

Meaningful Interaction with Products

Wellington Gomes de Medeiros

Introduction

This research explores three current key ideas in design: semantics, emotion, and interaction. That designers need to consider products as a means to establish meaningful and emotional interactions is becoming increasingly evident. This paper describes part of an investigation that aims to further our understanding about the representational (product semiotics) and non-representational (product semantics) qualities of products, and the connection of these two dimensions of meaning in design with the emotional and pragmatic aspects of interactions. The question that initiated the research was how the meanings that convey pragmatic and emotional interactions could be systematically explored in connection to the semantic qualities of products and the users' understanding. I propose the concept name, "meaningful interaction" (MI), for exploring the semantic dimension of products and the users' understanding and behavior in interactions.¹ Underlying MI is the thinking that the semantic and symbolic features of artifacts and the contexts of interaction are key issues for design innovations. It also is based on the belief that the meanings that artifacts trigger throughout interaction activate people's reactions at pragmatic and emotional levels.

Rationale for the Study

The motivation for this study is rooted in the understanding that designers should approach functionality, usability, semantics, and emotion as equally important for design processes. This breadth suggests a move from the understanding of artifacts as being created primarily to fulfill practical tasks, to the understanding that they are able to communicate their qualities to users and to establish emotional connections. In this sense, design processes should bring the pragmatic and emotional dimensions of products and interaction to the same level.

¹ Wellington G. De Medeiros, "Meaningful Interaction: A Proposition for the Identification of Semantic, Pragmatic, and Emotional Dimensions of Interaction with Products" (PhD thesis, Staffordshire University, UK, 2007).

Semantics is believed to be a key principle for guiding designers and industry.² The manipulation of the attributes of artifacts aiming to establish meanings has been an object of concern for designers for a long time. However, the first systematic approach to the matter emerged when the term “product semantics” was proposed.³ Since then, “product semantics” has drawn the attention of designers to the idea that the success of a design would be directly related to people’s understanding of the meanings in products. This connection suggests the notion that users do not merely perceive the physical attributes of products but tend to be moved by the meanings they identify and understand. However, according to its creators, “product semantics” should not be viewed as separate from the inherent qualities and meanings within products. Thus, product semantics pursue a non-representational concept of meanings. In essence, product semantics is not a sign—a view that is controversial. Some researchers believe that the symbolic quality and value of products are representations of something outside their inherent qualities and thus are signs.⁴

This study argues that these two perspectives—representational and non-representational qualities of meanings in products—should be explored as equally important and that they require a means by which they could be systematically approached. In this direction, a proposition that could incorporate these two possibilities of meanings (representational and non-representational) in a comprehensive tool for clustering and analyzing the semantics of products and the users’ responses would contribute further knowledge to these issues.

Concomitant to the rising of semantics, the study of “emotion” has gained more evidence and academic support. The connection between design and emotion has been spreading rapidly worldwide, and industry and designers have demanded clarification of theoretical and methodological matters, in addition to empirical exploration of the connection between the semantics of products and emotional responses of users.⁵

This paper presents MI as a proposition that aims to contribute to the improvement of the debate around the connection between semantics, emotion, and interaction in design. It is based on the view that to understand the semantic aspects of interaction and the emotional connection of people with products, distinguish the main elements involved as active characters—people, products, and contexts—is crucial. These elements should be approached as playing important roles in the process of establishing meanings that create emotional and other types of relationships. Because people might attach meanings to usability and non-usability related terms, MI explores the possibility of characterizing meanings within two dimensions of interaction (pragmatic and emotional) and four types of semantic values (practical, critical, ideological, and ludic).

2 Klaus Krippendorff, *The Semantic Turn* (New York: Taylor & Francis, 2006).

3 Klaus Krippendorff and Reinhart Butter, “Product Semantics: Exploring the Symbolic Qualities of Form,” *Innovation* 3, no. 2 (1984): 4-9.

4 Mihaly Csikszentmihalyi and Eugene Rochberg-Halton, *The Meaning of Things: Domestic Symbols and the Self* (Cambridge: Cambridge University Press, 1999); Susann Vihma, *Products as Representations* (Helsinki: Publication Series of the University of Art and Design Helsinki, 1995).

