Viana, V., Nagy, D., Xavier, J., Neiva, A., Ginoulhiac, M., Mateus, L. & Varela, P. (Eds.). (2022). Symmetry: Art and Science | 12th SIS-Symmetry Congress [Special Issue]. *Symmetry: Art and Science*. International Society for the Interdisciplinary Study of Symmetry. 088-095. https://doi.org/10.24840/1447-607X/2022/12-10-088

TRANSFORMATION IN IMPLEMENTATION. SYMMETRY CONCEPTS IN INDUSTRIAL DESIGN PRODUCTS

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Muñoz, P. L. (2015) Expandible tessellations. In Sperling, D. and Herrera, P., eds. Homo Faber. Digital Fabrication in Latin America, [Exhibition Catalog of Homo Faber, Sao Paulo, Brasil, July 7-31], Sao Paulo: Instituto de Arquitetura e Urbanismo, 14-17.
Muñoz, P. L. (2013) Layers of Symmetry, *Symmetry: Art and Science*, 2013/1-4, 258-261.

Abstract: *In our courses on Morphology for Industrial Design undergraduates, the concept of order and disorder in form is present through the study of the different levels of symmetry. This paper describes an instructional material that was developed to counterweight the limitations of the COVID-19 lockdown, to connect our students with graduates in order to examine the relevance of the contents of our courses and its implementation in professional practice. Diverse types of objects, designed by different Studios were chosen, where symmetry was a relevant aspect. This experience was successful, as students could understand that the activities carried out in abstract forms could be transferred to their design projects and also because we understood unexpected relations of symmetry to market strategies, functional and communicational issues. Beyond the appreciation of symmetry within spatial structures, of relations between motifs, and the outcome of symmetry operations, we found remarkable relationships between user´s expectations and design projects that are instrumental to adjusting its degree of innovation.*

Keywords: Symmetry; Industrial Design; Morphology; Implementation; Education.

INTRODUCTION

Throughout industrial design history, there have been different trends that promoted ordered and analytical prescriptions for design, where efficiency prevailed. These found their greatest expression in the Modern movement in architecture and design, in the first half of the 20th century. It supported the elimination of everything beyond function and usefulness in product design. The demand to abandon ornament, the search for authenticity in the use of materials, and in the identity of a product, looked for an image of neutrality and cleanness in everyday objects distant from human desires and emotions.

Concurrently, Gestalt theory qualified basic geometric forms as pregnant and balanced. Together with other Gestalt laws: proximity, closure, continuity, similarity – the law of *good form* arises. According to Marcolli (1978:113), it states that "*lines, shapes and images, group towards a privileged shape that, in general, is simple, sometimes even symmetric and always in conditions of being perceived as the best possible form.*" We should add that *the best* was the most regular, symmetric, and simple, therefore pure. Rudolph Arnheim (1971, p.32) explains: "*A long tradition, going back to Greek philosophy and never quite dislodged by the voices of the occasional dissenters, describes the arts as principally or wholly concerned with the establishment of order, harmony, proportion, etc*." Its role would be to confirm these concepts through a permanent reference to an ideal to be reached. However, Arnheim (1971, p.42) clarifies: "*Even the most traditional aesthetic taste does not limit itself, in the more sensitive observers, to considering beauty exclusively as the absence of distorting stresses, although Classicist theory concentrates on this aspect*."

In the 1960s Post Modernism provided a breaking ground for these design values and extreme analytical methods. Samar (2004, p.181) states: "…*it sought to overcome the restrictions enforced by the "functionalist doctrine" and the concept of "good form", and it became a solid opposition to those who considered that design should be a media to identify a social position*". Innovation arrived abruptly through whimsical products that became our everyday objects. These forefront design studios introduced attributes that were unthinkable in products. They did not persist in this disruptive practice but many design concepts they supported, such as hybridity, diversity, layering, and juxtaposition, were accepted with less intensity in consumer products.

