

Beyond metaphor in product use and interaction

Abstract

The overall aim of this paper is to demonstrate that there is a need for supplementing the theory of product metaphor with a more elaborate theory of product meaning. More specifically, we argue that the notion of product metaphor neglects three critically important aspects of meaning making in product use. First, the notion of product metaphor usually accounts for how the visual form and appearance of a product might cue people to conceive of the product in terms of another conceptual source (e.g. a coffee maker as a butler), while leaving the role of cross-modal sensory experience in product meaning out of consideration. Secondly, like other theoretical frameworks in design semantics, the notion of product metaphor primarily accounts for the semantic operations that are involved in the first initial phase of product categorization and interpretation, while eschewing the question as to how product interpretation might evolve over time as people interact with and use the product. Finally, in product use there often emerge more complex and even ambiguous forms of meaning, which fall outside the explanatory scope of the source-target construal principle – the key semantic principle of product metaphor. In order to remedy these limitations inherent in the theory of product metaphor we introduce a new semantic framework based upon Fauconnier and Turner's theory of conceptual blends.

Keywords

Sensory engagement, conceptual blends versus metaphor in product design, emergent forms of meaning, product blends.

1 Introduction

The overall aim of this paper is to demonstrate that there is a need for supplementing the theory of product metaphor with a more elaborate theory of product meaning. More specifically, we argue that the notion of product metaphor neglects three critically important aspects of meaning making in product use. First, the notion of product metaphor usually accounts for how the visual form and appearance of a product might cue people to conceive of the product in terms of another conceptual source (e.g. a coffee maker as a butler), while leaving the role of cross-modal sensory experience in product meaning out of consideration. Other fields of study have uncovered the role of cross-sensory experience in metaphor in language [1] as well as in film and advertising [2], [3], but design semantics still awaits further inquiry in respect to product metaphor. Secondly, like other theoretical frameworks in design semantics, the notion of product metaphor primarily accounts for the semantic operations that are involved in the first initial phase of product categorization and interpretation, while eschewing the question as to how product interpretation might evolve over time as people interact with and use the product. Karapanos et al. [4]

have developed an initial framework for understanding how a user's relationship to a product changes over time, but they do not offer any insight concerning product metaphor.

Finally, in product use there often emerge more complex and even ambiguous forms of meaning, which fall outside the explanatory scope of the source-target construal principle – the key semantic principle of product metaphor [5].

These inherent limitations of product metaphor theory will be laid bare through a detailed product analysis of Anna G, Alessandro Mendini's design of a corkscrew for Alessi. At the mere sight of it, Anna G seems to be a paramount example of product metaphor. However, we will demonstrate that the actual use and multi-sensory interaction with Anna G may cue people to construct new ambiguous forms of product meaning that fall outside the explanatory scope of product metaphor. More specifically, we shall refer to such ambiguous forms of product meaning as "product blends". Unlike product metaphors, product blends demand of the user that he or she conceptually unifies two divergent or even contradictory meanings. This kind of meaning construction has been largely overlooked in design semantics (for exceptions, see [6], [7], [8], [9]). Closely related studies have dealt with how, for instance, interaction designers can explore ambiguous forms of meaning as a resource for spurring users' imaginative interpretations of technology [10]. In a similar vein, [11] present an interesting study of how contradictory meanings often underlie experiences of product novelty and surprise. Yet, there is a lack of a coherent semantic account of how products cue users to construct ambiguous forms of product meaning. In this paper, we introduce a new semantic framework for understanding ambiguous meaning in the form of product blends and how it differs from product metaphors. In so doing we wish to shed light on processes of meaning attribution that emerge from multi-sensory interactions with products over time. By drawing upon recent research in cognitive semantics, notably Fauconnier & Turner [12], [13] we furthermore offer a basic diagram enabling design researchers to give an accurate formal description of the semantic principles of product blends. Finally, we compare weaknesses and strengths inherent in our framework with related work within design research.

