Please cite this article as:

Figures of Speech as Semantic Operators in the Innovation Process

Claudio **DELL'ERA***, Tommaso **BUGANZA** and Roberto **VERGANTI**

Department of Management, Economics and Industrial Engineering,

Politecnico di Milano – Piazza L. da Vinci, 32 20133 Milano Italy

* (corresponding author)

Tel: +39 02 2399 2798

Fax: +39 02 2399 4083

claudio.dellera@polimi.it

Claudio **DELL'ERA**

Claudio Dell'Era is Assistant Professor in the Department of Management, Economics and Industrial Engineering of Politecnico di Milano, where he serves also as Co-Director of MaDe In Lab, the Laboratory of Management of Design and Innovation of MIP Politecnico di Milano (www.madeinlab.it). Research activities developed by Claudio Dell'Era are concentrated in the area of *Management of Innovation*. Specifically research interests are about two main streams: the former concentrates on innovation strategies developed by leading companies that operate in design-intensive industries where symbolic and emotional values represents critical success factors to generate competitive advantage (*Management of Design-Driven Innovation*); while the latter analyzes approaches and practices adopted during innovation processes by high-tech companies that face turbulent environments (*Management of Technological Innovations in Turbulent Environments*). He has published in relevant international journals, such as *Journal of Product Innovation Management*, *Long Range Planning*, *R&D Management*, *International Journal of Operations & Production Management*, *Industry & Innovation*, *International Journal of Innovation Management*.

Tommaso **BUGANZA**

Tommaso Buganza is Assistant Professor of Management of Innovation at the Faculty of Design and at the School of Management of Politecnico di Milano. Tommaso Buganza's papers investigating the development of new products and services in turbulent environments won the Best Paper Award at the EIASM (European Institute for Advanced Studies in Management) International Product Development Management Conferences in 2003 and 2004 and the runner-up diploma in 2002.

Roberto **VERGANTI**

Roberto Verganti is Professor of Management of Innovation at the Politecnico di Milano, where he also serves as the Scientific Director of MaDe In Lab, the laboratory for education in management of design and innovation. He is also chairman of PROject Science, a consulting institute focusing on strategic innovation, a visiting professor of Design Management at the Copenhagen Business School and Adjunct Professor of Design Innovation at the University of Vaasa, Finland. He is a member of the Editorial Board of the Journal of Product Innovation Management and of the Advisory Council of the Design Management Institute. He has published over 100 papers, including 35 papers in leading international journals (such as the Journal of Product Innovation Management, Management Science and Harvard Business Review) and seven books. He was awarded the "Compasso d'Oro" in 2001 (the most prestigious design award in Italy) for the Italian Design System research project for which he served as a member of the Scientific Organising Committee. His most recent book is Design-Driven Innovation, issued in August 2009 with the Harvard Business Press.

Figures of Speech as Semantic Operators in the Innovation Process

Purpose

Product functionalities aim to satisfy the operative needs of the customer, while product meanings (i.e., the emotion and the symbolic values represented by the product) aim to satisfy the emotional and socio-cultural needs of the customer (Csikszentmihalyi and Rochberg-Halton, 1981; Margolin and Buchanan, 1995). What consumers are increasingly looking for in consumer products are new forms of psychological satisfaction that go beyond normal and simple consumption; today, more than ever, products define their own presence not only through their attributes, but also through the meanings that they assume, through the dialogue that they establish with the user, and also through the symbolic nature that they emanate. Figures of speech can be exploited to emphasise a message or a meaning; with this paper, we want to propose an application of rhetorical figures to product design that will make them more communicative.

Approach

Specifically we propose the "Rhetorical Innovation Process" as a methodology that foresees the application of figures of speech as semantic operators. Firstly we discuss several product innovations that can be interpreted according to the "Rhetorical Innovation Process". Then, a brief workshop assignment in the Strategic Design course at the Faculty of Industrial Design of Politecnico di Milano explored the potentialities of the method in relation to different product typologies. 40 Italian master students were divided into 8 groups (5 industrial design students each) in order to develop 5 products per group.

Findings

The results obtained by design students demonstrated as figures of speech can stimulate associations with other contexts and modifications to existing architecture. The exploration of the "rhetorical innovation process" in collaboration with eight design student teams has shown as this method can support and enrich the concept generation phase. Moreover, four configurations proposed by the "rhetorical innovation process" allow one to generate different alternatives supporting the creative process and allowing the identification of strengths and weaknesses associated to each solution.

Value

The method elucidates the structure and process adopted by several designers and also illustrates an effective framework for communicating choices to their clients. Especially the cross-context associations proposed in the "rhetorical innovation process" provide additional insights and incentives during the concept generation.

