

# Affordances of intimacy: the extended self in human-environment interaction

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**Abstract.** This paper organizes theoretical contributions from different disciplinary areas, in order to investigate the issue of intimate relationships that individuals establish with some elements of the environment. The theme of the relationship between the self and the external environment is explored through an ecological approach, in order to obtain insights in understanding the phenomenon of human-product interaction. The aim is to offer a theoretical framework that could help to identify useful principles and guidelines for design.

**Keywords.** Intimacy, Affordances, Self-boundaries, Human-environment interaction

## 1. Introduction

As technology enters people's personal space at various levels of intimacy: from the domestic sphere, in the form of service, nursing or entertainment robots, to handheld devices, wearable technologies, and prosthesis, a growing body of research argues the need to make them accepted [1, 2, 3, 4].

Moreover, new and emerging technologies have been appropriated to mediate close personal relationships. In particular, we observe this appropriation with the video chat systems, which allow distance-separated family members to interact, providing a feeling of connectedness. Examining these practices, a number of studies have tried to understand what design factors would be critical for the improvement of these systems [5, 6, 7].

Even though intimate relationships can be recognized as emerging in human-environment interaction, in this stream of literature it has not been explicitly studied how intimacy can arise in the relationship between people and products, and what are the characteristics of objects that lead subjects in establishing this kind of bond with them. My aim is to contribute to these theories with a theoretical framework that could help to identify useful principles and guidelines for design.

This paper is organized as follows. First of all, I will take into account the contributions coming from psychology on the theme of self-boundaries, which is crucial in understanding intimacy both interpersonally and in the relationship with objects. Then, to deepen the material and measurable aspects of personal space, I will talk about proxemics. Subsequently, I will consider some theories from social psychology on interpersonal relationships, identifying a general definition of intimacy

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that could be used to study the phenomenon of intimate relationships between people and objects. I propose to address this notion of intimacy through an ecological approach, suggesting that applying the theory of affordances to its full potential, makes it possible to explain intimacy between people and objects, as it has been observed in some recent experimental studies in design.

## **2. Self Boundaries**

Studies in psychology show that the distinction between the self and what is external to the self is not clear, it is gradually learned since childhood and undergoes continuous variations [8].

Many authors agree that self-boundaries should be placed outside the body's limits and that they can extend to include objects, people and concepts physically placed in the external world [9, 10, 11].

For example, James argues that, even if it is difficult to distinguish between "what a man calls me and what he simply calls mine", the self, in the widest possible sense, can be defined as the total sum of what a person can define his or hers. In fact, "we feel and act about certain things that are ours very much as we feel and act about ourselves", and those things arouse in us "the same feelings and the same acts of reprisal if attacked". With regard to the material self, which he distinguishes from the social and the spiritual ones, James says that it includes the body in its inner part, as well as clothes, family, home, and all the material goods with different degrees of intimacy [9, p. 183].

Commenting on the social aspect of the self, Cooley extends its boundaries to everything that can cause the specific emotions of the ego, that is pride and shame [10]. Making reference to extensions of the ego, Allport explains that they can be also identified with moral, religious and political values [11]. Psychoanalysts refer to introjection and emphasize the process of psychic appropriation of objects or people in the external world [8].

The relationship between the self and the external environment is thus a complex and interdependent one, constituted by continuous interacting influences. Based on various factors, some relating to the person and some to the external environment and the situation, people control the amount of contact with others, trying to achieve a desired level of access to the self. As Pedersen claims "too much or too little interaction compared to the optimum desired is unsatisfactory. Too much is experienced as an invasion of privacy, and too little yields loneliness and alienation" [12].

## **3. Proxemics and Personal Space**

The phenomenon described above has also been observed in studies on proxemics, which is concerned with people's organization and use of space, and deals with these phenomena through the study of the distances that people maintain around themselves. These distances indicate the type of relationship an individual intends to establish as well as the dual function that personal space has: that of protecting and of communicating [13].

The protective function of personal space, which was first studied by ethologists, refers to the fact that animals maintain a certain distance from their peers and from members of other species based on their age, size, sex and other factors, in order to protect themselves from intruders [14, 15, 16]. Hediger identified and described the gradient of these distances as Social distance, Personal distance, Critical distance, and Flight distance [14]. The terminology he used was partly and subsequently adopted by other authors, in particular by Hall, who described the system of distances observed between humans as Public distance, Social distance, Personal distance and Intimate distance [17].

The communicative function of personal space is of importance from Hall's anthropological perspective that defines "space as a system of communication" and coins the term proxemics to indicate studies that deal with "man's use of space as a specialized elaboration of culture". In this regard, the author focuses on intercultural differences, arguing that "people from different cultures not only speak different languages, but inhabit different sensory worlds" [17].

Although the conditioning that each of us receives from his/her particular culture is undeniable, the theory of modularity of mind and Gibson's theory of direct perception have provided evidence of inter-subjectivity in the relationships between the individual and the environment [18, 19].

#### **4. Intimacy in interpersonal relationships**

In social psychology, the concept of intimacy is closely linked to that of privacy, which refers to the mechanism of regulation of exchanges that take place between the self and the outside world, and thus can be defined as "a boundary control process" [12].

