

Deceptive Practices Robotic Art

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Abstract

Charles Darwin wrote six botany books, three on flower reproduction, given the importance of the reproductive process in life's evolutionary complexity. This paper presents an experimental design/art small-world system of three robotic deceptive flowers and their reproductive behaviour. The system shown is the first generation of robotic individualisations. The concept is based on the idea that deceptive flowers decoy pollinators by advertising a reward, which is not provided. The artwork is inspired by the genus *Aristolochia*, which uses fly-trapping to spread its pollen. This study seeks aesthetic visual fabrics and sizes to impress people to interact with the robotic structures. Once a person is close enough to the flower, it will trap the person for a few seconds. The project is also a feasible design experiment intending to study individuals' reactions to the trap conditions. The installation aims to sensibilise individuals to the high cost of the mind and body's reproductive circumstances.

Keywords

Robotics, Small-world Systems, Conceptual Art, Textile Art.

Introduction

In this paper, the development of an artwork called *Deceptive Practices* takes place within the concept of individualisation. A process that all technical beings undergo. Here, it presents the circumstances that motivated the individualisation process and how the first generations of this artwork had taken its forms and behaviours.

The project's concept is about reproduction as a transductive act that escapes the individual body where it takes place. So important is this transductive event for the continuity of life that evolution is a concept described by an immeasurable time of recursive reproductions and adaptations in opposition to the act of creation. However, as humans, culture will become a driving force to affect reproduction directly and indirectly. The cost of reproduction for human beings is related to the environment, economy, culture, technology, and many other subjects linked to the generation of new humans. It is a complex issue transcending any disciplinary circle, expanding it to transdisciplinary matters explored in this paper.

The small world of robots is also a fundamental concept of honouring that individualisation does not happen within isolated individuals but due to their relationship with others. Although each robotic structure has autonomy within its own body, the other feels what happens with one. Furthermore, in another level of magnitude, the collective of bodies also reacts to the presence of human beings. The conceptual model wants two goals: the perception of flowers connected and behaving separately and humans as part of another species' reproduction process. As all reproductions have a cost, this project intends to securely trap humans within the flowers to mark this conceptual condition.

Finally, it is essential to clarify that some levels of investigation about scientific principles and reproductive cultural issues are necessary to reach the artwork concept of transdisciplinary. Here, considering other-based knowledge translations, they intend to transform scientific and social research questions, not research results, into conceptual issues within the art process. Also, the process will be inspired by the specific reproductive strategy of the *Aristolochia* species as a deceptive flower that uses pollinators. This strategy will be translated to robotic behaviours. The results are descriptions of the individualisation of such a concept, with a research question: Can an art/design piece sensibilise people to the costs and views that encompass reproduction?

Artwork Concept

Philosophic Arguments on Individuation, Individualisation, Transduction and Reproduction

Living organisms can be perceived as more and less individualised where the difference is not necessarily related to superiority in vital organisation [1]. Through individuation theory, it is possible to understand robotic plants as small-world systems that challenge the concept of the individual. A plant, a living being, is in an excellent position to question robotics biological mimicry because the biological definition of a plant can flow from colony to rhizome to individual. Individuation can be a philosophical response to understanding the process of being in time, including robots, in many levels of integrated systems. The orders of magnitudes of interchange information transfer the notion of the individual to the individuation process, where no individuation exists without being in transformation: "the living being retains within itself an activity of permanent

individuation" [1], p.21. The metastability of the process is perceived as individual, and metastability is viewed in orders of magnitude or domains.

Within the individuation process, transduction is the mechanism by which systems exchange. According to Simondon, transduction corresponds to the existence of a nexus. It is an operation, physical, biological, mental, or social, where an activity propagates from each part next to the other part within a domain and between domains. Some authors [2] in physical computing, where the research presented here establishes its praxis, consider transduction a limited definition of transforming analogue to digital information and vice-versa. It is essential to establish that although it is also a transductive event, the only transformation between analogue to digital and vice-versa precludes a broader understanding of transduction as the process of propagation that enables living structures to exist in a metastability state.

