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The Use of Product Semantic Approach on Contemporary Industrial Design Practice: Analysis through Design Applications

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Abstract
Nowadays, product design is touching human life in a more rapid development and acceleration than ever, both in terms of technical, technological and production as well as user experience. However, it is seen that many methods applied and investigated in product design are insufficient in terms of product meaning and use alone. Here, the importance of the communication plane of industrial products with users comes to the fore. Product communication, product readability, transferring concepts through the product, interface and signification, product semantics such as form and expression can be revealed with many methods. These methods contribute to user-oriented design by bringing remarkable new approaches to product-user communication. Today, it is stated in the current literature that such applications are among the most expected design approaches from product designers. Contemporary product design is based on experience, needs and communication in the axis of user-oriented design. At this point, it can be observed that product semantics opens up new fields for product designers in terms of designing approach. In this article, the effect of product semantics approach in contemporary product design is discussed and analyzed on design applications. In this way, while examining how product semantics can be seen and understandable results on products as a design approach, some approaches are presented about how it can be handled as a design method.
Keywords: Product design, Product semantics, Product readability, Communication in design, User experience (UX)

Çağdaş Endüstiryel Ürün Tasarımında Ürün Anlambilimisel Yaklaşımın Tasarımda Kullanımı: Tasarım Uygulamaları Üzerinden İnceleme

Özet
Günümüzde ürün tasarımı hem teknik, teknolojik ve üretim açısından hem de kullanıcı deneyimi odaklı olarak hiç olmadığı kadar hızlı bir gelişme ve ivme içinde insanların hayatlarına dokunmaktadır. Bununla birlikte ürün tasarımında uygulanan ve araştırılan birçok yöntemin tek başına ürün anlamlandırma ve kullanımı noktasında yetersiz kaldığı da görülmektedir. Burada endüstriyel ürünlerin kullanıcılar ile kurduğu iletişim düzleminin önemi ön plana çıkmaktadır. Ürün iletişimi, ürün okunabilirliği, kavramların ürün üzerinden aktarılması, arayüz ve anlamlandırma, biçim ve ifade gibi ürün anlambilimi uygulamaları ile ortaya konulabilecek birçok yöntem ile dikkat çekmektedir. Bu yöntemler ürün-kullanıcı iletişimi noktasında dikkat çekici yeni yaklaşımları da beraberinde getirerek kullanıcı odaklı tasarıma katkı sağlamaktadır. Günümüzde bu tür uygulamaların ürün tasarımcılarından en çok beklenen tasarım yaklaşımları arasında olduğu da güncel literatürlerde ifade edilmektedir. Çağdaş ürün tasarımı, kullanıcı odaklı tasarım ekseninde deneyim, ihtiyaç ve iletişim üzerine konumlandırılmaktadır. Ürün anlambiliminin de bu noktada ürün tasarımcılarına tasarlama yaklaşımı açısından yeni alanlar açtığı gözlemlenmektedir. Bu makale de çağdaş ürün tasarımında ürün anlambilimi uygulama yaklaşımının etkisi tasarım uygulamaları üzerinde ortaya konulmaktadır. Bu sayede ürün anlambiliminin bir tasarım yaklaşımı olarak ürünler üzerinde nasıl görülebilir ve anlaşılır

sonuçlar elde edilebileceği incelenirken, tasarlama yöntemi olarak nasıl ele alınabileceğine dair bazı yaklaşımlar da ele alınmaktadır.
Anahtar kelimeler: Ürün tasarımı, ürün anlambilimi, ürün okunabilirliği, ürün iletişimi, kullanıcı deneyimi

1. Introduction

Product semantics is a field of science that has a relatively complex theoretical content and examines human symbolic qualities. The focus of this field is on the use of products in cognitive and social contexts. However, the application of the field of product semantics to industrial products dates back to the 1980s (Krippendorff, K. & Reinhart B., 1984). The realization and spread of the added value created by semantic applications in the field of product design has opened a new field of application that is completely related to contemporary design practice. Today, with the advances in technology, the shape of the objects is no longer directed by the technologies inside (Norman, D. 1998). Semantic expression of products, deciphering the product and its contents, establishing the interest of form and function of usage and forming a correct communication plane with the products, the validity of the mode applications of traditional design understanding is now being discussed (Vihma, S. 1995).

The intersective qualities of design that creates a bridge centered on user experience, semantic values and service features refer to the interdisciplinary qualities of products design as mentioned by (Yum, M.S., 2021). Product semantics is a field of application, which should be considered as a design language and aims to reveal products that can be read in terms of human understanding problems in terms of perception and related usage relationship, in which the semantic structures created by the users are examined (Evans M., Sommerville, 2007). Product semantics is a field of application, which should be considered as a design language and aims to reveal products that can be read in terms of human understanding problems in terms of perception and related usage relationship, in which the semantic structures created by the users are examined (Evans M., Sommerville, 2007).