2 Product Analysis of Anna G

The creation of product meaning is a dynamic process relying on the product-user relation. Product meaning is not an invariable entity, but is a result of a hermeneutic act of user interpretation. In this sense product meaning may vary according to people's socio-cultural background, past product experiences, gender, self-identity, and so forth. In fact, one and the same product may prompt users to construct multiple meanings, even meanings that contrast or contradict one another. Anna G provides us with a good example of such a product. In this section, we offer a product analysis showing how each author of this paper interprets Anna G differently. None of these interpretations should be seen as the authoritative one. Rather, what we want to demonstrate is that products like Anna G are able to prompt two alternative forms of product meaning: product metaphor or product blend. While research literature on product metaphor is vast, product blends have received little attention so far. The theoretical explanation of the difference between these two forms will be given in the following section.



Fig. 1. Anna G, corkscrew by Alessi.

2.1 Cila's Interpretation

Anna G is a tall and thin figure with a tall neck, big eyes and long dress call to mind the "gothic look" of the 1990s (Fig. 2a). Especially, the one with the black dress has almost a Tim Burton-esque image. The visual association grows stronger with the notches around the shoulders and neck, and the thin arms screwed to the body. This can be seen as more of a visual analogy

that is based solely on Anna G's appearance, which does not make a contribution to the functionality of the product. Still, its proportions and stylistic features make the product a beautiful and iconic object, which make it pleasurable to simply look at it.

2.2 Özcan's Interpretation

As a first impression Anna G looks inviting with her soft lines and colors, she looks like she would love opening wine bottles. After placing her on top of the bottle and turning her head to push the corkscrew into the cork, her arms start to rise in the air slowly (Fig. 2b). This movement is interpreted as the first sign that she gets happy. As she gets closer to opening the bottle, her arms rise higher and higher; consequently she gets happier and happier. The smile on her face strengthens this meaning attribution. Her happiness corresponds with the emotions of the user after opening a wine bottle; the user's feeling of accomplishment is reflected in the behavior of the product.

2.3 Markussen's Interpretation

In its visual form Anna G evokes associations to a holy, almost saint-like female figure with a glory surrounding her head. This metaphor is further entailed by the fact that, when standing on a shelf or table, the "arms" of the corkscrew can be placed in a position similar to those of praying figures found in so many Renaissance paintings or catholic visual culture (Fig. 2a). However, when the corkscrew is not simply looked at, but used to open a bottle of wine, the user is cued – through haptic interaction – to construct a thought-provoking counter-image. After opening a wine bottle, the cork is hidden under the skirts of the female figure. Because it is hidden, the user has to look up under the skirts and reach out after the cork to remove it (Fig. 2c). This is a rather rude gesture that actually conflicts with the product metaphor elicited through visual experience. Thus, it draws attention to the effects of wine drinking being associated with lust and desire, male-female relationships, gender issues, perhaps even sexual harassment, etc. This second product meaning is also motivated by the product's name – Anna G – which is a name a stripper may take on when dancing and performing in a nightclub.



Fig. 2. Anna G in use (from left to right, a, b, c).

2.4 Anna G as a Challenge for Design Semantics

While Cila's product interpretation is primarily grounded in the perception of the visual form and appearance of the product, Özcan's and Markussen's stories also include meaning attribution as they evolve from using the product. However, there is a central difference between the two last interpretations. While in Özcan's interpretation the image of the woman celebrating the opening of the wine bottle is consistent with the image evoked through her visual experience of Anna G, in Markussen's account the use of the product resulted in a counter-image of a woman that is contradictory to and violates the first image evoked through his visual product experience.

For design semantics it is a theoretical challenge to account for how one and the same product is able to evoke such ambiguous forms of meaning. Taken together the three product interpretations are useful for delving into (i) the interplay between multi-sensory product interaction and meaning attribution; (ii) the process of meaning attribution as it evolves over time through product usage; and (iii) how a product can cue people to construct a variety of different, and even conflicting meanings.

In the next section, we will show that while the theory of product metaphor indeed enables us to go a long way in addressing these questions, there is also a need for incorporating a new concept into the vocabulary of design semantics, namely "product blends". The notion of product blend is derived from the theory of conceptual blends as developed recently within cognitive semantics as a remedy for some limitations inherent in metaphor theory.