Simondon's individuation theory also comprehends evolution as an essential process of both technological and living beings. Within evolution, while individuations are limited in time and space, the specific *reproduction capacity* creates the absence of this limit. "Adding a living being is a specific transductive act permanent and localised, without analogy in physics: a particular individuation added to a specific one" [1], p. 235.

In the case of technical beings, in which this study understands robots as a particular example, evolution results from an internal condition within the being [3]. Caused by the imperfection of abstract thinking to respond to conditions of existence, the technical being faces obstacles in its interior functioning. That incapacity is born from the saturation of the system of subsystems to resist the limits of individuation [3], p. 49. A new technical being is assembled and becomes possible through abstract thinking and technologic relaxation, and here, Simondon explicitly changes the individuation process and renames it to *individualisation*. As such, reproduction is a very particular form of transduction, with the tremendous necessity of further investigation.

Other-Based Knowledge Translations

Social Issues on Feminism and Reproduction According to [4] feminist studies are well known to question the body through dualistic concepts of public/private and theory/practice, always cutting across established domains. The authors affirm that science-based explanations of the human organism as a human being generally propagate product-based narratives of identity, while in Simondon's individuation, it is a process-based existence. According to them, those product-based narratives are attempts to pass as universal or normative, which is, in fact, specific.

For example, Australia's government accepts the existence of Reproductive Coercion and Abuse (RCA), referring to the attempt to dictate a person's reproductive choices or interfere with their reproductive autonomy [5]. According to the reference, it is typically perpetrated against women and other people with female reproductive organs, although the exact numbers are hard to predict due to an underestimate of the actual prevalence of RCA. In Brazil, controlling a body through abortion (even when desired by the individual where reproduction is taking place) can be considered a crime in most circumstances, and the law considered "woman" only, to be heavily penalised by the act. The same behaviour is often ignored by the system depending on the woman's access to money or social connections [6]. Another specific cultural example is social practices that lead to placing pregnant women as mainly responsible agents in future parenting. According to Ballif [7], while implementing a conceptual framework to analyse anticipatory regimes in reproduction, pregnant woman is expected to act in parenting, which consists in a normalisation and removes the specific conditions of agent's reality.

Individuation process challenge agency itself, contesting principles of independence and rationality where individuals are expected "to have control over their body, independence in decision making, identifiable origins, prospects for the future, and respect and accountability for their actions as a free-thinking agent" [4], p. 102. Helping to investigate the specific context once individuation, which is a contrivance, happens due to a process.

To conclude, the conflict of view around reproduction presented in the above examples may come if analysed from a product-based perspective. On the other hand, from a process-based perspective, reproduction is transduction that explicitly exceeds the reproductive body (the order of magnitude) where reproduction occurs. It is a social and biological transformation. It implies that life's existence, evolution, and how it happens are an object of diverse research.

Scientific Research-Related Topics Research has been discovering and contributing to emphasising diversity and complex relations in individual formation. Findings include the conduct of returning home to reproduce, which is ensured by the diversity and multitude of imprinted individuals in opposition to individual adaptability [8]. Also, massively distributed living beings in nature, soil mosses contribute to terrestrial soil biodiversity by retaining 6.43 Gt more carbon in the soil layer than bare soils [9] During the preparation of this paper, new research about the evolution of phenotype in plants [10] was just released. The finding confirmed some of the intriguing issues that reflect the exploration of complex individuations, *including the exhaustion of the individual but not the process*.

Findings such as those presented are highly intriguing. Furthermore, they contribute to the philosophical understanding of individuation. They reveal the importance of nexus and relations to understanding individuation and how behaviours and natural evolution are linked. Biological behaviours, such as soil mosses, animals, fungi, and plants, reflect the relations and nexus in many orders of magnitude.