2. Product Semantics

To be able to see and understand all the concrete and embedded meanings that can be read on the product, to be able to reconstruct the formation, formation and reconstruction of the meaning-bearing event and process and thus to be general, abstract and universal; in other words, the effort to create a simple, coherent and all-inclusive theory is among the general objectives of semantics (Bayrakçı, O, 2004). Product semantics is generally defined as a field of research and discipline that deals with what the objects of use mean, the symbolic qualities of the product, and the psychological, social and cultural status of their use (Krippendorff, K., 1992). Product design methods create intersections with semantic approaches and combine the symbolic functions of products in a transitional structure with areas traditionally known and applied by designers such as physical, ergonomic and aesthetic functions (Bayrakçı, O, 2004). It can be said that the semantics of these combinations constitute a scientific basis for the development of applicable methods on products.

Product semantics offers a new field of application in design. Today, people live in a period when they do not respond to the physical properties of objects. It is accepted that users think what the products mean to them. At this point, some communication problems begin to appear at a basic level. Although simple and clear, this observation gives product designers the opportunity to rethink their design tasks in the design process and develop their own product communication language (Krippendorff, K., 1984).

Traditionally, industrial product design is defined by the concrete nature of the productions it proposes and the industrial production and collective consumption it supports. This approach is guided by many analytical variables such as industry standards, conditions, technology, materials and production methods. At this point, user-centered design, which is the main focus of contemporary product design, draws attention. The basis of user focus is the approach that includes many abstract concepts such as user satisfaction, usability, product legibility, affordance, meaning structures, meaningfulness, interface and motivation, which define and reveal itself between product and user (Evans M. and Sommerville S. 2007).

All these areas within the product semantics give product designers a unique role in the collaborative design approach of material culture; it offers an empirical field that offers virtually unlimited application possibilities for research and reflection in the field of design (Jordan, P.W., 1999).
The product semantics, however, acknowledges that meanings do not provide objective equivalents of universal value and cannot be matched with certain forms. Forms can have very different meanings in different cultures, social groups or individuals in different contexts. Product semantics is a way for the designer to deal with many interfaces between people and their designs that play an important role in the process of meaning (Krippendorff, K., 1984).

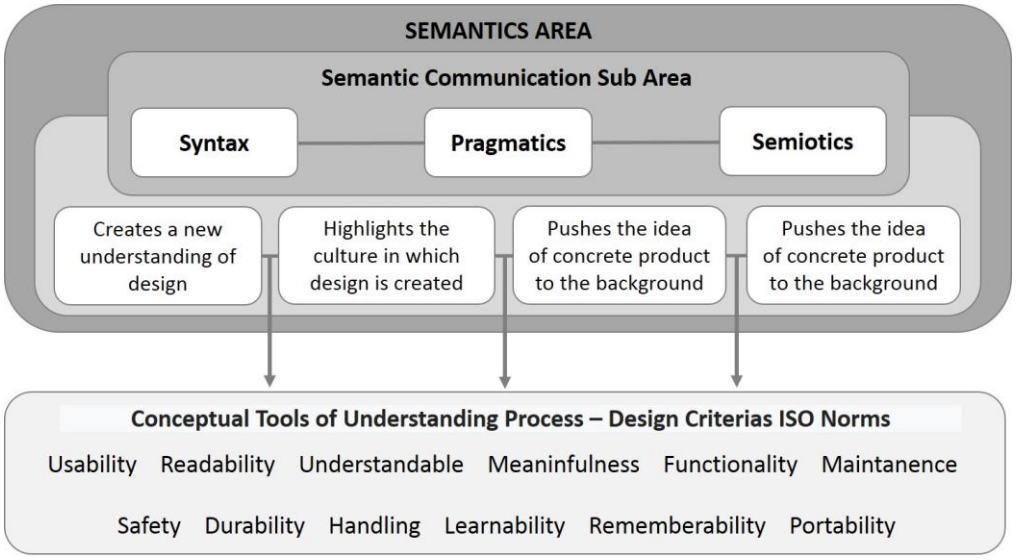


Figure 1. Characteristics of product semantics

a variety of design opportunities in terms of differentiation, originality, segregation and innovation in design activity. Product semantics do not show the designer a special way of shaping the design activity. The communication channels provide a rational and consistent point of view to the design problem. It tries to reach generalizations that will direct the design concept. Each design is influenced by the demographic structure in which it is created and the cultural past of the designer. In this case, it inevitably leads to a feature that highlights the culture in which it is made.

Product semantics basically considers products as a means of establishing specific interactions with the user. Therefore, it pushes the view that the result of the design activity is a concrete product. Semantics is said to be related to the generalization of phenomena on which the product is observed and evaluated by the user rather than the design of the product. While the engineering fields of production have concrete realities such as materials and technology, there are no concrete, hand-held numerical realities in the designer's hands when making decisions about the shape of the product. Product

semantics at this point, the technical function of the concrete product and user groups to create an interest that creates interest (Bayrakçı, 1985). The conceptual tools of the comprehension process shown in Figure 1 can be used to explain scientific and concrete expressions and their qualifications for product semantics. These conceptual tools are guiding in explaining the qualities of product semantics by having deep explanations in the design literature.