Today, beyond these extreme points of view, there is a more balanced use of symmetry-breaking that introduces tension in an existing range of products, in order to provide innovation. Design practice permanently challenges the ways in which our habitat is built and the appropriateness of the behaviors it promotes. In its 29th General Assembly the World Design Organization (WDO, 2015), the Professional Practice Committee agreed in this updated definition: "*Industrial Design is a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences*". A relevant dimension for differentiation in products is *Design Newness* (Talke *et al*., 2009) that acts as a trigger for attention and interest. However, it has to be regulated. As Raymond Loewy clearly defined in his *MAYA* principle (Dam, R. F., 2021), the designer´s goal is to reach the *Most Advanced Yet Acceptable* solution.

Ezio Manzini (1989) remarks that design is the materialization of something *"thinkable and possible"*. It happens at the intersection of mental and technical development. Digital fabrication produced a manufacturing shift from more regular, isometric shapes to those with lower levels of

symmetry. Transformation is becoming more frequent in everyday objects through different strategies and are financially feasible. In terms of Kolarevic (2003, p.52)

> *The sparse geometries of the twentieth century Modernism were, in large part, driven by Fordian paradigms of industrial manufacturing (...) The rationalities of manufacturing dictated geometric simplicity over complexity and the repetitive use of low-cost mass-produced components. But these rigidities of production are no longer necessary, as digitally controlled machinery can fabricate unique, complexly-shaped components at a cost that is no longer prohibitively expensive".*

In this context, we consider that the knowledge of all the degrees of symmetry is a central instrument for the design of complex shapes present in our everyday objects. One of the contents of our Morphology courses of Industrial Design, at the Faculty of Architecture, Design and Urban Studies of the University of Buenos Aires, Argentina refers to order and disorder in shapes through the variations in regularity: from isometry to ametry (Muñoz, 2013). As Covid-19 lockdown limited personal interactions, we created a multimedia project that summoned former students, with an average of 20 years of professional practice, to speak about certain relevant morphological concepts and how they played a role in professional practice. The aim was to recover information on the ways in which the contents of our courses prevailed and were implemented in specific design activities.

It was very motivating because students were able to check that the concepts and practices that they were learning played an important role once they left the University. We were pleasingly surprised to discover dimensions that these matters developed when they were related to professional requirements and context. We will discuss one of those sets of interviews, referred to symmetry[1]. Four diverse design areas were covered, as shown in Figure 1: product, *POP*- point-of-purchase, lamp, jewelry. We chose designs that displayed a significant consideration of symmetry in each of the five studios invited. The interviews started with two questions: Why did they choose to work breaking symmetry in their projects? What was the advantage of this approach?

DIVERSE APPROACHES: 1. RELATION TO CONTEXT

It was remarkable to see how symmetry was a relevant concept in their projects, and the role it played in these different areas. One recurrent notion was that its rupture was meant to create a difference with competitors. It was considered a tool to bring attention to the object, to make it look transgressive, distinctive, dynamic, fun; a way to make products visible in a symmetric context, and to link it to the youthful challenging vision of freedom as breaking the rules, even those of symmetry. Surprisingly, when perfect symmetry was broken, an important *degree of regularity* (Wolf *et*

al., 1952; Huff, 1975) was preserved. However, the general public acknowledged this rupture as something significant. This disruption of regularity will be illustrated in the design of the soap bars and nebulizers, by *Punta Diseño*, and in the POP (points of purchase) of whisky *VAT69*, by *Muchnick design*.