5 Stephan A. G. Wensveen, ed., *Proceedings of Designing Pleasurable Products and Interfaces* (Eindhoven: Technische Universiteit Eindhoven, 2005); Deana McDonagh, Paul Hekkert, Jeroen van Erp, and Diane Gyi, eds., *Design and Emotion* (London: Taylor & Francis, 2004).

Relevance of this Study

The relevance of this study is rooted in new approaches to human factors and their connection with the semantic and emotional dimensions of interaction in design. Traditionally, human-factor approaches to the interaction of people with artifacts have been investigated mainly from the point of view of the physical implications of the users' pragmatic needs.⁶ Qualities such as comfort, elegance, and friendliness have been understood for their relationship to the functionality and usability of products. Conversely, explorations—of the semantic dimension of artifacts and its connection with users' understanding of meanings in artifacts and emotional experiences in interactions—have been neglected. Alternatively, the flourishing idea that products that work well are attractive, and may cause delight, is now moving designers to the belief that attractive products might work better because they can provoke emotional satisfaction.⁷ However, emotional satisfaction often is still understood as tied to usability. This disagreement raises the debate about attractiveness in design, and about how product configurations elicit meanings that might provoke attraction and pleasure apart from usability.⁸ In this sense, a thing is attractive because it causes positive feelings activated by meanings embodied in its features. Naturally, meanings can provoke either positive or negative feelings in different people or in the same person in different contexts. These issues point to the relevance of exploring a means to help designers identify the potential of meanings in products and their relationship with the pragmatic and emotional particularities of interactions. To some extent, ergonomics- and technology-based decisions have overlooked these matters.

As a counterpart, social and psychological issues, including contemporary social behavior, gender roles, personal relationships, and product consumption,⁹ have had an increasing effect on design research and industry decisions. Turning to such issues has many implications for design processes, as users' emotional aspirations are reaching the top of companies' requirements for innovations. As a consequence, designers need to be aware of users' emotional experiences and their satisfaction with products beyond usability. They should be able to develop methodological approaches to create meanings in products according to the company's and people's requirements. When thinking about product interaction, designers should consider interaction between people, products, and environment as a sensitive relationship.¹⁰ In this sense, it is crucial to understand how artifacts elicit people's meaningful responses. Based on a human-centered perspective, this approach demands an understanding of features in products as mediators that establish meanings triggering an enormous variety of responses at pragmatic and emotional levels. This study emphasizes the view of design as an activity that essentially shapes meanings by conceiving product features as mediators. It responds

6 Patrick Jordan, *Designing Pleasurable Products* (London: Taylor & Francis, 2000), 20.

7 Donald Norman, *Emotional Design* (New York: Basic Books, 2004), 18.

8 Jordan, *Designing Pleasurable Products*, 2000.

9 Stephen R. Wester and David L. Vogel, "Working with the Masculine Mystique: Male Gender Role Conflict, Counselling Self-Efficacy, and the Training of Male Psychologists," *Professional Psychology: Research and Practice* 33, no. 4 (2002): 370-76; Ronald F. Levant, "The New Psychology of Men," *Professional Psychology: Research and Practice* 27, no. 3 (1996): 259-65; Marian Salzman, Ira Matathia, and Ann O'Reilly, *The Future of Men* (New York: Palgrave, 2005); Tony Chapman, *Gender and Domestic Life* (New York: Palgrave, 2004).

10 Jonathan Cagan and Craig M. Vogel, *Creating Breakthrough Products* (New Jersey: Prentice Hall, 2002), 5.

to the call for reviewing current methodological and empirical issues in design and seeks an enhanced understanding of the semantic dimensions of artifacts and interaction, as well as the implications of users' pragmatic and emotional aspirations.

According to the extant literature, further knowledge about the representational (product semiotics) and non-representational (product semantics) qualities of products is needed to clarify the connection of these two frontiers of meanings with the emotional and pragmatic dimensions of the users' understanding that emerges during interactions. These aspects are often explored separately and even dissociated.¹¹ Thus, in addition to the existing knowledge about the tangible qualities of products, "the experience of human beings with products reveals many new features and properties that are, at present, only partly and inadequately understood."¹² The semantic qualities of products and the emotional dimension of interactions are some of the new features and properties of products that need further clarification.¹³ This study seeks to contribute to this clarification.