3. Concept of Readability in Product Semantics

The concepts of product legibility bridge the form and function under the semantics science, which is one of the main communication channels between the product and the user. The discipline of Industrial Product Design shows an attitude in an effort to authenticate the semantics field under the title of Anlam Product Semantics ".
Semiotics and product semantics, which are discussed in the fields of design, provide original explanations for the problems specific to the field of design, while on the other hand, industrial products are considered as a concept and problems related to the pre- and post-use processes between user groups and the product are discussed (Barthes, R. 1994).

Semantics becomes important with the concept of readability and sub-expressions and expressions of this concept in terms of explaining the communication paths between the product and the user. "Products" is defined as "Object" in the semantics field.

The object is described by Eco as "Something useful" (Eco, 1972). According to this definition, although the object at first glance shows a purpose, the so-called function is completely impregnated. The object has always had a meaning. In order to explain this situation, Barthes stated that nesne there is no object that can get rid of meaning "(Barthes, 1979). At this point, product legibility finds its place under the discipline of industrial product design in the study of the meaning structures of everyday use objects. Through the interpretation that meaning can only exist on a form, it can be seen that the concept of readability plays an active role as a communicative structure in the perception and interpretation of the existence of meaning on forms.

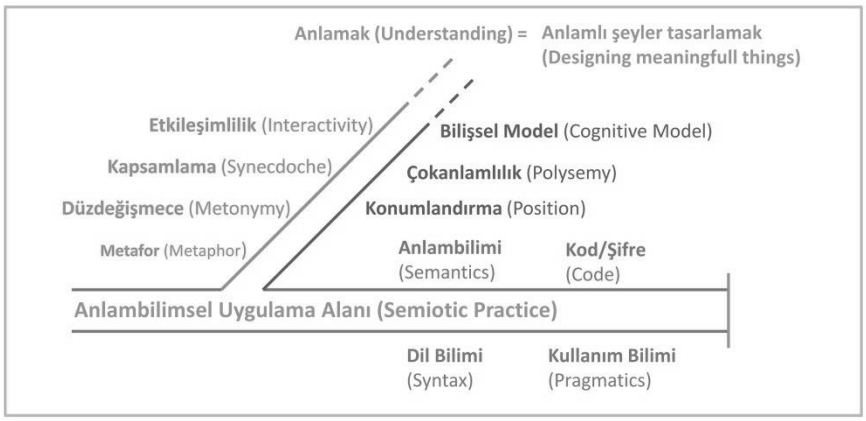


Figure 2. Semantic application and interaction areas (Krippendorff, 1992)

All the structural aspects of the products and semantic messages transmitted over the product are expected to be readable in the form of a communication plane in the user groups. These readings take place in certain circumstances under the direction of the cultural and social environment in which the product world is located and used. In Figure 2, Krippendorff illustrates the concepts articulated and used to design meaningful things within the semantic field of application. Here, the main problematic is "understanding". It is stated that the meaning processes can be solved at this point with the communication planes underlying the semantics. These concepts and technology seem to prevent significant communication between the product and the user. It is seen that product

readings will provide a significant convenience by giving systematic and measurable values in reestablishing communication between product and user. On the basis of the emergence of scientific and academic studies on semiotics developed under the field of semantics, which is called the communication age, problems in product-user communication mentioned above can be seen (Eco, 1977).

Krippendorff defines product semantics as "the examination of the symbolic properties of the meaning and use of goods in the psychological and social context"(Krippendorff 1984). Krippendorff also argues that engineers can be held responsible for the technical functions of the product and designers can be responsible for shaping the product in terms of communication. At this point, the responsibility for communicating between product and user groups is directly stated in the product design event. It is also stated that the losses in the communication structure should be handled in a new systematic structure.

Today, the uniformity seen in design products has created a monotonous which can be called as lack of description and story on the products. McCoy describes this as the process of transforming products into black boxes (McCoy, 1990). Technology has created a wide playground especially in the process of interpreting design to designers and presenting original results. The unbreakable ties between this shape-form and function have led to stretching and occasionally to break in some advanced technology products. Competitive market economies and capitalist order have led to the introduction of many products that have experienced a lack of communication between the user and the product, ignoring the loss of meaning, deciphering and usage information experienced by the users on the products (Blaich, 1990).

When the design trends of the 21st century are considered within the scope of the responsibility of the designer, it becomes compulsory to review this lack of communication with the products. The undeniable breadth of the possibilities provided by the technological infrastructure is considered as an advantage and is used more effectively in the design process (Bürdek, 1989). From this perspective, data on product legibility necessitates the strengthening of the indicators of the products in the product design process and using them as a tool for structuring user - product communication.