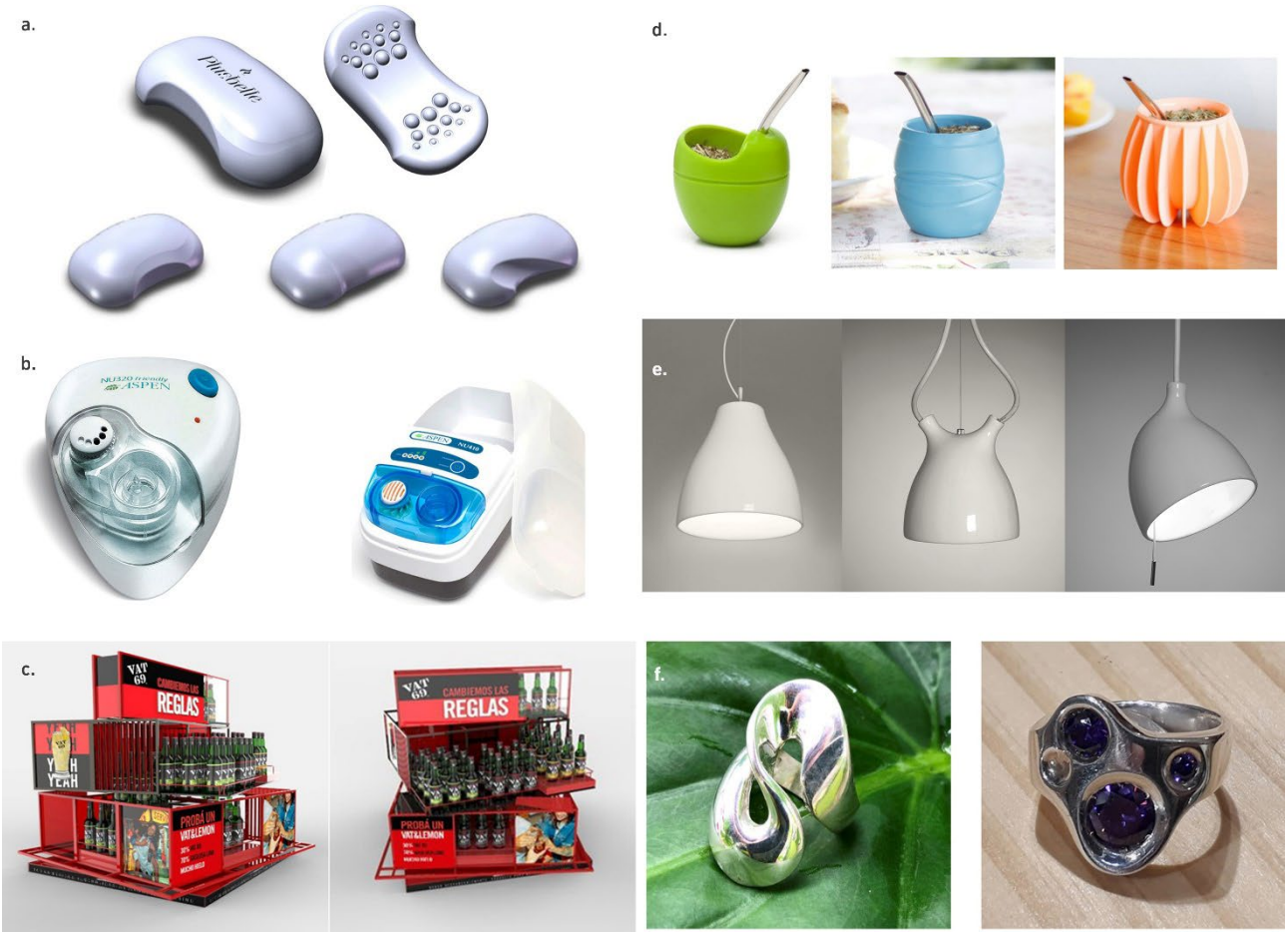

Figure 1 Some of the products discussed: a. Soap bar *Plusbelle*; b. Nebulizers; c. Point of Purchase for *VAT69*; d. Mate containers: Original *Mateo, Pampa* and *Touch*; e. *Sanita, Blanquita* and *Uncuerno* lamps; f. *Moebius* and *Iris* ring

DIVERSE APPROACHES: RELATION TO AN EXPANSION IN THE LINE OF PRODUCTS

Three *Mate* containers designed and produced by *Laura Cherny* and *Nicolás Demarco* have diverse symmetry even if they serve the same purpose: to drink the traditional Argentinian *mate* infusion. Throughout its history, this object was built from empty and dried gourds. In time, wood, metal and glass were introduced.