3 From Product Metaphors to Product Blends

Taken in its most basic sense, a metaphor is defined as “understanding and experiencing one kind of thing in terms of another” [14]. For example, in the phrase “love is a burning fire” an emotional state such as ‘love’ is understood in terms of a fire, which is uncontrollable and potentially destructive [15].

Until the 1980s it was usually believed that metaphors were primarily whimsical products of the poet’s mind, but the groundbreaking study by Lakoff and Johnson showed that metaphors are better understood as a fundamental cognitive operation of the human mind allowing us to make sense and understand the world. This assumption has been supported by countless examples in everyday language, which is permeated with metaphors (some of which we are hardly aware of anymore). For example, “she is unable to defend her claims” is an instantiation of the metaphor ‘Argument is War’; “you’re wasting my time” instantiates the metaphor ‘Time is Money’, and so forth.

On the basis of their study of metaphors in everyday language, Lakoff & Johnson [14] developed a cognitive linguistic account of the underlying semantic principle involved in the creation of metaphors. More precisely they proposed that metaphor creation is governed by a source-target construal principle, which could be illustrated as in Fig. 3:

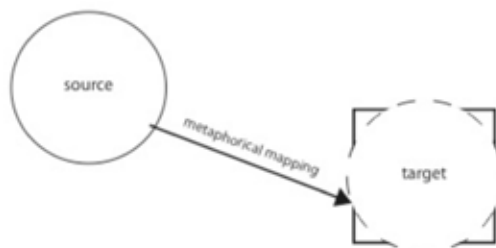


Fig. 3. The rule of metaphor (adapted from Wulff et al. 1990).

In “Love is a burning fire”, fire is the source domain, the qualities and structures from which are metaphorically projected onto love being the target. When an argument is compared to war, ‘war’ becomes the source domain that lends its action structures to a metaphorical mapping onto the phenomena of ‘verbal dispute’ being the target, and so on. Further, it is forfeited by Lakoff that the metaphorical mapping of

meaning structures from source to target cannot take place unless there is a structural isomorphy between source and target (also known as the invariance principle [16]). Hence, the metaphorical mapping can only be processed if love is malleable in some way according to the structural qualities of fire.

In their work, Lakoff and Johnson have succeeded in uncovering how the source-target principle is responsible for organizing meaning on a wide range of levels ranging from abstract thought in mathematics to gestalt laws of perception as well as neurobiological processes [17], [18], [19]. The cognitive semantic theory of metaphor has also proven useful for understanding how metaphors work in product design. In product metaphors, the target is the product in question and the source is the entity that is associated with it in order to modify the target to convey particular meanings. This modification is provided by projecting some attributes of the source onto compatible attributes of the target. The metaphorical mapping is quite tangible in this case; the mapped qualities are visible to users in the appearance, movement or interaction pattern of the target [20]. In this way, the target is seen through the lens of the source, which leads to cognitive and emotional effects in the users [21], [22].

By applying the notion of metaphor, it is possible to uncover semantic principles underlying Cila’s and Özcan’s product interpretations. In both cases, the corkscrew is understood and experienced as a women-like figure: for Cila a Tim-Burtonesque figure and for Özcan a celebrating woman. Despite their differences each of these two product interpretations are governed by the source-target principle as depicted in Fig. 4:

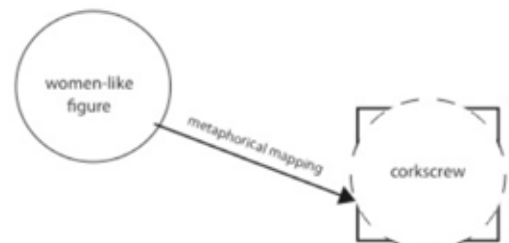


Fig. 4. Anna G as a product metaphor.