1. Introduction

The concept of design-driven innovation introduced by Verganti (2009) presupposes that each product has a particular language and meaning; it expands and elaborates on the concept of form in order to consider the symbolic and emotional value of a product. The linguistic dimension of a product allows the company to innovate, creating new messages and proposing new meanings in relation to the socio-cultural models that govern the context in which the product will be proposed (Dell'Era et al., 2008). Theorists of design have developed several practical models and tools to support the development of products from a semantic point of view; the most acknowledged theory of semiotics is from Pierce (1935) and explains that messages and therefore meanings are created by signs (indexes, symbols and icons). According to Pierce (1935), a sign is not a thing or an object but a relation, and it can be defined as "something that stands to somebody for something in some respect or capacity". This theory of semiotics can be applied to products, and in this case, the set of signs used to make a product speak can be called product language. Van Onck (1994 and 2000) identifies possible signs of a product language, specifically analysing the product form: topology (colour, material, surface, form, texture, etc.), mereology (continuity, interruptions, holes, boundaries, hierarchies, dimensions, orientation, etc.) and morphology/morphogenesis (reflection, aggregation, separation, transformation, etc.). Butter and Krippendorff (1984) pioneer the term "product semantics", defining it as "the study of the symbolic qualities of man-made forms in the cognitive and social context of their use and application of knowledge gained to objects of industrial design". Butter (1987) also classifies three principal contributions that semantics can provide: to make the use of products self-evident, to make products culturally meaningful and to give products a distinct character. Monö (1997) identifies four principal semantic functions of a product (describing, expressing, exhorting and identifying) that increase communicative effects; while Vihma (1995), noting that the semantic dimension of a product corresponds to its purpose and final cause, introduces the concepts of product identity and ideal type. A figure of speech is a word or phrase that departs from straightforward, literal language. Figures of speech are often used and crafted for emphasis, freshness of expression, or clarity. However, clarity may also suffer from their use (adapted from Mortara Garavelli, 2003). Starting from this definition, a figure of speech can be exploited to emphasise a message or a meaning; with this paper, we want to propose an application of rhetorical figures to product design that will make products more communicative.

This paper is organized in the following way: next section (Section 2) establishes a theoretical context by discussing the relationships between product design and figures of speech. In Section 3, we introduce the "Rhetorical Innovation Process". In Section 4 we present several products that can be interpreted according to the process previously introduced, while in Section 5 we illustrate the application of the "Rhetorical Innovation Process" by 8 groups comprising 5 Italian industrial design students each. Finally in Section 6 we discuss these results and their managerial implications.

2. Product design and figures of speech

In the marketing field several researchers have demonstrated the potentialities of figures of speech. McQuarrie and Mick (1996) classify rhetorical figures distinguishing between figurative and nonfigurative text, between two types of figures (schemes and tropes), and among four rhetorical operations that underlie individual figures (repetition, reversal, substitution, and destabilization); finally they associate these categories to consumer responses. Leigh (1994) investigates the frequency with which figures of speech and figure categories are used in advertising headlines. Holt (2004) mentions icons, suggesting that every society needs myths, simple stories that help people deal with tension in their lives. Icons represent a particular kind of story and are used by consumers to address identity desires and anxieties. Holt (2002) claims that consumers are looking for brands that allow them to develop and enrich their own identity projects. Brand stories and images rely heavily upon metaphors to communicate and spur customers' imaginations. More generally, rhetorical figures are interpreted as tools that allow to stimulate innovation. According to Fahnestock (2002) figures of speech have been used to accomplish key conceptual moves in scientific texts. Finally several researchers underline the potentialities of figures of speech also as organizational tools. According to Bartel and Garud (2009) innovation narratives are cultural mechanisms that address coordination requirements by enabling translation; they show how innovation narratives are powerful mechanisms for translating ideas across the organization so that they are comprehensible and appear legitimate to others.

As mentioned before, the simple satisfaction of operative needs is not sufficient to compete in a market where customers are looking for new kinds of relationships with products. The use of figures of speech in the innovation process allows the development of products that attract customers' attentions and desires. As claimed by Lundholm (2003), metaphoric products can stimulate users' desires; metaphors can help in the description, expression, exhortation and identification of specific meanings of products (Monö, 1997). Lundholm (2003) describes the concept of metaproduct as meanings and values the user associates with the product, improving its success in those markets where the basic necessities or needs are not enough. While the literature about product signs and meanings is particularly rich (Pierce, 1935; Van Onck, 1994 and 2000; Vihma, 1995; Monö, 1997), the use of rhetorical figures as means to innovate products is engaged by few authors.