When the designers launched a new *mate,* they decided to use an unusual material, silicone, and a different shape that was unlike the classic image of the object. Bilateral symmetry replaced rotational symmetry, to provide differentiated directions (front and back, left and right) and functional

areas, such as the place to fit the drinking filter (*bombilla*) at the desired angle. This was the first and so *original* product of the line of *mates* called *Mateo.*

Later, to influence a more conventional public, rotational symmetry was recovered but the irregularity of the embossed lines allowed certain rupture in the *Mateo Pampa* design. Next, a greater degree of symmetry was achieved in the *Mateo Touch*, through the flaps that emphasize rotational symmetry, providing a particular handling sensation, while recalling the typical gourd shape of the emblematic object.

The timeline in the development of these products started in a greater divergence from traditional symmetry and moved on to a more subtle one, ending in classic symmetry. The three models coexist, providing different options: from a more innovative to a conventional alternative, in order to reach a wider public.In the same line, we consider the *A3 studio* case. Most of the lamps they design and produce have rotational symmetry, associated with manufacturing aspects. However, the fabrication process of casting ceramic molds allows greater freedom in design than rotational processes such as metal embossing.

Breaking symmetry in a new family of products, first by introducing two protruding surfaces in *Blanquita* and then just one in *Uncuerno* was a strategy to expand the product range of options and reach new customers. Even in the less symmetric options, the *Uncuerno* line, a reflection plane is preserved. However, there is a decrease in symmetry because the lamp hangs at an angle to the axis of the lampshade and the way of illuminating is unusual for a hanging lamp due to its angularity and variability as it turns.

The question of its design value arises: is it right to have a lamp that shows an inconstant behavior in its function? Its designers support this idea. In their experience, it takes time to acknowledge and recognize the value of the tension that breaking classic rotational symmetry provides. However, its value is undoubted. As Talke *et al*. (2009, p.612) explain, *"the majority of consumers need time to get used to really new products, to understand new features, and to overcome technology-related risks before deciding to buy such products"*. These are some of the designer´s reflections (Cátedra Muñoz, 2021):

> *"Asymmetry is hard to process and to accept. It generates tension. It is also harder to construct, as a rotational mold is easier and less expensive. There is a traditional way of thinking that has to be questioned and deconstructed. (...) The increase in sales it promotes is limited too because it is not easily accepted. (...) The design path is going beyond what sells. We are happy to see it done and then follow its course".*

DIVERSE APPROACHES: 3. RELATION TO TRADITION AND FABRICATION

The last area, jewelry, combines a rupture of tradition with the possibility of expanding a line of products, but it also includes fabrication issues. We will analyze some products of *Los Ulyses* studio, represented by Darío Bessega. At first, the initial asymmetrical uses were an answer to technical difficulties, because producing organic forms by hand is easier if they are not symmetrical. In addition, in jewelry design the main point of interest is traditionally located in the centre of the objects. This convention is not followed in many projects of this studio.

In the *Moebius rings* the central area is not the main nucleus. Both turns provide homeometric rotational symmetry, but one of them is convex and the other is concave. The *Iris collection* presents an intuitive and subjective balance between the three stones and the vacant space. The point of interest is multiplied, and the empty space produces a breach in the regularity of the object. Again, the question arises: Is it right to have some stones and their imprint in the same object? Should these points of interest be organized more regularly?

There is an additional value in asymmetrical rings. They allow different possibilities in their use as there is not a correct upright position. Its owner decides how he/she will wear it on every occasion.

Most of the rings designed by the studio are asymmetric or have lower levels of symmetry, breaking away from the conventions of one of the most conservative areas of design in Argentina: jewelry. This has been a design strategy to innovate, explore, and recall nature dynamics. In living processes, perfect balance is fleeting, quickly changing into another one through transformations, and so are these design explorations.