4. Design Studies in Product Semantics

With the introduction of product semantics in contemporary product design, the studies taking place in three areas are remarkable. These are:

- Studies on Theory
- Studies for Interpretation
- Practical Studies

Studies on theory, Klaus Krippendorff (Krippendorff, K., 1984) is the name of the center of the field due to his past studies on product communication, the name of the product semantics and the theories and conceptual models he developed. In addition, Hans Jürgen Lannoch (Lannoch, H, Lannoch, H.J., 1989) draws attention with his theory examining spatial perspectives in the field of product semantics.nWhile Uday Athavankar (Athavankar, A. Uday, 1989) stands out with its applied classification theory that can be used in product design and design education, this theory shows that it is the closest theory to industrial product design.

Most of the studies in the field of product semantics aim to bring new interpretations to existing theories from different perspectives. Although some of the comments have application-related content, they may be intended for educational purposes, methodological purposes for product design and analysis.

Studies for interpretation Technological, descriptive, behavioral, identity, can be counted as studies in the context of narrative reality (Bayrakçı, O, 2004).

Semantics in practical studies consists of unique analysis. Likewise in the field of product semantics; product analysis, product profile analysis, product meaning analysis are the applications specific to this field. The field of contemporary linguistics, semiotics and semantics is comprised of studies on the descriptive level. Under the heading of practical studies, there are also product designs based on educational applications and method suggestions for product design and product semantics propositions.

The first example of using product semantic perspectives directly for product design can be seen in the designs of Philips from the Netherlands after 1984. Robert Blaich, who joined Philips in 1980 as the company manager, mentioned that the "company communication identity was very uncertain at that time and determined that consumers find Philips' products robust and durable but boring.

Blaich started to use this approach in product design after he met with product semantics in 1984; By means of semantic tools such as "mertaphors" and "analogical", it is possible to give information about the content of the product, while at the same time it is possible to realize a visual expression that enhances the function of the product. With these approaches, Blaich's radio-cassette designs based on the "Roller" and "Moving Sound" product concepts have led to sales of up to two million units. Blaich stated that he uses product semantics applications to increase product sales. "Product Semantics Sells" was also seen to shout slogans.

Picture 1. Phillips "Roller" radio-cassette player

From the semantic point of view of the design of the Phillips "Roller Radio", we see that the loudspeaker sections are designed in a circular motion with a rotating pair of wheel folds metaphor. In terms of interface, the control sections are grouped in two different areas; radio-cassette controls the cassette section and frequency range, audio, balance, such as the settings are divided into the section. In terms of form, it is seen that the functional parts are visually separated, grouped and become more easily communicable in terms of product-function in user care. It can also be read on the product that it carries codes that refer to a young audience in terms of color codes and overall appearance. Introducing the music listening experience in a product form language that includes concepts such as fun, cheerful, moving, friendly, simple, easy to understand, portable and meaningful, enables us to put forth an effective product semantic approach in terms of product communication and user satisfaction. We can consider that product semantic design approaches underlie the internalization of the related product for the user and finding a good and solid place in the usage life.

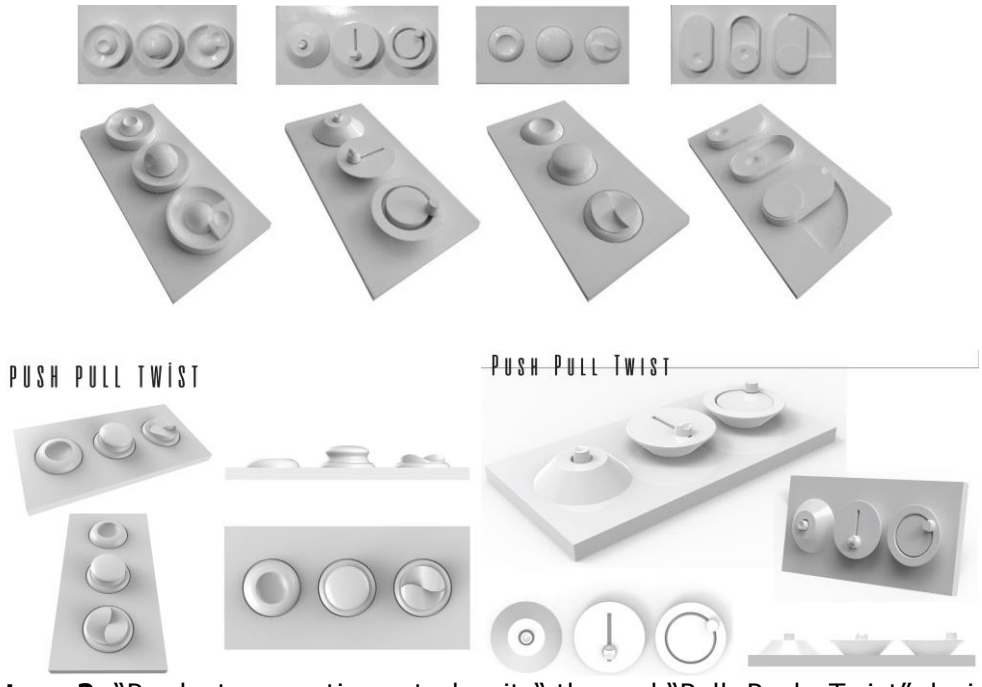
5. Product Semantics Analysis on Design Applications