Pierce (1935) introduces one of the first categorisations of semantic functions, explaining that a sign could refer to an object as an icon, index or symbol; as mentioned before, Monö (1997) proposes four different semantic functions called "describe", "express", "exhort" and "identify". Starting from this classification, Lundholm (2003) proposes some examples of physical products based on the four semantic functions and develops the "metaphoric product method". It is based on four sequential steps. The method starts with the development of a list of words that describe the product; then, the list has to be analysed and, on the basis

of the words, a metaphor is chosen. A list of words describing the chosen metaphor is the input for the third step, which foresees the comparison between the two wordlists to evaluate the chosen metaphor; then, finally, it is necessary to implement an abstraction of the metaphor or parts of it in the product form. Also, Dumas (1994) proposes a method based on the application of metaphors to integrate and give full expression to the diversity of factors in a project; this method, which she calls "totem building", consists of the development by a design team of sophisticated metaphors that help to articulate mutually understood goals and serve as criteria to evaluate alternative solutions. Starting from the study developed by Lakoff and Johnson (1980), according to which "metaphor is not just a matter of language, that is of mere words, on the contrary, human thought processes are largely metaphorical", Dumas (1994) considers the metaphor as the better device for building a shared view of the development team and describes the "totem building" method as based on five sequential steps: build the context, define the context, build a vocabulary, refine perceptions and distil the totem. Refining the Dumas method, Gautvik (2001) introduces a methodology of creating new products within a specific product family that consists of two basic phases: the analysis of existing products in a product family and construction of a totem generating new product ideas and concepts. Different from Lundholm's method, this last one starts with an existing product family and focuses on product identity and expression.

If we turn our attention to all figures of speech and not only metaphors, it is necessary to admit that there is not much in the literature about the use of rhetorical figures in product design. There are many classifications of figures of speech: Lakoff and Johnson (1980) categorise metaphors in structural, orientational and ontological terms, and Lundholm (2003) writes about abstract and concrete metaphoric entities. Adapting the classification proposed by McQuarrie and Mick (1996) and Mortara Garavelli (2003), we propose the following simplified categorisation of figures of speech according to their function (see Table 1).

The first category is completely different in comparison to other four, because it foresees connections with another context, while the last four categories work on the structure of the sentences without referring to other contexts. More detailed figures of speech belonging to the category "Exaggeration" work on some words in the sentence, while those belonging to the categories "Suppression", "Repetition" and "Inversion" work on the structure of the sentence. In a certain way, it is possible to associate each category of figure of speech except the first one with mathematical operators: "Exaggeration" with exponents (exp), "Suppression" with subtraction (-), "Repetition" with multiplication (x), and "Inversion" with inversion ($^{-1}$). Also Goldenberg et al. (2003) suggest five innovation patterns (subtraction, multiplication, division, task unification and attribute dependency change) that partially adopt mathematical logics to support product development; they believe that this systematic process can generate ideas that are both ingenious and viable. Starting from the previous classification, in the following section, we introduce the "Rhetorical Innovation Process", a method based on the use of figures of speech as semantic operators able to support the development process reinforcing and enriching product meanings (each category in Table 1 can be

considered as a semantic operator). Then, we present examples of products that can be reinterpreted through our model, and finally, we describe the results of a workshop developed with industrial design students.

Category	Example of figure of speech	Other figures of speech
Cross-context association	**METAPHOR** In language, a **metaphor** (from the Greek: *metapherin*) is a rhetorical trope defined as a direct comparison between two or more seemingly unrelated subjects. In the simplest case, this takes the form: "The *[first subject]* is a *[second subject]*." More generally, a metaphor describes a first subject as *being* or *equal to* a second subject in some way. Thus, the first subject can be economically described because implicit and explicit attributes from the second subject are used to enhance the description of the first. This device is known for usage in literature, especially in poetry, where a few words, emotions and associations from one context are associated with objects and entities in a different context.	Allegory Comparison Parable Simile
Exaggeration	**HYPERBOLE** Largely synonymous with exaggeration and over-consulting, **hyperbole** is a figure of speech in which statements are exaggerated or extravagant. It may be used as a result of strong feelings or be used to create a strong impression, and it is not meant to be taken literally. It gives greater emphasis. It is often used in poetry and is a literary device.	Irony Litotes Periphrasis Pleonasm
Suppression	**ELLIPSIS** An **ellipsis** is a rhetorical figure of speech, the omission of a word or words required by strict grammatical rules but not by sense. The missing words are implied by the context.	Asyndeton Synecdoche
Repetition	**ANAPHORA** In rhetoric, **anaphora** (from the Greek *anaphérō*, *"I repeat"*) is the repetition of the same word or group of words at the beginning of several consecutive sentences or verses to emphasise an image or a concept.	Accumulation Alliteration Climax Polyptoton
Inversion	**CHIASMUS** **Chiasmus** (latinised form of Greek χιασμός, from χίασμα (chiasm), "crossing") is a figure of speech based on inverted parallelism. This criss-crossing term derives its name from the X-shaped Greek letter χ (chi). It is a rhetorical figure in which two clauses are related to each another through a reversal of terms in order to make a larger point. In Latin, in particular, it was used to articulate balance or order within the text in which it was included.	Anastrophe Cacaphony Oxymoron

Table 1: Classification of figures of speech (adapted from McQuarrie and Mick, 1996; Mortara Garavelli, 2003)

3. The Rhetorical Innovation Process

The "Rhetorical Innovation Process" foresees the application of figures of speech as semantic operators; it is based on the classification of the previous section and can be structured according to three sequential steps.