However, in Markussen’s product interpretation, a new meaning emerges that cannot be adequately captured by this diagram. As Anna G is used to open a bottle of wine a counter-image is evoked which is laden with entirely opposite connotations of a woman than that

of a saint. This counter-image is contradictory to the initial product interpretation, but nevertheless calls for integrating the elements and meaning structures into the same overall product interpretation making it highly ambiguous. Now, for design semantics, what is central to ask is, what are the underlying semantic principles of this type of product meaning?

3.1 Semantic Principles of Product Blends

In order to answer the question in the previous paragraph, it is valuable to take a brief look at some of the more recent developments within cognitive semantics. In particular, those made around the mid 1990s, when Gilles Fauconnier and Mark Turner discovered some forms of meaning making that appears to be instances of metaphor, but which, under closer scrutiny, turns out to be governed by semantic principles violating the source-target and invariance principles. Moreover, Fauconnier and Turner suggested that these new forms of meaning should be termed 'conceptual blends' [12].

A conceptual blend is not the result of meaning structures from a source being projected onto a target. The creation of a blend relies on conceptually integrating structures from two so-called input spaces into a third space: the conceptual blend. This third space is not the sum total of meaning structures from the two input spaces. On the contrary, the third space represents emergent new meaning, which cannot be explained by refuge to any of the inputs. In order to illustrate the semantics principles behind this conceptual blending process, Fauconnier and Turner [13] suggest the following basic diagram (Fig. 5):

In Fauconnier and Turner's diagram, the dashed lines from the inputs into the blend represent conceptual projections of structures. Since structures from both inputs get projected and integrated into new hybrid meaning structures in the blend there is a violation of the source-target construal principle. Moreover, the full lines in the diagram between input elements represent one of Fauconnier and Turner's key insights, namely that conceptual blends "can operate along strong clashes between the inputs" [13]. Let us try to somehow substantiate these theoretical arguments by applying the basic diagram as an analytical framework for understanding Anna G (Fig. 6):

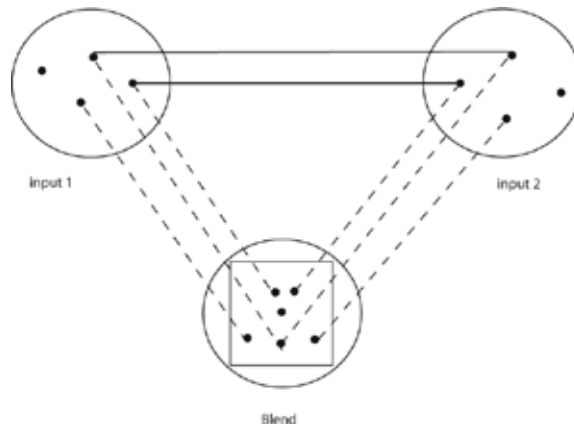


Fig. 5. Basic diagram illustrating the semantic principles of conceptual blending [13].

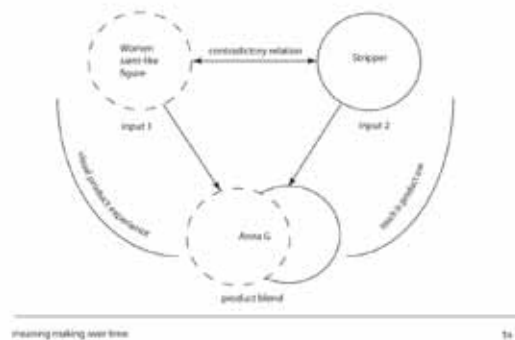


Fig. 6. The semantics of product blends.

In Fig. 6 we have elaborated on Fauconnier and Turner's basic diagram making it more fit for describing the construal principles of conceptual blends in product design. For instance, we have added visual experience and touch in product use in order to depict how meaning is attributed differently according to how the product is experienced. The saint-like woman arising from visually perceiving Anna G is represented by a dashed circle in input 1. The stripper being evoked from touching and using Anna G is represented by a full circle in input 2. Now, what makes Anna G a prompt for a conceptual blend is that it opens up for a process where the saint-like woman and the stripper get mixed into one ambiguous female blend associated with the product. All of this takes place through time (the arrow below the diagram, where time is indicated as t_n). By adding a temporal axis to the diagram, we wish to mark time as an important factor for product interpretation. This should be seen as broadening product metaphor theory,

which is usually focused primarily on the first initial stages of visually perceiving a product. Further, we propose the notion of “product blends” rather than conceptual blends as a new concept for working with ambiguity and contradictory meanings in product design. As a start, we predict that product blends can be found on various levels of product experience, most notably on a sensory, a conceptual and an emotional level.