First of all, it is necessary to examine why product semantics is used in design applications. The reason for this is that this field of application is not only about creating formal changes in products. Participation of the product semantics in the design process also includes revealing the responses that directly address the user's perceptions, meaning structures, emotions, feelings and experiences, in short, visible on the product. In this sense, we can say that the form of a product is the scope of the concepts, functions and product identity as a whole through which the designer wants to be explained and conveyed. The concept of form and function is an integrated and inseparable structure. Today, beyond the mere function of form, it exhibits a multifaceted structure surrounded by cultural influences, product semantic approaches and communication concepts. The design application studies presented in this article include the studies carried out with eight students from the fourth year students of the Department of Industrial Design, Istanbul Commerce University. These studies were grouped into three main groups. These are:

1- "Pull, Push, Twist: Product semantic control units" Study
2- "Semantic Transformation" Study
3- "Semantic Identity Transfer" Study

5.1. "Pull, Push, Twist: Product Semantic Control Units" Study:

In the first study, it was asked to create a family of three control elements; This is achieved by creating forms that communicate to a user in the form of "Pull, Push, Twist". At this point, the situation that makes this work difficult, the control elements in three different functions, semantically transferring their functions to the user in the most accurate and short way, at the same time to create a case of belonging to the same family has created the case of belonging. This work is in essence a deceptively simple work; it can be easily realized that creating forms that can only function typographically is not an easy task. The whole work is presented in one color and no written or graphic explanation of the different control functions is allowed. This, in terms of user - product communication, helps to form the semantics in the recognition of the function in terms of clarity, simplicity and meaningful reception of indicators. With this study, the power of form to explain itself is tested.



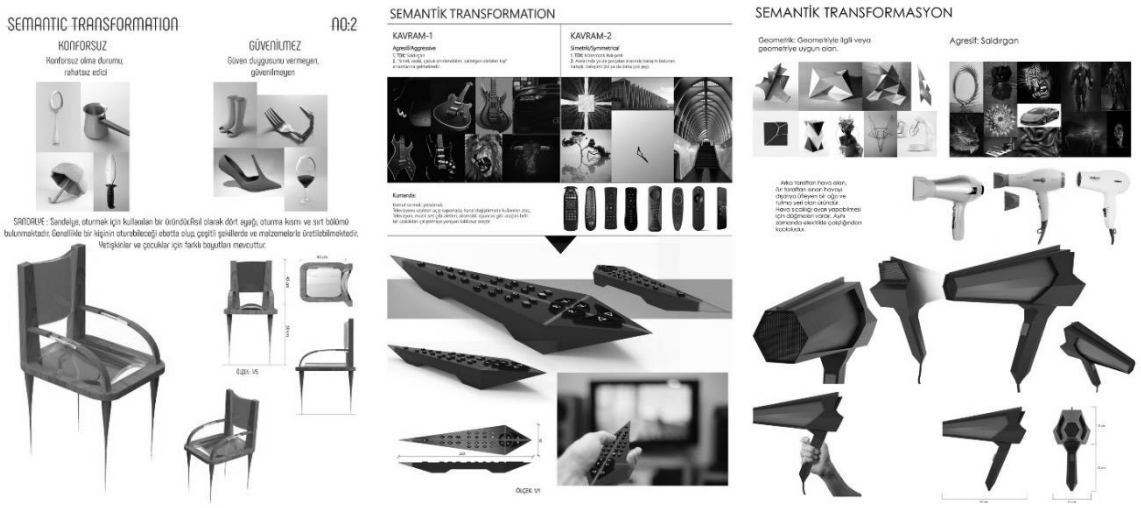
Picture 2. "Product semantic control units" themed "Pull, Push, Twist" design applications

5.2. "Product Semantic Transformation" Study:

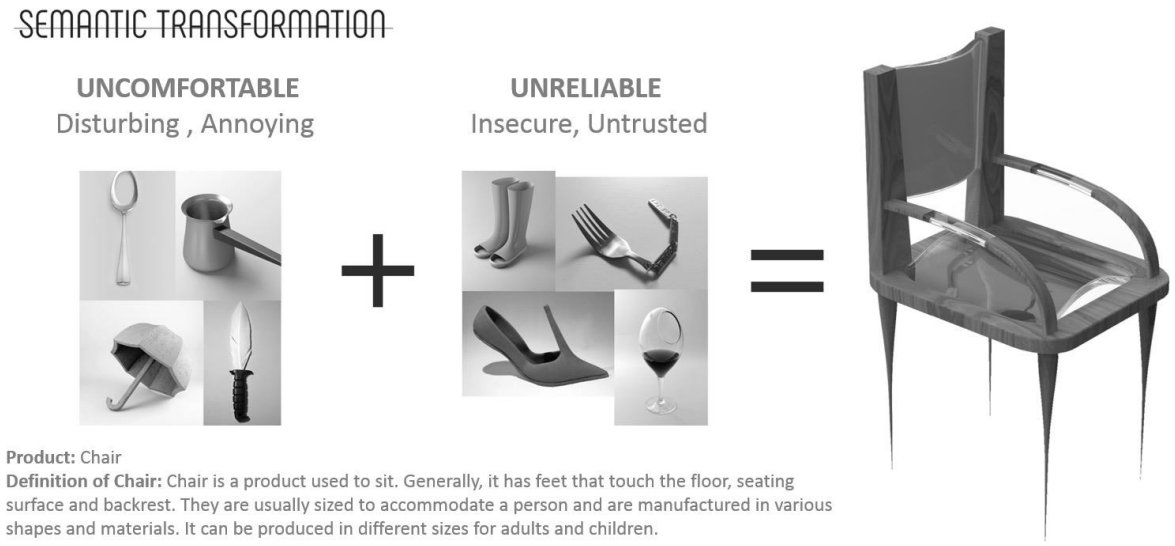
Göstergesel Kavramlar | Visual Indicator (Sign) Concepts				Product List
Sosyal Değer ve Konumlama Social Values and Position	**Kullanılabilirlik ve Etkileşim** Usability and Interaction	**Form /Biçim Kalitesi** Qualities of Form	**Kişilik Özellikleri** Personality Characteristics	
(SVP) (n=5)	**(UI) (n=7)**	**(QF) (n=6)**	**(PC) (n=10)**	
Güncel | Contemporary **Geleneksel** | Traditional SVP-1	**Anlaşılır** | Clear **Karışık** | Confusing UI-1	**Elegan** | Elegant **Elegan Olmayan** | Inelegant QF-1	**Çekici** | Attractive **İtici** | Repulsive PC-1	Hair Dryer
Yüksek Sınıf | High Class **Düşük Sınıf** | Low Class SVP-2	**Kolay Kullanılan** | Easy to Use **Zor Kullanılan** | Difficult to Use UI-2	**Organik Biçimli** | Organic **Geometrik Biçimli** | Geometric QF-2	**Agresif** | Aggressive **Sakin** | Submissive PC-2	Flashlight
Yüksek Tek. | High Tech **Düşük Tek.** | Low Tech SVP-3	**Konforlu** | Comfortable **Konforsuz** | Uncomfortable UI-3	**Süslü** | Omate **Sade** | Plain QF-3	**Sessiz** | Quiet **Sesli** | Noisy PC-3	Water Flask
Pahalı | Expensive **Ucuz** | Cheap SVP-4	**Güvenilir** | Reliable **Güvenilmez** | Unreliable UI-4	**Yenilikçi** | Innovative **Taklitçi/Emite** | Imitative QF-4	**Yaşlı/Olgun** | Mature **Genç/Toy** | Immature PC-4	Iron
Küresel | Global **Yerel** | Local SVP-5	**Kütleli/Hacimli** | Robust **Zarif/İnce** | Delicate UI-5	**Kompakt** | Compact **Geniş/Büyük** | Large QF-5	**Heyecanlı** | Exciting **Sakin** | Calm PC-5	Wristwatch
	Pratik | Practical **Pratik olmayan** | Impractical UI-6	**Simetrik** | Symmetrical **Asimetrik** | Asymmetrical QF-6	**Kadınsı** | Feminine **Erkeksi** | Masculine PC-6	Teapot
	Güvenli | Safe **Tehlikeli** | Dangerous UI-7		**Arkadaş Canlısı** | Friendly **Sevimsiz** | Unfriendly PC-7	Camera
			Sıradışı | Extraordinary **Sıradan** | Ordinary PC-8	Desk Lamp
			İlginç | Interesting **Sıkıcı** | Boring PC-9	Television Remote
			Fütüristik | Futuristic **Nostaljik** | Nostalgic PC-10	Toaster
				Chair

Graphic 1. Indicative concepts and product list

In the second study, two different concepts will be crossed between the indicative concepts given in Graph 1 and a new product will be designed with a product semantic approach. In addition, the function and user analysis of the product to be selected from the list in Chart 2 was requested. In Graph 2, the functional causality of the selected product is maintained. Two different indicative concepts selected from Graphic 1 are used and it is aimed to make these concepts "readabl" on the product. At the beginning of the study, it is also desirable to visualize the selected product as an indicator in Saussure's tripartite indicator theory.



Picture 3. Three different semantic transformation design applications



Picture 4. Product semantic transfer application over "Chair" product using "Uncomfortable" and "Unreliable" concept pair

If we examine the design application in Figure 4 with explanations: In this study, "uncomfortable" and "unreliable" concept pairs were selected from Graphic 1 and these concepts were tried to be transferred through "chair" product through product semantic transformation. In order to make both concepts readable, firstly, a research has been put forward on the linguistic origins and meanings of the concepts. Afterwards, a moodboard study was conducted to reveal and evaluate the formal character of the concepts. In order to reflect the concept of "uncomfortable" in terms of product semantics, the sitting and backrest sections have been introduced in a convex form. This has been attempted to reflect the uncomfortable feeling of the user while reading and evaluating the use of the product, and to convey a sense of uncomfortable and uncomfortable experience if I sit in a chair like this.