1. Analysis of product architecture

The first step of the process consists of the identification of different parts that constitute the architecture of the product to be developed. For this reason, it is necessary to start from a sort of product archetype that can be considered reliable for the development process.

2. Identification of the configuration

As mentioned before, the classification described in Table 1 underlines two different categories of semantic operators: unlike "Exaggeration", "Suppression", "Repetition" and "Inversion", "Cross-context association" foresees cognitive connection with another context in order to develop references to concepts, trends, values, people, imaginings, events, etc. that are not strictly connected to the product architecture. The other four semantic operators work on the product structure in different ways, without requiring any kind of external reference. Moreover, different semantic operators can be applied to the entire product or simply to its components, as identified during the previous step. For this reason, the "Rhetorical Innovation Process" can be applied according to different configurations in relation to two main decisions: the application object (entire product or components) and the application of the cross-context association. The following matrix describes the four configurations that have to be considered according to previous two decisions (see Figure 1).
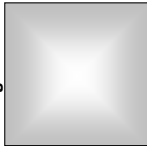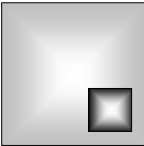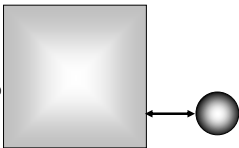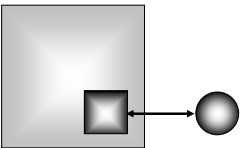

Figure 1: Identification of the configuration

*3. Application of semantic operators*

Once the configuration is identified, it is possible to apply the semantic operators. In the case of Configurations 1 and 2, only "Exaggeration", "Suppression", "Repetition" and "Inversion" are applicable, while as far as Configuration 3 and 4 are concerned, it is necessary to apply the "Cross-context association" and then other semantic operators.

In order to verify the applicability of the "Rhetorical Innovation Process" in the spring of 2005, a brief workshop assignment in the Strategic Design course at the Faculty of Industrial Design of Politecnico di Milano explored the potentialities of the method in relation to different product typologies. 40 Italian master students were divided into 8 groups (5 industrial design students each) and collaborated for an entire semester with the authors of the paper in order to identify examples of product that can be interpreted as the output of the "Rhetorical Innovation Process" (see section 4) and to develop 5 products per group, following the "Rhetorical Innovation Process" step by step (see section 5). Each design team, comprising five Italian industrial design students (24 years old), developed each task over a period of three months meeting every week the authors in order to share collected materials and review both interpretations of existing products and developments of new products.

4. Products reinterpreted according to the "Rhetorical Innovation Process"

In this section, we present four products (one for each configuration) reinterpreted according to the "Rhetorical Innovation Process". In order to avoid the repetition of the first step of the process (analysis of product architecture) for each example, we present different applications of the "Rhetorical Innovation Process" on the same product typology (chairs). Analyzing the architecture of a chair (or eventually an armchair or a seating system) we can identify four basic components: seat, back, legs and armrests.

Configuration 1: Application on entire product & Absence of Cross-context association
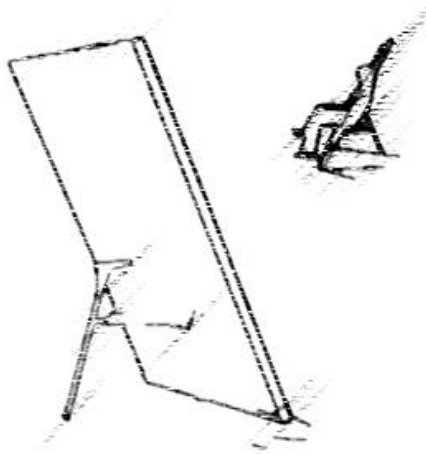
The chair looks like a flat surface. Swedish design firm No Picnic created RAM, a flat elasticised textile surface that you sit in, for manufacturer Felice Rossi (2002). The upholstery fabric adapts to the shape of the body and then regains its original form when you leave it. An enamelled steel tube structure underneath provide the support, with a seat and back in polyurethane foam covered in leather (www.mocoloco.com). In this case there is no association with other contexts; the product is the result of a formal operation through which some components are hidden (seat and legs) and others deleted (back and legs). The omission of these components allows us to reinterpret the chair RAM as an ellipsis (this figure of speech foresees the omission of a word or words required by strict grammatical rules but not by sense, where the context implies the correct interpretation of the missing words); more specifically, this effect is obtained through the application of the "Subtraction" operator to the entire product. Figure 2 provides additional product examples about *Configuration 1*.
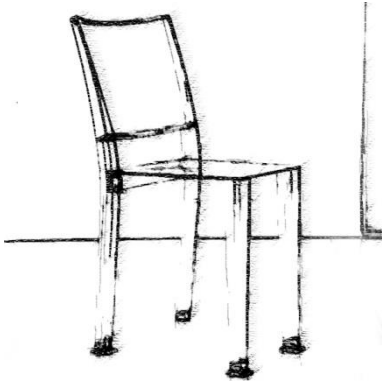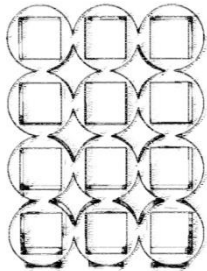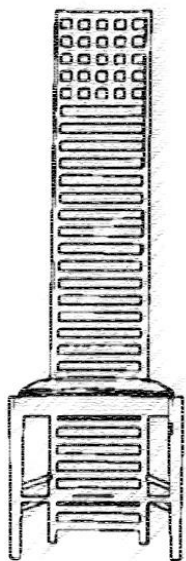
Chair	Library
Exaggeration (small dimension)	Repetition (cylinder)
Product: **La Marie** Company: **Kartell** Designer: **Starck P.**	Product: **Irkel** Company: **Cappellini** Designer: **Shwan L.**