Definition of MI

MI is an active process observed at the semantic level of the relationship between people, products, and contexts. It is based on a dialogical process of communication between these three elements through the combination of actions at the semantic level. It provides a means to access the distinct and indistinct meanings and associations in design and interactions, including the symbolic- and non-symbolic-related meanings connected to the inherent quality of products and the external references represented in products. It ascribes two dimensions for interactions—pragmatic and emotional—and four semantic values—practical, critical, ideological and ludic—for clustering and analyzing information about the semantic dimension of interactions. MI is presented as a framework for the systematic analysis of adjectives, associations, statements, and behaviors gathered during observation of interactions through a combination of qualitative and quantitative methods.

MI has two complementary aspects: (1) a theoretical foundation that acknowledges the issues in the *process* of interaction at the semantic level, and (2) a practical solution in the form of a *framework* to help in the exploration of MI in design studies and design processes. In this sense, the identification of MI as a process means that it provides a theoretical understanding about the dynamic relationship of the elements of interactions: people, products, and contexts. This relationship implies a series of actions and exchangeable meanings in the form of a dialogue among these three elements.

11 Krippendorff, *The Semantic Turn*; Vihma, *Products as Representations*.

12 Richard Buchanan, "Design Research and the New Learning," *Design Issues* 17, no. 4 (2001): 3-23.

13 Cagan and Vogel, *Creating Breakthrough Products*, 63-65; Jordan, *Designing Pleasurable Products*, 20.

The MI statement encompasses seven discrete topics: (1) MI as a dialogical process; (2) MI as a combination of actions; (3) MI as accessing the indistinct; (4) MI as providing access to the symbolic; (5) MI's two dimensions for interactions: pragmatic and emotional; (6) MI's four semantic values for interactions: practical, critical, ideological and ludic; and (7) MI as a framework.

In MI, the semantic dimension of the relationship between people, products, and context is the primary aspect. Thus, meanings are seen as the main stimulus to activating interactions, and questions focus on how products elicit meanings; how people can understand and embody meanings in products; and how contexts partake in this relationship. The following sections address the seven topics in the MI statement as described in the previous paragraph.

MI as a Dialogical Process

MI is a dialogical process of communication/collaboration between people, products, and contexts. It is a dynamic relationship that takes place at the semantic level. In this sense, the elements of MI (i.e., people, products, and contexts) should be understood—and approached—as operating in a cyclical process of constructing/exchanging meanings. As MI occurs at the semantic level, these elements should be understood as active characters that can establish meanings.

“Dialogical process” means the exchange of information as stimulus between the elements of interaction. In this sense, products are mediators of messages at two levels: the messages embodied by designers and the messages embodied by the people themselves. The messages embodied in product attributes by designers are meant to trigger specific meanings. They are built “to stand for something,” and then to provoke calculated user reactions. However, designers cannot foresee the whole range of possible meanings that a product can produce. The likely unpredictability of interactions generates unlimited possibilities for people’s interpretation. Hence, product attributes should be articulated to establish dialogues.

Dialogical processes between people, product, and context in interaction are an aspect that design must absorb.¹⁴ In MI, people have the primary role, and they establish the dialogical flow. People—and so far only they—can establish an effective dialogue with artifacts and contexts, even when the product triggers the interaction. Nevertheless, the role of products and context to afford user’s reactions cannot be dismissed. Moreover, the user’s reactions to the same product might vary diachronically and under different circumstances of interaction. What is activated in

14 Mario Mattioda and Federico Vercellone, “From Function to Dialog,” in *Theories and Practice in Interaction Design*, Sebastiano Bagnara and Gillian C. Smith eds. (Hillsdale, NJ: Lawrence Erlbaum Associates, 2006), 181-92.

this dialogical process are the meanings that the elements trigger, with the user as the main agent, sender, receiver, and reactor to the meanings; this interactivity and the user's primary role must be taken into account.

In this sense, a situation of communication/collaboration is established. Because a dialogical process exists, the probability of communication exists. The purpose of any communication is to achieve shared meanings.¹⁵ Hence, the process of establishing communication is a process of making connections and sharing meanings. In communication studies, connections between people can be immediate—face-to-face—or intermediated, as through advertisements.¹⁶ In MI, connections can occur at two levels: between the user and the product, and between the user and the designer/stakeholders. The connection with the meanings embodied in products by designers can happen first, in that the product is supposed to have an intended meaning. This intention normally is established or arises at the stage where usability is the major requirement. The second moment is constructed during interactions and is usually a response to an emotional requirement. These two moments take the dialogical process to a level of dynamic relationship between the three elements of MI. In the process of communication between products and people, MI takes the two as having equally important roles in the means of communication. This sharing process is regarded as cyclical, and the symbolic nature of products and contexts is a determinant in the dialogical process and communication in MI.