3.2 Conceptual Structure of Product Blends

As we demonstrated, meaning attribution is a complex process that is facilitated by sensorimotor and semantic systems. Although the verbal correspondents of a meaning may be stored in the semantic system, the attribution of the meaning is primarily triggered by multi-sensory interactions with objects. During meaning attribution, these two distinct types of mental representations (i.e., sensorimotor and semantic) do not interact with each other directly. Paivio [23] suggests an amodal system, i.e., a conceptual system that bridges the representational gap between the semantic and the sensorimotor systems. Thus, a concept is the melting pot of mental representations. A conceptual representation of an object can be activated earlier than its semantic representation [24]. That is, as soon as people are confronted with objects (e.g., an apple), a network of mental representations will be automatically activated (e.g., the image, taste, sound and smell of an apple, and other meanings stored in the semantic system). Because, sensorimotor and semantic representations are connected via conceptual representations, a concept can be activated either by the semantic system or the sensorimotor system. Barsalou [25] presents a further explanation for conceptual systems. He suggests that a conceptual representation is an embodied representation construed by prior experiences taking place not only in the sensorimotor and semantic systems but also in the emotional systems. According to Barsalou’s account, object representations can also be variant resulting from infinite arrangements of experiences. Furthermore, Bar [26] suggests that all objects belong to a context frame, which a network conceptual associations again construed by exposure to real world events. Thus, conceptual representations of an object cannot be disconnected from its context of existence, and thereby from other objects within the same context.

Furthermore, because everybody experiences objects and events in their own settings, conceptual associations also become idiosyncratic to people. To summarize, the word or the image ‘apple’ activates a network of mental representations referring to sensorimotor, semantic and emotional systems, and other conceptual associations (i.e., sub-concepts) resulting from a contingent activation (a farmer, an orchard, grandmother’s apple-pie, happiness, Adam & Eve, guilt, sin, iMac, Steve Jobs, etc.). Thus, when a product such as Anna G is experienced, it is very likely that Anna G evokes all kinds of associations intrinsic to the product and idiosyncratic to the user (see Section 2 for interpretations the authors provided from their perspectives). Therefore, it is more logical to explain such rich interpretations and the underlying mental processes with conceptual systems in consideration. As opposed to the semantic system, which provides a narrow linguistic account, the conceptual system tackles first the sensorimotor representations and relates them to several meaning structures occurring in the semantic system [27]. As a result, a blending occurs between the conceptual associations (rich in multi-sensory, emotional and action content) activated by one single product. As we mentioned before, product blends tackle human-product interactions over time. Interactions with products occurring at different stages may evoke different conceptual associations. Barsalou’s [28] account with ad-hoc categories may explain this phenomenon. That is, people depending on the context and situation may activate a network of items associated by one common goal and/or function. Moreover, concept structures are not fixed and can be updated depending on the new inputs and new situations [29]. Thus, in the course of product use, the activated conceptual associations can take different forms and may prime the following associations to be activated. Therefore, in the essence of product blends, a continuous negotiation for meaning attribution occurs between the primary concept that is activated (e.g., saint-like woman in Figure 4) and sub-concepts that are subsequently activated. For example, visually experiencing Anna G as ‘a woman’ (i.e. the primary concept) activates woman-like knowledge in the beginning of product interaction. Later haptic and tactile interactions with the product (e.g., holding Anna G from the waist, turning it around looking under her skirt) activate another concept, which is the ‘stripper’

(sub-concept). Accordingly, the primary concept of Anna G gets updated starting from a saint-like woman figure and becoming a stripper. In this example, it is the ambiguous form of Anna G and the conflict in the conceptual associations that mainly underlie the occurring product blend.