Figure 2: Additional product examples about *Configuration 1*

Configuration 2: Application on product component & Absence of Cross-context association

The High Backed Chair was designed for the White Dining room of the Ingram Street Tearooms. Mackintosh designed the interiors of tearooms owned by Miss Catherine Cranston in various parts of Glasgow, Scotland between the years 1897 and 1910. A version of this chair, painted white, appeared in Mackintosh's Main Street studio as early as 1900. The chairs originally had fabric-covered (some were covered in leather), horsehair drop-in seats. An interesting aspect of this chair is that the back slats, with their cut-out piercing, span from the top to the rail near the floor and do not connect with the seat. This makes them very flexible and almost too delicate and springy for ordinary use. Mackintosh was preoccupied with a visual appeal of his high-backed chairs, which have subsequently been criticised for their lack of comfort and practicality. The high-back chairs frame the person sitting in the chair and enclose the space around the table. There was a lower-backed version of the "Ingram street" chair designed as well. In fact, the high-backed chair was a modification of the original lower-backed chair (www.designmatcher.com). As far as the High Backed Chair is concerned, and as with the previous example, there is no connection to other contexts; unlike with the RAM chair, though, the semantic operator is applied only to a product component and, more specifically, to the back. We can interpret the Mackintosh project as a sort of hyperbole used to create a strong impression; for this reason, we can classify the High Back Chair as a product of the application of the "Exaggeration" operator. In fact, hyperbole is a figure of speech in which statements are exaggerated or

extravagant; it may be used to create a strong impression and to give greater emphasis. Figure 3 provides additional product examples about *Configuration 2*.
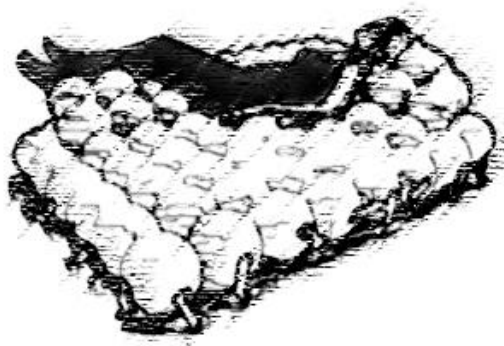
Lamp	Shoes
Subtraction (light bulb)	Exaggeration (heel)
 Product: **Holonzki** Company: **Ingo Maurer** Designer: **Ingo Maurer**	 Product: **Decolletè cubista** Designer: **Levine B.**

Figure 3: Additional product examples about *Configuration 2*

Configuration 3: Application on entire product & Presence of Cross-context association

The Feel seating system, designed by Sarit Atias and Axerold Amit in 2002 for Animi Causa, is based on the concept that the body's position is a mirror to the soul; it can change its form according to the emotional state of the body. The Feel seating system gathers all positions in one object; the shape is inspired by a molecular structure, the basic form for all objects in the universe. It is made of 120 soft balls covered with elastic fabric. The structure of the Feel system allows it to create an array of positions as vast as the imagination (www.animicausa.com). Unlike with the previous example, as mentioned before, this seating system is characterised by cross-context association: its shape and flexibility are metaphorically connected to the idea of molecular structure, which can change according to different necessities. The "Cross-context association" is not the only semantic operator applied to Feel; the ball shape is repeated many times like a sort of anaphora, and for this reason, we can also identify the application of "Repetition" operator. This figure of speech foresees the repetition of the same word or group of words at the beginning of several consecutive sentences or verses to emphasise an image or a concept: in this case, the repetition of the ball emphasises the flexibility and modularity of molecular structure. Figure 4 provides additional product examples about *Configuration 3*.