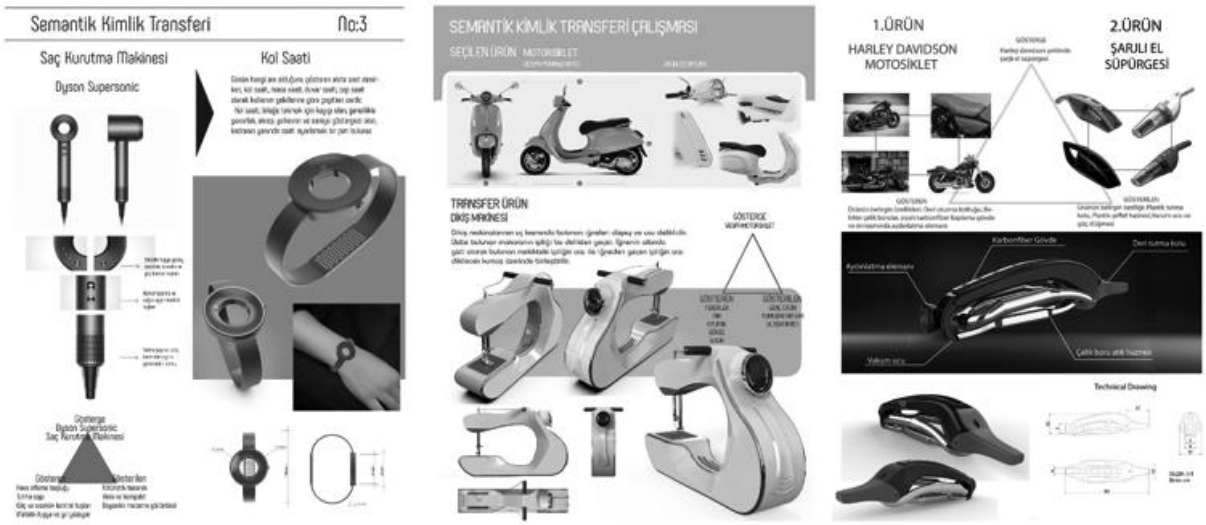
In addition, in order to reflect the concept of "unreliability", the foot sections of the chair have been reduced from the required section thickness to a very thin section thickness. This structural view tries to put forward the concept of "unreliable" at a readable level by establishing a semantic communication that the user can break the legs if he or she sits in this chair. Another important approach at this point is the transfer of the chosen concept pair as a sample product of the chair product while keeping it in a recognizable plane. As long as the chair product example is recognized as an indicator, product semantic transformation can be realized. If the chair example is presented as a new example and it is not recognized by the user as an indicator, it is not possible to read the selected concept pair on the product.

5.3. "Product Semantic Identity Transfer" Study:

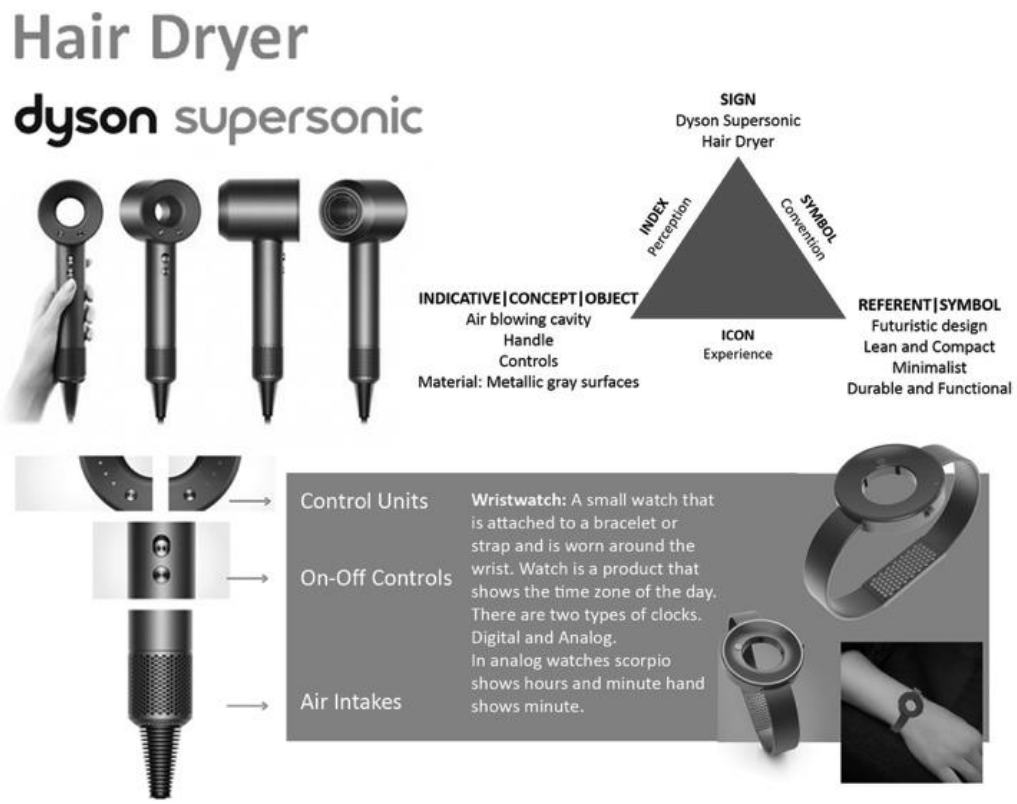
Corporate identity; expresses the identity of an enterprise, organization. The behaviors of the employees in the organization consist of the communication forms, philosophy, products, services and visual elements of the organization (Okay, A. 2003). In semantic identity approach, product form is defined as a set of perceptual and visual clues. The group of formal units that make up the product form is directly related to visual cues, a particular concept, or a specific essence. The most frequently used visual cues on the product are the product meaning profile and class identity. The product whose semantic identity is examined is called as the central member in the literature. The choice of visual cues the designer obtains from the product at the point of loading the semantic identity depends on what it refers to as the product meaning profile. The more formal and