Product blends can be constructed as a result of product experiences on different levels (i.e., sensory, cognitive and emotional). In Markussen's account of Anna G, both the primary concept and the sub-concept are activated by sensory product experiences (i.e., the visual and tactile product experiences, respectively). However, the activations of primary and sub-concepts may also be a result of emotional and cognitive product experiences. In Özcan's account of Anna G, an emotion (i.e., happiness) is identified in the course of the product use, which serves as a sub-concept that updates the 'woman' concept. However, in this case, the occurring concepts are not contradictory but complementary to the overall product experience. In Cila's account, the visual experience refers primarily to 'a gothic woman image' and a further cognitive elaboration into the primary concept activates the sub-concept of 'Tim Burton's heroines'. Consequently, the primary concept gets stronger making the product more pleasant to the user. Although product blends can occur as a result of different types of product experiences, what makes its effect strong lies in the (in)congruency between the activated primary concept and the sub-concept. We suggest the notion of product blends as a new concept for understanding the semantics of ambiguity and contradictory meaning in product design. Over the years, there has been an increasing interest in design research in ambiguity and contradictory meaning. In the following section, we review some of the contribution and relate and discuss them in relation to our own framework.

4 Contradictory Meaning and Ambiguity in Design

Without doubt, we can consider Anna G as a rather atypical product within the product category of corkscrews. For some atypical products, the functionality is not the primary concern from the perspectives of both designers and users. For example, Phillippe Starck states that he mainly designed the Juicy Salif (the famous Alessi lemon squeezer) as a conversation starter in awkward situations [30].

Products such as Anna G and Juicy Salif are rather ambiguous in their physical constitution – physical constitution of a product normally gives rise to a 'lexical level' meaning attribution (i.e., corkscrew or lemon squeezer). These products rather refer to complex meaning structures beyond a lexical association, which makes them good examples for product blends. Thus, ambiguity in product categorization is an essential factor for product blends to take place in the first place. Furthermore, contradiction in occurring concepts is what makes the product experience intriguing. If the designers of ambiguous products have similar concerns as Starck's, then facilitating the activation of contradictory concepts in human-product interaction can be seen as a deliberate design decision for creating richer product experiences (that is, experiences that go beyond the functionality of the product). In the following paragraphs, an overview will be given on how ambiguity and contradictory meanings have been studied within the design literature and shortcomings of these studies will be discussed.

4.1 Sensory Incongruity

Sensory incongruity has been studied in the context of surprise in product design [31]. Ludden studied three types of sensory incongruities (i.e., visual – tactual, visual – auditory and visual – olfactory). For evoking surprise reactions, visual-tactual incongruity was found to be the most effective. Furthermore, it was shown that the surprise reaction had a long-term effect on other emotions such as interest, fascination and confusion. Ludden's main interest was to observe the emotional effect of the synthesized sensory incongruities in product use in order to understand whether sensory incongruity could be used as a design strategy. However, Ludden's doctoral dissertation has not covered the semantic impact of sensory incongruities.

Sensory incongruities by eliciting conflicting emotions may further influence the meaning attribution process to the product experience. Our framework on product blends assumes emotions as part of the embodied experience [c.f. 25] and therefore part of the activated concept frame. Thus, we assume that emotional responses are involuntary and play an important role especially in assessing conflict between the emotional responses towards the primary concept and the sub-concepts.

4.2 Contradictory Meanings

Hong and Chen [11] offer a study of simultaneous use of contradictory meanings in product design. More specifically, they focus on how meaning attribution triggered by a product may manifest itself in the semantic continuum between two opposite adjectives: typical-unique, traditional-modern, simple-complex, rational-emotional. As an example of how products can be designed according to the typical-unique polarity, they mention a chair that makes double use of one of the legs as an umbrella stand and a flowerpot. In this instance, contradictory meaning occurs as a result of adding functions from other product categories (umbrella, flowerpot) to the existing product category of a chair. By merging typical product genres in a unique way in its design, the chair plays humorously with the typical-unique polarity. We argue that, by introducing the notion of product blends, we have added a new perspective on contradictory meaning, which is absent from Hong and Chen's study.

