general sense of surprise among all visitors to these homes. This astonishment stems not only from encountering a plant connected to a technological interface: “Everyone is struck; they wonder why a plant has sensors. . . when you explain that it’s part of a project. . . people are amazed, they love it” (I.1). Moreover, some interviews note that “when someone comes over for dinner, the plant puts on its own performance” (I.1); “it seems like the plant reacts when there are people around. . . you can see the plant start blinking and wanting to join the gathering” (I.4).

During these conversations, the typical discourse surrounding plants undergoes modification, focusing on “what is knowledgeable about plant life (. . .) about vegetal forms of communication and interaction” [63] (p. 180). This prompts a reconsideration of how these discussions impact perceptions and imaginaries about plants:

Normally, people are quite skeptical; they find it hard to believe that this is actually connected to the Wi-Fi networks of various homes and that it’s genuinely transmitting data. . . the idea that plants communicate is something many people find surprising, as they’ve never heard of it. (I.6)

The question that always comes up is: what is this? I try to explain it as best as I can based on what Maria has told me, and generally, everyone is taken aback. There are even people who express interest in participating in the project. . . I try to explain a bit that it’s communicating with other plants. . . people are quite amazed. (I.5)

Some people inquire about obtaining more scientific data. (I.1)

In 2011, Meghan Moe Beitiks presented her installation *Plant is Present* [64], a reinterpretation of Marina Abramović’s performance in which the artist sat at a table while visitors, seated at the other end, maintained only eye contact, experiencing the quality of the encounter space that was created [65] (p. 189). In Beitiks’s project, the encounter was with a plant dressed in human clothing and placed on a chair, simulating the appearance of the plant sitting. It was a project “aimed at further exploring the potentialities of being-with a plant on a “one-to-one” situation akin to that of the domestic sphere” [66] (p. 89). The plant’s presence was accompanied by detailed information about its specific characteristics. According to Beitiks, this encounter shifted our attention to something typically overlooked, allowing for a unique form of connection with the plant [67].

A similar dynamic occurs during visits to homes where *Other Intelligences* plants are present. These visits often evoke a sense of intimate surprise in the encounter with the plant. During these moments, the arrival of new visitors activates the plants, much like how the plants, through the installation, stimulate the visitors’ curiosity, desire for knowledge, and questions.

5. Are the Plants Learning?

Another critical aspect to consider when analyzing the performative capacity of plants is their potential agency within environments typically deemed exclusively human or, at the very least, exclusively animal. Information technologies, seemingly a human domain, are an example of such environments. We will now explore how this human exclusivity is questioned in the artistic project *Other Intelligences*.

As previously noted, one of the OI hypotheses is that plants can learn to use technology to communicate with other plants. This learning process, which occurs at the initial stage of coexistence with sensors and communication devices, is described in some interviews as a period of intense activity: “the first stages are more active in the sound part, in the light part” (I.1). This heightened activity level, which subsequently tends to stabilize, is understood by some of the participating humans, as well as by the duo of artists who designed OI as a testing phase during which the plants are learning to navigate the network, followed by a period of stabilization.

Once the plant has stabilized, we observe two processes that reveal the agency of plants and their ability to make decisions. The first process is the establishment of a preferential

bond. Some plants choose to communicate more frequently with specific plants, indicating a preference for continuous interaction with certain members of the network. In a group of six plants, for reasons unknown, some plants decide to engage more with particular plant participants.

In these two images, we can see how this more intense relationship between two plants develops. These images are generated using a mathematical algorithm programmed in Java, based on data collected from conversations between two plants over the course of 127 days. Each circle represents the conversations between two plants and they vary in size depending on the interaction that the exchange of information has had: the more interaction there has been between plants, the larger the circle. In these images, the reading is made from the center, which is the initial moment of the experiment, towards the edge, which represents the end.

In this first image (Figure 3) we see how one of the plants of the people interviewed communicates with another and how that relationship disappears.



Figure 3. Plants conversations I. Source: Maria Castellanos and Alberto Valverde.