Armchair	Chair
Cross-context association (entire product)	Cross-context association (entire product) + Repetition (piece of wood)
Product: **Joe** Company: **Poltronova** Designer: **De Pas, D'Urbino, Lomazzi**	Product: **Favela** Company: **Edra** Designer: **Campana H. and F.**

Figure 4: Additional product examples about *Configuration 3*

Configuration 4: Application on product component & Presence of Cross-context association
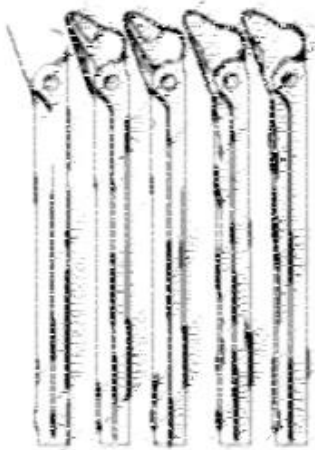
Donald, a fun and practical chair, was designed by Studio Cerri and Associates for Poltrona Frau in 2000. This folding chair is made with a die cast aluminium structure and steel inlays in a satin finish with a leather seat and backrest. The top of the chair has the profile of a duck, demonstrating the application of a "Cross-context association" with a specific component. More specifically, the connection with an external entity—in this case, the duck—is developed through the particular shape of the back. Unlike in the previous example, a unique semantic operator is applied to the product; in fact, Donald is characterised solely by the association with the duck, with no other semantic operators applied on the product structure. When it comes to this chair, we can talk about allegory: this figure of speech is a figurative mode of representation conveying a meaning other than (and in addition to) the literal. The profile of a duck adds the meanings of fun and joke to the chair, and they are quite implicit (differently from metaphor and, above all, from comparison, parable and simile). In fact, they can be perceived in just one small detail and are only visible when one observes the chair from a particular vantage-point. The name of the product (Donald) helps the user to reconnect the product to one of the most famous ducks in the world, Donald Duck. Figure 5 provides additional product examples about *Configuration 4*.

Lamp	Household appliances
Cross-context association (pedestal)	Cross-context association (whistle)

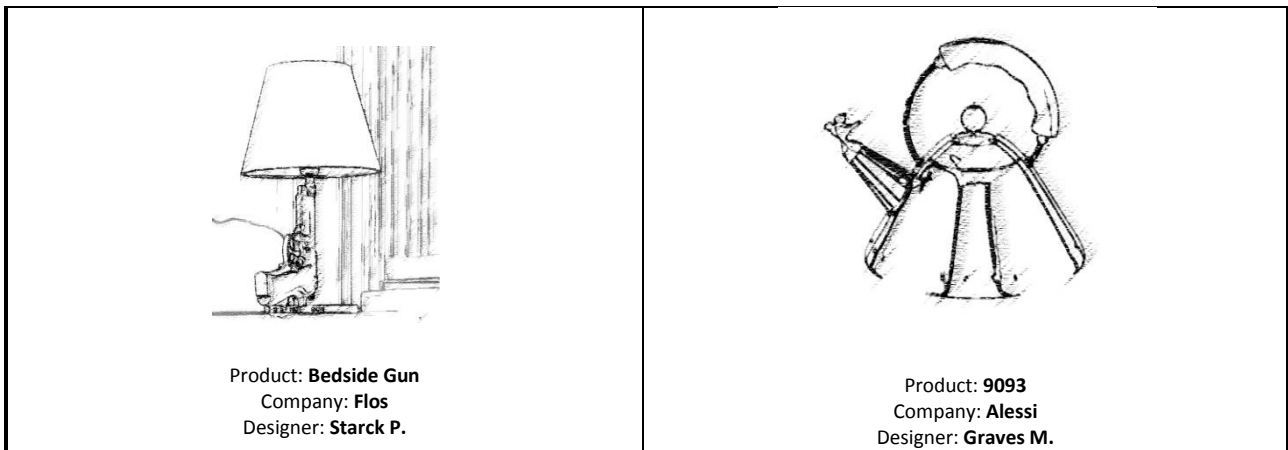|	
Product: **Bedside Gun** Company: **Flos** Designer: **Starck P.**	Product: **9093** Company: **Alessi** Designer: **Graves M.**

Figure 5: Additional product examples about *Configuration 4*

5. Application of the "rhetorical innovation process"

As mentioned before, in order to verify the applicability of the "Rhetorical Innovation Process" in the spring of 2005, a brief workshop assignment during the Strategic Design course at the Faculty of Industrial Design of Politecnico di Milano explored the potentialities of the method in relation to different product typologies. A single product typology was assigned to each group (chairs, bathroom furniture, household appliances, lamps, tables, kitchens, shoes, bags); in this section, we present examples of household appliances.