MI as a Combination of Actions

Because the nature of MI is first characterized as a dialogical process with exchangeable meanings, it is consummated through the combination of actions between the three elements of interaction: people, product, and context. These elements perform actions of a distinct nature. Products and contexts are usually physically static; they do not move on their own or create an intentioned action toward the user, unless they are designed and activated to do so. They are usually understood as passive characters in interactions. This situation might change in the future as technology and artificial intelligence offer possibilities for making products active, and even endowing them with some level of intelligence (e.g., robots). In reality, technological products are no longer as static as they were a few decades ago, and the investigation of the semantics of form and movement is now expanding as an important subject.¹⁷

In MI, the term "action" does not refer simply to the basic action of raising an arm or to the gesticulations of the body itself.¹⁸ Instead, it refers to the point of interaction where the meanings are at play. Thus, the term "action" should be understood at the

15 Michael Burgoon, Frank G. Hunsaker, and Edwin J. Dawson, *Human Communication* (London: Sage, 1994), 18.

16 Richard Dimbleby and Graeme Burton, *More Than Words: An Introduction to Communication* (London: Routledge, 2001), 5.

17 Loe Feijs and Frithjof Meinel, "A Formal Approach to Product Semantics with an Application to Sustainable Design," *Design Issues* 21, no. 3 (2005): 67-81.

18 Ted Honderich, *The Oxford Companion to Philosophy* (Oxford: Oxford University Press, 1995).

semantic level, where the three elements are involved in a process of interaction in which the meanings in each element are exchangeable during the interactions. This cyclical movement of meanings occurs at two levels: internal meanings and external meanings. Thus, the product and the context, despite being physically static, express their dynamics through their semantic qualities and also by responding to the interaction with the user. For instance, a product shape designed to be understood as “easy to open” or as “masculine” has these embodied meanings as an internal means of communication. However, users eventually interact with this product in different contexts, such as in shops, at home, or at work. The user, as the core element of this dynamic relationship, might see different meanings in the product, depending on the context.

Studying the active characteristics of the elements of MI requires exploring both the natural and the symbolic qualities of their meanings. The natural quality refers to what is primary to product semantics—a product’s quality to establish meanings that represent only its inherent qualities. Symbolic quality is the quality of a product as representation and sign. Meanings in MI are activated during interactions; thus, the study of the meanings that a product might trigger requires facing actual interactions.

MI as Providing Access to the Indistinct

The term “indistinct” in MI should be understood as referring to that which is not easily identified in people’s reactions; thus, it is meant to be an antonym to what is easy to perceive and identify. Sometimes people say one thing to mean another thing. This apparently ambiguous communication could be the case in verbal expressions used to express personal preferences and symbolic relationships with products. Also, people sometimes gesticulate without expressing their feelings verbally. MI considers meanings that arise from this kind of situation as important sources of information about how people feel about things. For this reason, direct observation of interactions is very important for accessing indistinct and vague meanings in words, verbalizations, and gestures.

The MI proposition implies that the quality of interactions as conveying meanings or implications might or might not be directly observed or identified because users might not explicitly express their thoughts. In human communication, what people say can be used as a means to deliver meanings that are beyond the referent—the thing to which they refer. Two different functions in human communication are the function of “representation” (the semantic and symbolic aspects of messages) and the function of “presentation” (the pragmatic aspect of messages).¹⁹ Thus, beyond using and describing the tangible qualities of objects, people use objects as references to communicate something else (e.g., about themselves).