semantic references the central member makes, the closer the final design proposal will be to the central member (Bayrakçı, O. 2004).

A product that includes an industrial product and has a reference to another field outside its own production and market area; The aim of the course is to carry out identity transfer and identity loading studies with a semiotic approach such as corporate identity, form repertoire (form, shape, line, color, texture), product language and design language.



Picture 5. Example of Three Different "”Product Semantic Identity Transfer" Applications



Picture 6. Design Application of "Product Semantic Identity Transfer to "Wrist Watch" Through "Dyson Supersonic" Brand and Model Hair Dryer.

In the first stage of the Product Semantic Identity Transfer design application shown in Figure 6 and "dyson"was chosen as the product brand. In the second stage, the "Supersonic hair dryer" in the product range of the "Dyson" brand was selected. After this point, it was requested to select a product belonging to a product range not produced by that brand over the selected brand and the product of the brand. The product selected in this study was the "wrist watch". First of all, the product analysis of the selected brand has been carried out in many aspects such as function sections, general appearance, general character, material, color, texture, function, and in other aspects, brand identity and product identity have been examined. The institutional traces and identity clues obtained from the research and investigation stage were tried to be transferred onto the chosen wristwatch product. By transferring the identity elements of the Dyson Supersonic transfer hair dryer to a different product, it is aimed to expand various possibilities in order to achieve results such as innovation, conceptual transfer and formal originality in the field of product semantics.

6. Conclusions and Explanations:

Throughout history, we know that the knowledge that every innovation emerges from a need is one of the basic explanations. Communication, comprehension, comprehension and reading are also important building blocks for meeting specific needs. In this respect, when we look at the history of concepts, explanations and applications within the theoretical infrastructure of semantics, it is understood that it is a very new field of research and application. The need to understand the environment, abstract and concrete phenomena and objects of the phenomenon of communication starting with linguistics, and the development of semiotics and the developments from there to semantics have always been put forward in line with needs. In this respect, when we focus on product semantics, which is a sub-subject of semantics, it sees the objects of daily use as indicators and says that it is the subject of certain meanings, paves the way for a new way of thinking and application in the field of contemporary product design.
It is essential to design products with initial goals on functionality and service in order to provide user experience outcomes (Yum, M. S., 2021). We commonly define an object as 'something that works'. Accordingly, at first glance, the object can be perceived as completely swallowed away in what is called a function in a direction of use. However, each object has certain social, cultural and personal meanings that are articulated and existed with different possible functions of use. At this point, the importance of products to communicate with the user comes to the fore. It is also seen that the design and manufacturing applications known today are inadequate to design products that can be internalized by the user. At the beginning, technological breakthroughs start to cover the communication planes and semantic structures of the products. At this point, the possibilities of product semantics as one of the new design approaches can play a key role in achieving remarkable innovations in products in terms of added value it creates in product-user communication, function description, user satisfaction, usability and product readability.

Above; "Pull, Push, Twist: Product Semantic Control Units", "Product Semantic Transformation" and "Product Semantic Identity Transfer" studies and product semantics in the field of science-oriented studies in terms of different applications, innovative thinking, communication-oriented design approach to focus is aimed at. These studies have been tried to put forward by analyzing with the design applications how the theoretical knowledge infrastructure of product semantics can be used in contemporary product design. In the case that there is an individuality of the sign and signification which is indicated by semiotics, different approaches, propositions and applications that can be put forward in the field of design through product semantics can be multiplied over time. This situation may contribute to the literature and application area in terms of application diversity. At the beginning, technological breakthroughs start to cover the communication planes and semantic structures of the products. At this point, the

possibilities of product semantics as one of the new design approaches can play a key role in achieving remarkable innovations in products in terms of added value it creates in product-user communication, function description, user satisfaction, usability and product readability.

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