SOME CONCLUSIONS

When symmetry goes beyond pure geometric entities and emerges in everyday objects, different possibilities arise, linked to function, technology, tradition, context, and so on. Its diverse intensities of regularity make evident our complexity, our need to change, our instability, vulnerability, curiosity, desire for adventure, our yearnings, and aspirations that cannot be bound only to rational directions and values such as economy, optimization, and speed. As Ginsberg (2014, p.44) says: *"Designed things are a synthesis of ideas and values".*

Simple, balanced, harmonic, and coherent shapes – matching the attributes of the classic paradigm of good design - is only a part of the morphological language. Roman Gubern (1996, p. 37) defines: *"...a natural beauty, according to those perception rules, and a cultural beauty, based in artificial codes of transgressive appetites, even if they are unconscious".*

Every new product is acknowledged as such, by the equivalence with what is expected in forms, components, structures, and materials in its particular group, developed through its history. We have learned that symmetry deals with the relations between forms, components, and motifs, but it exists not only between them but in relation to an absent archetypical image as well. Berkowitz (1987) explains: *"The ideal design is typically one that is interesting and challenging, but not too complicated".*

Ingeniously breaking this tradition introduces tension and makes evident the transgression. If it is greater, the challenge increases, as it demands an active appreciation to discover it, requiring more time to accept it. The disruption promotes questions about its validity, promoting exchanges of ideas, but fortunately, these projects survive and are nourished by their creators due to their potential for innovation and for the creation of new product families organized by the reduction of regularity.

Symmetry structures order, but its lower levels -which defy simplicity-, introduce a challenging issue and demand an active appreciation to discover them. These complex shapes, less regular, with an order that has to be actively found seduce us with their need to be deciphered, in their veiled rationality. Most objects discussed have some level of symmetry, even if they are perceived as asymmetric. We find order relaxing, but we are stimulated by some sort of disorder, by a change in rhythm, by something that is not what is expected, that innovates. There is a permanent dialogue between the confirmation of stability and the breakthrough of what is new. This possibility of innovation questions the principles of a discipline to transgress them. The tension between order and chaos, reason and impulse is present. This understanding is more demanding, but it is also rewarding in its outcome.

REFERENCES

Arnheim, R. (1971). *Entropy and Art. An Essay on Disorder and Order.* University of California Press.

Berkowitz, M. (1987). Product shape as a design innovation strategy. *Journal of Product Innovation Management, 4*(4), 274-283.

Cátedra Muñoz (2021, May 21). *Simetría y diseño* [Video]. YouTube. https://youtu.be/UHe2WjWDpgA

Dam, R. F. (2021). *The MAYA Principle: Design for the Future, but Balance it with Your Users' Present.* Interaction Design foundation. https://www.interaction-design.org/literature/article/design-for-the-future-but-balance-it-with-your-users-present#

Ginsberg, A. D. (2014). Design as the Machines Come to Life. In *Synthetic Aesthetics. Investigating Synthetic Biology´s Designs on Nature* (pp. 39-70).

Gubern, R. (1996). *Del bisonte a la realidad virtual. La escena y el laberinto*. Anagrama Ed.

Huff, W. S. (1975) Synopsis of a classification of structure. In *Symmetry, an appreciation of its presence in man´s consciousness* (pp. IV, VII). Sema.

Kolarevic, B. (2003). 3. Digital Production. In *Architecture in the Digital Age: Design and Manufacturing* (pp.29-54). Spon Press.

Manzini, E. (1989). *The material of invention. Materials and Design*. MIT Press

Marcolli, A. (1978). *Teoría del campo. Curso de educación visual*. Xarait Ediciones y Alberto Corazón Editor

Muñoz, P. (2013). Layers of Symmetry. In *Symmetry: Art and Science, vol 1-4* (pp. 258-261). SIS-Symmetry

Samar, L. (2004). Capítulo 16. El diseño industrial en la posmodernidad. In *El diseño industrial en la historia* (pp.181-190). Ediciones TEC

Talke, K., Salomo, S., Wieringa, J.E., Lutz, A. (2009). What about Design Newness? Investigating the Relevance of a Neglected Dimension of Product Innovativeness. *Journal of Product Innovation Management 2009*, *26*, 601-615.

Wolf, K.L. and Kuhn, D. (1952). *Gestalt und Symmetrie: Eine Systematik der symmetrischen Körper*. Niemeyer.

WDO.World Design Organization (2015). *Definition of Industrial Design* https://wdo.org/about/definition/

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