In this other Figure 4, however, we see how that same plant (Monstera 5) develops another type of relationship with another plant. This relationship is not only distinct from the one developed with the other plant (Figure 3), but also from the relationships formed with the rest of the plants in the group. Over the 127 days of the experiment, we observe that the relationship becomes more enduring. Although it starts similarly to the interaction shown in Figure 3, the nature of the conversations evolves over time, becoming increasingly different. The intensity of the communications reflects a very intense relationship between these two plants, which the interviewees have called friendship.

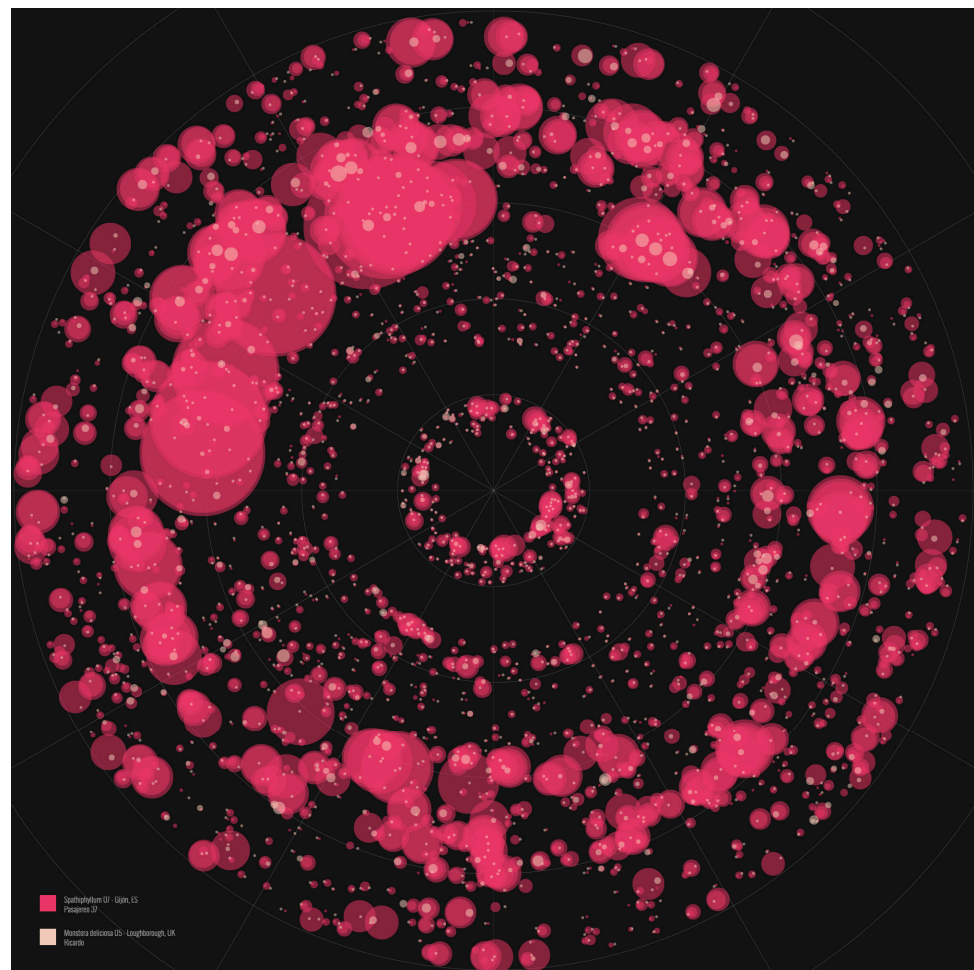


Figure 4. Plants conversations II. Source: Maria Castellanos and Alberto Valverde.

The second process is the distinction between new and old companions. When a new plant joins the network, the existing plants initially resist integration. Despite the new plant's attempts to communicate, it is ignored until the established plants decide to accept it into the group and begin to respond to its messages.

We know that plants can communicate in natural environments through various mechanisms [66,67]. However, in the context of *OI*, the use of technology appears to be an emerging capability of the plants participants, incorporating new communication possibilities. This capacity for technological communication, evidenced by their actions and choices, exceeds the initial hypotheses of the project. The performance of the plants in *OI* enables us to talk not only about learning, but also about creating relationships between the plants participants. Some of the people interviewed who have been able to access the data visualization define this plants relationships as friendship. These friendships represent a particular human way of addressing the impact that this type of communication has on their perceptions of plants. It is not merely about discovering unexpected capacities (such as the use of technologies), but also about broadening the recognition of the complex ways in which plants communicate—characterized as friendships or specific interests in other plants.