19 Kurt Danziger, *Interpersonal Communication* (New York: Pergamon Press, 1976).

In the analysis of the semantic, pragmatic, and emotional dimensions of design interaction, considering both the evident meanings in people's responses and the meanings not immediately identified (e.g., those expressed through metaphors) is important. The traditional view of metaphor says that "metaphorical meanings are semantic phenomena. That is: elements of language, such as words or sentences, can have, in addition to their literal meanings, metaphorical ones."²⁰ Although the identification of metaphor and its roots have been debated,²¹ this traditional view is in line with the foundations of MI. In this study, the notion of metaphor is tied to the expressions that arise spontaneously in interactions, without much attention or elaboration from the person experiencing the interaction. Hence, identifying and exploring metaphorical expressions in MI requires considering how people express their view and how their behavior and background inform metaphorical meanings.²²

In language and communication, the use of metaphors can be helpful as a complement to or reinforcement of literal expressions.²³ The analysis of gestures and behavior in association with the verbal expressions also is a useful strategy to accessing indistinct meanings in MI. Spontaneous statements, including intentionality, non-intentionality, metaphoric messages, and expressions verbalized during interactions but in which meanings are not immediately identified, all inform MI investigations. The systematic identification of types of meanings in these domains is a route to accessing valuable information about the semantic dimension of design interaction. MI offers a systematic framework to identify the indistinct meanings by translating metaphoric expressions and unclear associations with products into comprehensible information that reflects user understanding.

MI as Providing Access to the Symbolic

MI recognizes the property of products and interactions to add meaning as values (significance, meaning, or purpose) to a person's life. The symbolic qualities of the three elements (people, product, and context) have important roles in the cyclical establishment of values (i.e., meanings) in artifacts that influence the construction of the users' identity, including their taste and their lifestyle.

Symbolic signs are established as conventional values. As conventions, symbols have static semantic values and therefore are different from metaphors, which are dynamic.²⁴ We should differentiate meanings in products that serve as references to the product's inherent qualities from those that are constructed as social and cultural conventions. Objects are symbols when they are signs that represent status, qualities of the person, and are symbols of

20 David E. Cooper, *Metaphor* (Oxford: Basil Blackwell, 1986), 46.

21 Sheldon Sacks, ed., *On Metaphor* (Chicago: The University of Chicago Press, 1981).

22 Max Black, *Models and Metaphors* (London: Cornell University Press, 1962), 29.

23 Andrew Goatly, *The Language of Metaphors* (London: Routledge, 1997); David E. Cooper, *Metaphor* (Oxford: Basil Blackwell, 1986).

24 Carl Hausman, *Metaphor and Art* (Cambridge: Cambridge University Press, 1989).

social integration.²⁵ Symbolic signs are therefore signs created as a means to transport people to symbolic realities that are constructed “outside” the artifact and incorporated as value by individuals and their peers. In the same way, artifacts themselves are a means by which symbolic realities are constructed.²⁶

The identification of symbolic meanings is an important part of MI. The three elements of MI are active characters in the construction of symbolic realities. The identification of the symbolic dimension of the user’s responses can reveal what a product represents, not just to a specific person, but also in many cases to a larger population.

MI’s Two Dimensions: Pragmatic and Emotional

MI identifies two dimensions of interactions: pragmatic and emotional. Underneath these two umbrella dimensions are the four semantic values in interactions, practical, critical, ideological and ludic.²⁷ In this section, we look at the two dimensions and how the values relate to them. The four values are discussed on their own terms in the following section.

The Pragmatic Dimension of MI

The pragmatic dimension of MI refers to the dimension of interaction where the users’ understanding of the product qualities is firmly rooted in product-based values. In this dimension, MI users’ associations and their understanding of products are tied to their view of the product qualities themselves. Thus, the pragmatic dimension of MI covers semantic values related to physical attributes, usability, and functionality, among other values connected to practical issues. The semantic values people convey in the pragmatic dimension are denotative-based values, as they are connected with the immediate meanings in products related to materiality and use.

The pragmatic dimension of MI approaches practical issues in a restricted sense. In design literature, the term “pragmatic” can also refer to the analysis of products in terms of aesthetic use and use for fun.²⁸ This view of the connection between the terms “pragmatic” and “use” seems to be too wide and ambiguous. Taking a different route, the pragmatic dimension of MI refers primarily to the product’s physical attributes and the appraisal processes directly or indirectly related to its use. The other types of use (i.e., aesthetic and for fun) are in the emotional dimension of MI, described in the following section. The pragmatic dimension focuses on two major points: the user’s responses to the product materiality and attributes and the user’s experience of using the product.