Research-Related Inspiration Views This artwork looked at Charles Darwin's workings in plant behaviours for inspiration. He is the recognised father of evolution, and his systematic research discreetly differentiated his work from all the emergent ideas of evolution that arose during his time. It is not a secret that his passion for plants was also distinguishable and that in the field of botany, during his time, he was but an amateur in love with his discoveries. According to Thompson [11], while barnacles had to be Darwin's first passion, plants also became another because of their convenience as experimental material. He used them as building blocks of his theory of evolution. When the theory became a reality, he developed a further understanding of plants using his theory as a powerful engine. His findings and experimentations as an amateur inspire researchers who can use modern technology to understand his approaches further. According to the author, three of Darwin's books about plants could be organised into one chapter named Sex and the Single Plant, where *the reproduction of the individual* is emphasised through Darwin's works in this chapter. Thompson affirms that sex and flower in botany can be the same.

The evolution of the form in Darwin's work with orchids seems straightforward to him: although visually designed, the flower is an organ that originated for some other unknown purpose and adapted to a new one. Likewise, *the behavioural challenge of the flower is cross-fertilisation*. It is hard to get pollen reliably transported from different flowers of the same species. Darwin had a scientific question: Why is all that effort necessary?

Darwin's research consistently discussed evolution. In this case, it is the seed of research within hysterotomy in flowers and pollination specialisation dependence and coevolution. He used creativity and experimentation within the available constraints of his time, creating an opportunity for new research fields.

Artwork in Progress

Here, we will describe the artwork in progress. Until the moment of writing this text, we have reached three individualisations. Figure 1 presents the first individualisation. The artwork then was a piece 50mm in height, using an Infrared IR Proximity and an Infrared Proximity Sensor - Sharp

GP2Y0A21YK to calculate both distance and presence within the robotic internal area. The piece also incorporated textile experimentation and used Windrose Hardware [12].



Figure 1. First individualisation, created in July 2023. ©Author's archive.

Figure 2 presents the second individualisation, which consists of three robotic flowers. The individuals used the same components of the first generation presented in Figure 1. However, they were made without textile experimentation to focus on the interconnection between individuals and experiment with interaction.

Finally, we will end with the third individualisation, where a huge step was taken into this evolutive artwork. Figure 3 presents this individual who needed a new metal servo to hold the mechanical arms. It cannot encapsulate a real person but playing around with a 3D-printed figure of around 70 cm was possible. The individual also received a new conceptual textile art and an encapsulated bag with sensors. The same Windrose hardware was used; however, a new proximity sensor, Gravity: VL53L0X ToF Laser Range Finder, was used instead of the Infrared Proximity Sensor - Sharp GP2Y0A21YK used in generations one and two. The mechanical issues, sensor precision, and connection with the board led to new challenges in the study for the fourth intended to be achieved in 2024.

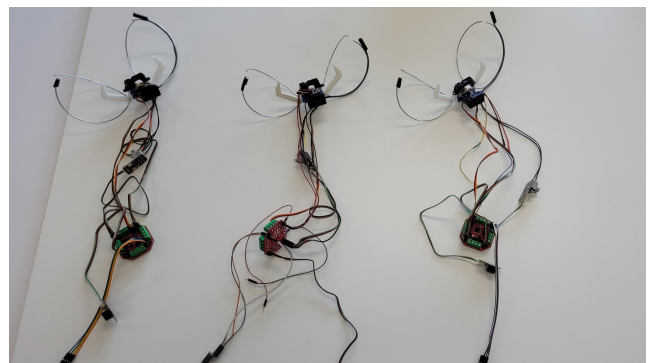


Figure 2. Second individualisation, created in September 2023. ©Author's archive.



Figure 3. Third individualisation, created in October 2023. ©Author's archive

As presented, the artwork is a process where many individualisations have been released but have yet to reach the situation where we intend it to become a final installation. Considering it is a work in progress, we seek funds to create a bigger version of the robotic individuals. However, due to the nature of the project, all individuals are using the same hardware and, as such, could be easily connected in a network of generations still capable of exchanging data within the small-world network.

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