Configuration 1: Application to entire product & Absence of Cross-context association
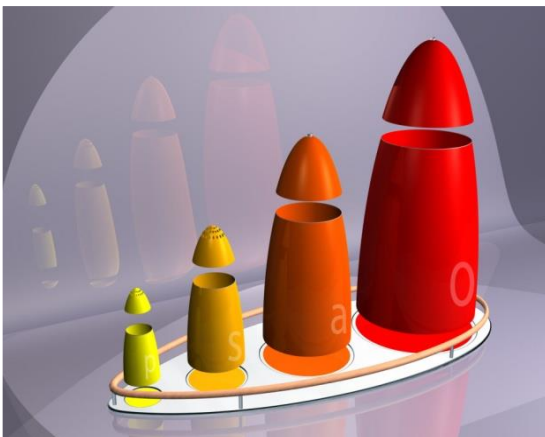
The first example of the "Rhetorical Innovation Process" concerns a condiment set; analysing the architecture of this product, we can identify four containers dedicated to pepper, salt, acetum and oil and a tray that can collect all of the containers. The size and shape of each container (and obviously that of the tray) can be extremely variable, but they have to allow the insertion of specific content and its correct exit. In this sense, it is necessary to consider that some contents are granular (pepper and salt) and others liquid (acetum and oil). Finally, the sizing for each container has to consider frequency of use in relation to the contents of each in order to be correct. We see an example of Configuration 1 in the fact that the condiment set does not foresee any connections with other contexts but is the result of a simple formal operation. More specifically, the "Repetition" operator has been applied to the entire product through the use of the rhetorical figure climax; in this figure of speech, words, phrases, or clauses are arranged in order of increasing importance. The product is composed of four containers arranged in order of increasing size; also, colours are arranged according to a progressive gradation in order to emphasise the climactic effect.

Configuration 2: Application to product component & Absence of Cross-context association
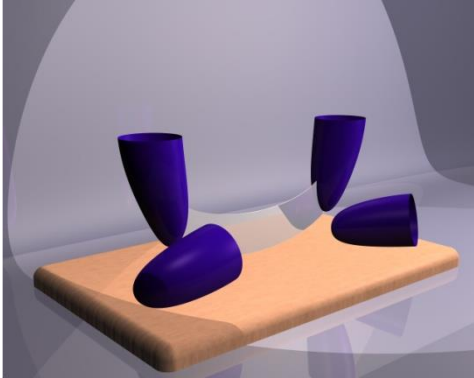
This example of the "Rhetorical Innovation Process" concerns a crescent-shaped blade. Its architecture is very simple: basically, it is composed of a blade and two handles. Like in the previous example, this product also (as an example of Configuration 2) foresees no connections with other contexts. A semantic operator is applied to a specific component—the handles—instead of to the entire product. More specifically, adopting the figure of speech of hyperbole, the students appropriated the "Exaggerating" operator here. The exaggerated size of the handles emphasises their importance and suggests to the user a hidden feature to discover. In fact, the handles can also be used as containers of different ingredients, such as parsley, oregano or different kinds of spices in general.

Configuration 3: Application on entire product & Presence of Cross-context association

The example of Configuration 3 concerns an ice bucket. The first step in the "Rhetorical Innovation Process" entails the analysis of the product architecture, which in this case is also very simple. On a fundamental level, it is possible to identify three components: the bucket (or the container in general), which has to respect some restrictions with respect to size, the shovel and then a handle (or a particular shape that facilitates the hilt). In this case, students applied two semantic operators synergistically: "Cross-context association" and "Inversion" were simultaneously used to develop a new ice bucket. In fact, the shape of the entire product (bucket, shovel and handle) invokes the toys used by the children on the beach; as a result, it becomes possible to reconnect the product to a specific context (beach or summer) and consequently to associated meanings (heat or holidays). In particular, the feeling of "heat" can be considering antithetical to the feeling of "cold", as strictly connected to the object "ice". As far as the ice bucket is concerned, we can see that the students applied oxymoron, the figure of speech belonging to the "Inversion" category, to combine two normally contradictory terms (e.g., "deafening silence") and thus to make a point that belongs to the set of expressions called contradiction in terms.

Configuration 4: Application on product component & Presence of Cross-context association

The last example is about a scale for food. In this case as well, the product structure is very simple; the main components are the base, the weight measurer, the weight indicator and the food container. This balance was obtained by applying only one semantic operator; specifically, the students concentrated their attention on a specific component, the tool used to measure weight. Through "Cross-context association", they connected the product to one of the primordial figures of Greek mythology, Atlas. After the war against the Olympians, Zeus condemned Atlas to stand at the western edge of the earth and hold up the heavens on his shoulders so as to prevent the two from resuming their primordial embrace. The connection with Atlas and his mythological endeavour to hold up the incredible weight of the heavens communicates to the user the principal feature of the product.

6. Figures of Speech as Semantic Operators in the Innovation Process

The use of figures of speech in the innovation process can allow the development of products that tease customers' attention and desire. Figures of speech can be interpreted as semantic operators able to support the innovation process. As shown by products reinterpreted according to the "rhetorical innovation process", the application of rhetorical figures can support the concept generation phase. Also, the results obtained by design students demonstrated as figures of speech can stimulate associations with other contexts and modifications to existing architecture. As argued by Verganti (2003) designers act as brokers of languages. The opportunity to collaborate with different companies in different industries allows designers to transfer design languages among industries. By capturing, recombining, and integrating knowledge about socio-cultural models in different social and industrial settings, designers help in creating breakthrough product meanings. The method elucidates the structure and process adopted by several designers and also illustrates an effective framework for communicating choices to their clients. Managers (and more generally companies) are not able to appropriately communicate and commercialize new products and services conceptualized by designers because they know only the final output of the innovation process rather than its entire story. The "rhetorical innovation process" can enrich the dialectic between managers and designers; specifically the proposed methodology improves the effectiveness of new concepts proposed by designers and provides new interpretative tools that managers can adopt in order to comprehend new product ideas. The exploration of the "rhetorical innovation process" in collaboration with eight design student teams has shown as this method can support and enrich the concept generation phase. Especially the cross-context associations provide additional insights and incentives during the concept generation. They improve the effectiveness of new concepts leveraging on references points known both by designers and their clients;