25 Csikszentmihalyi and Rochberg-Halton, *The Meaning of Things: Domestic Symbols and the Self*, 20.

26 Roland Barthes, *Mythologies* (London: Paladin, 2000).

27 These terms were inspired by Jean-Marie Floch’s *Visual Identities* (London: Continuum, 2000), 118.

28 Vihma, *Products as Representations*, 53-55.

Previously, we indicated that MI explores processes of signification: It analyzes the semantic qualities of associations in interactions. As explained in the following section, the pragmatic dimension encompasses two types of semantic values: practical and critical. Meanings in products expressed in these two types of semantic values are tied to cognitive processes of understanding what products are created to provoke. In this sense, “intentionality” is a key factor in the pragmatic dimension. Here, intentionality refers to the meanings intentionally delivered by designers through product attributes. Designers convey meanings in products by communicating as product outcomes their type, function, usability, technology, and other qualities. However, this is just one facet of interactions that the pragmatic dimension of MI covers.

The semantic values in the pragmatic dimension are not restricted to meanings that designers assign to products. Despite being engendered by the practical qualities of products, some meanings can trigger reactions that are not necessarily connected to the ones intentionally ascribed. For instance, a packaging designed to be understood as easy to open might trigger reactions that reveal a user’s particular view, such as uncomfortable, usable, or unusable. These responses are judgments about the quality of the products and are not necessarily based on the actual manipulation, such as when a person sees a product and makes appraisal estimations but does not touch it.

The Emotional Dimension of MI

The emotional dimension of MI refers to the dimension of interaction where the users’ understanding of a product exposes people-based values, such as aesthetic preferences, symbolic connections with the products, and other psychological and subjective matters. Thus, the emotional dimension is rooted in emotional, affective, and symbolic aspects of design interaction. The semantic associations in this dimension encompass meanings other than usability, functionality, and values related to practical issues. In the emotional dimension, interactions bring about aesthetic experiences, social paradigms, conventions, and playfulness.

The two semantic values of the emotional dimension of MI (ideological and ludic) contribute to the systematic identification of the connotative factors of the user’s responses. In the example of packaging, the failure or success of the users’ experience could trigger reactions and semantic associations in the emotional dimension rather than in the pragmatic. For instance, responses such as excitement and attraction are associations that, despite being related to the use of a product, do not have a primary connection with its pragmatic dimension. Rather, they indicate understanding in the connotative domain, which underpins the emotional dimension.

MI's Four Semantic Values: Practical, Critical, Ideological, and Ludic

The four semantic values can be categorized under the umbrellas of the two dimensions of interactions. As shown previously, practical and critical values fall under the pragmatic dimension, and ideological and ludic values fall under the emotional dimension. The following paragraphs explain each of these values.

Practical Semantic Values in the Pragmatic Dimension of MI

The practical semantic values of meanings in MI cover the users' semantic associations connected to the physical attributes, including the tangible and perceivable qualities of products. In the practical semantic value, users' understanding of material, shape, proportion, textures, and other features trigger understandings such as proportion, light, smooth, balance, ergonomic, stable, and solid, among others. These associations reflect the user's pragmatic reactions to the tangible properties of products.

Critical Semantic Values in the Pragmatic Dimension of MI

As in the practical semantic values, the physical features of products also generate critical semantic values. However, the user's associations and meanings at this level disclose the user's judgments and reveal how he or she might feel about the use of a product. Meanings, such as comfortable, functional, and simple, reveal how a user feels (and often thinks) about using a product in a specific context.

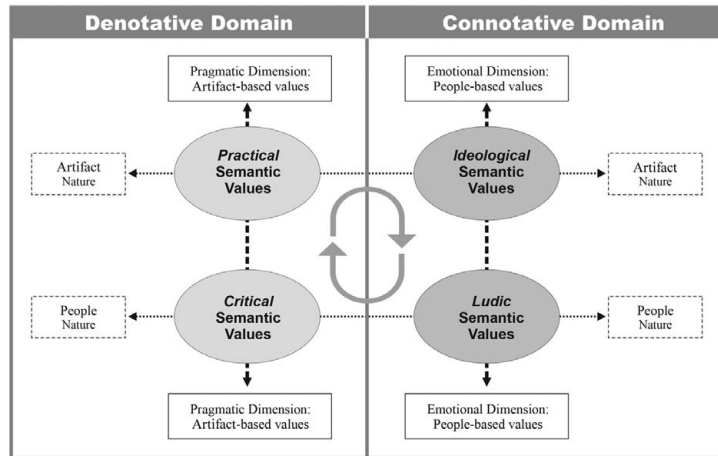
Ideological Semantic Values in the Emotional Dimension of MI