First of all, Hong and Chen's framework is too coarsely grained to capture contradictory meanings like the one we find in Anna G. Anna G does simply not fit into any of the four categories of contradictory meaning. Secondly, many of Hong and Chen's examples such as the chair provide insight into lexical level meaning attribution, i.e., the process of associating primary concepts with a product. In this paper we have broadened the perspective so as to include the interplay between primary concepts and sub-concepts. Thirdly, for Hong and Chen meaning attribution is primarily a matter of how people react towards visual images of products, whereas we see meaning attribution as emerging from multi-sensory product use, which is a time-based interactional process. Finally, as Hong and Chen base their study on the so-called differential semantic method, they end up conceiving of contradictory meaning as being manifested in between two opposite adjectives. However, product blends are contradictory forms of meaning, which cannot be adequately accounted for in bipolar terms. Thus, a product blend is not the sum total of two adjectives or something in between, but a new third structure. The basic diagram enables us accurately to account for the semantic principles behind this structure.

4.3 Ambiguity as a Resource for Design

Gaver, Beaver and Benford [10] have developed an analytical account of how ambiguity in design can be roughly grouped into three categories: (i) ambiguity of information, an example of which would be Mona Lisa's smile where the technique known as *sfumato* is used to create a certain sense of indeterminacy in the viewer; (ii) ambiguity of context which is exemplified by Marcel Duchamp's *Fountain* from 1917, a urinal brought into the context of an art gallery; and (iii) ambiguity of relationship is a third type of ambiguity illustrated by Lieshout's *Bais-ô-Drôme* which is a trailer designed to become a love caravan that in a strange way mixes utility (a trailer) and sexual debauchery.

While Gaver, Beaver and Benford [10] offer many central insights into the nature of ambiguity and how it can be used by designers in various ways to increase user creativity and interpretations, they do not offer a semantic explanation of this phenomena. We argue that the basic diagram of conceptual blends can be valuable as an explanatory tool for providing a more fine-grained understanding of the semantics of ambiguity in design. Thus, the diagram can be used to account for the semantic principles underlying ambiguity of information, ambiguity of context and ambiguity of relationship.

5 Conclusion

Alessandro Mendini who designed Anna G for Alessi, once said that as a designer he wishes to communicate through his objects and work in general, "trying to say things that encourage people to deepen meditation and spirituality". As a product, Anna G surely encourages people to meditate upon a series of topics related to celebration, wine drinking, gender issues and so on. In this paper, we have demonstrated that the product's ability to trigger this rich variety of interpretations has to do with a certain ambiguity of product meaning. More specifically, we have shown that this ambiguity can be explained in terms of two divergent semantic principles: product metaphor and product blend. While the existing research in design semantics has a lot to say about product metaphor, little has been written so far about product blends. To fill in this lack of knowledge, we have found it necessary to introduce conceptual blending theory as a supplement to metaphor theory. In so doing we have remedied the inherent limitations of metaphor theory that has to do with its inability to account for:

- **Contradictory forms of meaning that violate the source-target principle;**
- **How multi-sensory product experiences give rise to different interpretations of the product;**
- **How meaning attribution evolves over time through product use and interaction.**

Needless to say, our contribution must be further elaborated by future work as it is built up from only one single product analysis. In particular there is a need to study the many forms that product blends can take, and to support such studies with empirical findings and user tests. For example, we could empirically study the shift in product semantics over time through experiences deriving from a range of non-rich (mono-sensory) and rich product interactions (multi-sensory), that is, from visual only to multisensory or auditory only to multi-sensory. Despite this missing body of work, we argue nonetheless that the notion of product blends marks a new interesting research topic for design semantics. As they increase user creativity and interpretations, product blends could serve as a resource for deriving new design ideals for designing richer and meaningful user experiences.

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