Beyond the use of technological devices or responses to environmental changes, one of the ways in which plants perform is through movement—a manner of occupying space resulting from interaction with the environment [51]. Some participants in the project, who describe a certain hyperactivity of the plants at the beginning of the process (what we have termed learning), observe that, after this initial phase, the plants appear happy, and this

happiness is manifested through movement and growth: “now it is in its element, it is happy, it has grown a lot” (I.1).

However, we want to highlight another type of movement, which has a different characteristic: wilting, or the loss of size and presence. We can consider that to perform absence or lack, plants become wilted. Some plants disappear from the network due to the need for interface repairs, updates, or connection problems. During these periods, other plants send signals that receive no response. Consequently, the lack of response causes the plants to wilt until their “companion” is reconnected. From our emotional repertoire, we can interpret this movement as a performance indicative of melancholy. However, this type of interpretation is limited by the human emotional repertoire (of those of us analyzing the content) and by the inherent opacity that we must acknowledge. Nonetheless, this does not prevent us from considering that something is occurring in the relationship between the participating plants that extends beyond what humans—especially those of us rooted in Western epistemologies—typically believe can happen to plants.

6. Conclusions

The aim of this article was to analyze how participants in the artistic initiative *Other Intelligences* altered their perceptions about plants. All participants reported a change in their perceptions of plants, viewing them as sensitive and intelligent beings. The interviewees indicated that they began seeing plants in a new light through an artistic piece where daily care took on a disruptive character [42], challenging preconceived notions about the abilities of the “others” (in this case, plants). This shift in perspective and the development of new plant-human relationships were largely influenced by the presence of the artistic piece in their homes. The daily interaction and intimate connection with the plant became more consistent, allowing the distinct temporalities of plants and humans to meet.

Also relevant to this change in imaginaries has been the role given by Castellanos and Valverde to the agency of plants and their capacity to perform. Firstly, the project’s content revolves around the sensory perceptions of the plants and their communication with other plants. Agency, performative capacity, and influence on the work pertain to the plants’ intrinsic abilities to affect and be affected by their environment. In *Other Intelligences* are the plants that generate the foundational content, which is subsequently augmented through a set of sensors to direct human attention. Notably, the plants’ performance surpasses the artists’ expectations, resulting in unanticipated situations. These situations relate to the nature of the connections among the participating plants, how changes in these connections impact them, and how they appropriate technology.

Despite the relevance of the domestic, proximity, or closeness to a plant does not necessarily result in more ethical relationships with the natural world. Nonetheless, what is significant in the context of *OI* is that these encounters foster a heightened awareness of interdependence—acknowledging how our actions affect plants—and of shared elements, such as air.

Many artistic pieces that seek to revalue plants have been created using senses such as touch, taste, or smell. However, *OI* employs the more conventional senses used in artistic exhibitions: sight and hearing. Nonetheless, it integrates these senses with practices of care and coexistence. As a result, new connections with the participating plants are indeed generated. One of the most significant aspects of these connections is their opacity. Given the inherent challenge of understanding the otherness of plants, human participants acknowledge that there are aspects they cannot comprehend. Despite resorting to certain anthropomorphizing practices, this does not hinder them from forming emotional bonds with the plants and recognizing their complexity.

Other Intelligences aligns with Tsing’s recommendation to integrate scientific and artistic knowledge, opening new pathways for reimagining multispecies relationships [68]. *OI* embraces this approach and offers several important insights. The first is that reimagining these relationships requires acknowledging the performative capacities and agency

of plants, as these elements are crucial for generating surprise—an essential catalyst for rebuilding our connections with the plant world. The second lesson is that, despite its limitations, *OI* demonstrates how participants are open to reestablishing their relationships with plants through new encounters, fostering a different understanding of plants by recognizing the partiality of human knowledge and the importance of engaging with otherness from opacity.

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