consequently they facilitate the dialectic between designers and their clients. Moreover, four configurations presented in Figure 1 allow one to generate different alternatives supporting the creative process and allowing the identification of strengths and weaknesses associated to each solution. In other words four configurations support a lateral thinking approach decomposing the innovation problem in simple steps and providing alternative design directions.

The results obtained by eight design student teams can provide additional insights to improve the "rhetorical innovation process". Although different categories of products were explored (chairs, bathroom furniture, household appliances, lamps, tables, kitchens, shoes, bags), future research is needed to verify its application in different industries. Specifically, the method seems particularly suited for single objects (i.e. chairs, lamps, bags), while it shows some limits for complex systems such as bathroom furniture or kitchens.

7. Acknowledgments

8. References

- Bartel, C.A. and Garud, R. (2009) The Role of Narratives in Sustaining Organizational Innovation. *Organization Science*, Vol. 20, No. 1.

- Butter, R. (1987) Product Semantics – A New Perspective on Function in Industrial Design, in Vihma, Susann (ed.): Form and Vision – *Articles and Writings from the International UIAH'87 Conference*. University of Industrial Arts in Helsinki, Pp. 114-125.

- Butter, R. and Krippendorff, K. (1984) Product Semantics – Exploring the Symbolic Qualities of Form, *The Journal of the Industrial Designers Society of America*, Spring issue, Pp. 4-9.

- Csikszentmihalyi, M. and Rochberg-Halton, E. (1981) *The Meaning of Things: Domestic Symbols and the Self*. Cambridge: Cambridge University Press.

- Dell'Era, C. Marchesi, A. Verganti, R. and Zurlo, F. (2008) Language mining - Analysis of the innovation of dominant product languages in design-intensive industries. *European Journal of Innovation Management*, Vol. 11, No. 1, Pp. 25-50.

- Dumas, A. (1994) Building Totems: Metaphor-Making in Product Development. *Design Management Journal*, vol. 5, No. 1, Pp. 71-82.

- Fahnestock, J. (2002) *Rhetorical Figures in Science*. Oxoford University Press.

- Gautvik, K.H.L. (2001) Towards a product language - Theories and methodology regarding aesthetic analysis of design products.

- Goldenberg, J., Horowits, R., Levav, A. and Mazursky, D (2003) Finding Your Innovation Sweet Spot. *Harvard Business Review*, March.

- Holt, D.B. (2002) Brands and Branding. *Harvard Business School*, case study 9-503-045.

- Holt, D.B. (2004) *How brands becomes icons*. Harvard Business School Press.

- Lakoff, G. and Johnson, M. (1980) *Metaphors We Live By*. The University of Chicago Press, Chicago.

- Leigh, J.H. (1994) The Use of Figures of Speech in Print Ad Headlines. *Journal of Advertising*, Vol. 23, No. 2, Pp. 17-33.

- Lundholm, C.G. (2003) The use of metaphors in product design.

- Margolin, V. and Buchanan, R. (Eds.) (1995) *The Idea of Design: A Design Issues Reader*. Cambridge: MIT Press.

- McQuarrie, E.F. and Mick, D.G. (1996) Figures of Rhetoric in Advertising Language. *The Journal of Consumer Research*, Vol. 22, No. 4, Pp. 424-438.

- Mortara Garavelli, B. (2003) *Manuale di retorica*. Bompiani, Milano.
- Monö, R. (1997) *Design for product understanding; The Aesthetics of Design from a Semiotic Approach*. Liber, Stockholm, Sweden.
- Pierce, C.S. (1935) Collected papers of Charles Sanders Peirce. Eds. Hartshorne C, Weiss P (Vols. 1-6) and Burks A (Vols. 7-8) Cambridge MA, Harvard University Press.
- Van Onck, A. (1994) *Design. Il senso delle forme dei prodotti*. Lupetti Editori di Comunicazione, Milano.
- Van Onck, A. (2000) Semiotics in design practice. *Design plus research*, *Proceedings of the Politecnico di Milano Conference*, May 18-20.
- Verganti, R. (2009) *Design Driven Innovation – Changing the Rules of Competition by Radically Innovating what Things Mean*. Boston, MA: Harvard Business Press.
- Vihma, S. (1995) Products as representations: A semiotic and aesthetic study of design products.