The ideological semantic values are in the emotional dimension of MI. These values imply semantic associations that are underpinned by symbolic paradigms assigned to the products. Products that represent social paradigms, status, identity, lifestyle, and personality have symbolic qualities as the primary reference for users; thus, they are perceived as having ideological semantic values. At an ideological level, the use of a product does not necessarily refer to its actual manipulation. Possession and exhibition are themselves clues for the meanings they generate, such as fashionable, male/female, and traditional. "Politically correct" meanings might also attribute ideological values to products. Valuations such as ecological or recyclable overestimate ideological semantic values, stimulating the users' self-identification with products supposedly used in social and environmental care.

Ludic Semantic Values in the Emotional Dimension of MI

As with the ideological values, the ludic semantic values refer to the users' emotional semantic associations. However, unlike the ideological values, the ludic values cover individual-based

Figure 1
The Meaningful Interaction framework and
the four semantic values.



preferences, rather than social/symbolic-based values or patterns of behavior. The ludic semantic values disclose meanings in the users' responses related to playfulness. Ludic associations expose a sort of "state-of-the-spirit" and the mood of users projected on products during interactions. Semantic associations such as, funny, happy, and boring, highlight the users' feeling toward a product more than their understanding of the inherent qualities of the product. For this reason, the ludic associations reveal the most random and unpredictable associations and meanings among the four semantic values.

MI as a Framework

MI is proposed as a framework for clustering and analyzing information based on empirical and non-empirical data. The four semantic values are the core of the MI framework, providing systematic readings of the elements, the associations, and their relationships during interactions (see Figure 1). The MI framework is divided into two domains of signification: denotative and connotative. The denotative domain encompasses the pragmatic dimension, including the practical and critical semantic values. The connotative domain includes the emotional dimension, which includes the ideological and ludic semantic values. The curved arrows represent the cyclical and dynamic relationship between the four semantic values. They are intended to communicate that these values could arise either in isolation or in interconnected ways during interactions. They also indicate the flow between the four semantic values, indicating an eventual hierarchy of values according to people's choices.

The framework also illustrates that the semantic dimensions that enclose meanings and semantic associations in which the artifact itself is the central subject, are based on the *artifact nature*. Such values include the practical and ideological ones. The values based

on artifact nature comprise associations related to the physical attributes of products and associations and are based on the nature of products as conveying symbolic realities (e.g., status). In this case, the product is the means by which its owner forms and shapes identify.

Alternatively, the semantic values based on *people nature* are the ones in which people are the central subject in the development of meanings and associations. These values, which include the critical and ludic semantic values, expose the user's view and evaluations and what he or she thinks about the product. Ludicsemantic values might have little to do with the inherent qualities of products. Instead, the associations based on ludic values reveal how people "play" with a product and create their own flow of signification. Critical semantic values might indicate how people feel about a product before they actually use it. The MI framework is depicted in Figure 1.

Conclusion

This paper presents the main terms and concepts that are fundamental for an understanding of the MI framework. The text demonstrates that MI aims to cover the possibilities of the semantic qualities of products and interactions that bring meaning and values to people's lives, triggering pragmatic and emotional interactions. It is primarily based on (although is not limited to) the physical interaction with products and contexts.

MI is a response to the gap in design knowledge concerning the relationship between the representational/non-representational dimensions of products and the pragmatic/emotional dimensions of interactions. Its value has been validated in exploratory studies conducted since it was first proposed. The MI framework is also a response to the view that designers should have a more "research-like" attitude and should better understand how people actually interact and respond to products in interactions. Naturally, researchers should seek to provide designers with the models and means to be used in design processes. However, designers also should be able to understand how to collect and analyze people's requirements. The MI framework can help to explore meanings in products for designers who are aware that the current context of design requires a more inquisitive and "on the ground" attitude.

Acknowledgments

The author acknowledges the support for this research from the National Counsel of Technological and Scientific Development-CNPq, and the Department of Industrial Design of the Federal University of Campina Grande-UFPG, Brazil.