Intimacy can be seen as a specific level of privacy [12, 20], in which the most relevant boundary is not the one referring to the person's self, but the one enclosing a small group. The members of this group reduce contact with outsiders while increasing interaction between them. They share private information and develop joint projects and goals, in a relationship of interdependence.

One of the key aspects in the establishment of intimate relationships is the process of self-disclosure, through which a person makes his/her own self penetrable by another person. More precisely, according to Aron, Mashek and Aron, "in a close relationship the other is, to some extent, part of the self" [21], which means that an intimate relationship is accomplished by including other in the self.

As a consequence, the main feature of an intimate relationship is the gradual shift in perspective from one of "me and you" to one of "us". This determines the emergence of a new system with its own unique properties, based on the presence of interpersonal premises and expectations [22]. Indeed, according to Chelune, Robison and Kommor, "intimacy is a relational property. It does not lie within a person or in a situation, but emerges out of their interaction. It is a characteristic of a system, which influences and is influenced by its components" [22].

#### **5. An ecological approach to intimate relationships**

If intimacy is a relational property emerging out of interaction, it can be addressed through an ecological approach. This perspective, as described by Gibson, is based on

the principle of mutuality of animal and environment, according to which, the individual and the environment are not to be regarded as separate entities but as parts of a whole system [19]. Thus, in order to understand how a certain animal lives, we have to consider its integration in its own ecological niche, which means to conceive the characteristics of the animal and that of its environment relationally. Building on this assumption, Gibson describes the ecological niche as a set of affordances, that are action possibilities emerging from the union between person-related and environment-related aspects that are structurally proportionate.

The affordances are meanings specified in invariant structures, and they can be perceived directly, through “a process of information pickup” [19, p. 147], since “egoreception and exteroception are inseparable” [19, p. 116]. In other words, the information to specify the environment always accompanies that to specify the self, and we can perceive the first in relation to the second because they are structurally proportionate. For example, “The shapes and sizes of objects are perceived in relation to the hands, as graspable or not graspable, in terms of their affordance for manipulation.” [19, p. 224].

Given that the environment provides multiple affordances, what determines the type of interaction that will occur is the ubiquitous and continuous process of selection that an individual has to implement [23]. The appraisal of the opportunities provided by the environment is also at the basis of the act of approaching. Indeed, according to Gibson, the distances we keep are important for maintaining our safety and also to “obtain beneficial encounters” [19, p. 232]. In order to comprehend the kind of distance that should be maintained, the individual must be able to distinguish a positive affordance from a negative one, thus relationships of proximity are based on the perception of positive affordances.

Another key principle of the theory of affordances, which is important to keep in mind, is that the perceiver should be considered as a whole, hence rejecting the dichotomy between body and mind and conceiving perception as “a psychosomatic act” [19, p. 240]. This principle leads us to understand that a positive affordance can be determined not only by the functional value of an object but also by other object’s values. As Overbeeke and Wensveen claim “if affordances are about meaning, they are not just about functional meaning; they do not only fit our perceptual-motor skills, but also our emotional and cognitive skills. Man as a whole should be respectfully embraced” [24, pp. 93-94].

The establishment of an intimate relationship, on the basis of the functional value of an object, can be observed in the case of the interaction with tools: “when in use, a tool is a sort of extension of the hand, almost an attachment to it or a part of the user’s own body, and thus is no longer a part of the environment of the user” [19, p. 41].

In the same way, relationships of intimacy can be established through the union between expressive meanings and psychological capabilities. In a recent study on music perception based on the ecological approach, Krueger claims that music is a structured sound-time phenomenon with an instrumental value: it affords movement through emotion regulation. Moreover, he states that in everyday life we perceive music “as a resource we can use to do different things, much the same way we perceive tools and technologies as resources that help us accomplish different tasks”, and that “we potentially use music to become part of an integrated brain–body–music system” [25, pp. 1-2].

In “The ecological approach to visual perception”, Gibson takes into account this kind of meanings addressing them as “subtle invariants”, and gives us an example

describing the act of kissing someone: “to kiss someone, magnify the face-form, if the facial expression is amiable, so as almost to fill the field of view” [19, p. 233]. According to Gibson, “the value is clear on the face of it, as we say, and thus it has a physiognomic quality in the way that the emotions of a man appear on his face” [19, p. 138]. With Gibson’s reference to physiognomic qualities, the role of Gestalt psychology in the formulation of the theory of affordances becomes clear. Indeed a positive affordance has the same attractive value of the concepts of “demand character” and “invitation character” or “valence”, developed respectively by Koffka and Lewin [26, 27].

Finally, we must remember that, as shown by experimental studies of Michotte on causality, and Heider e Simmel on interpersonal perception, the recognition of physiognomic qualities does not happen only in the case of the interaction between people or between animals, but also in the observation of inanimate objects [28, 29].

## **6. Intimacy with technologies**

In design literature, the term intimacy appears in some recent studies on robots and ubiquitous computing [30, 31].

Bell et al. describe three possible manifestations of intimacy: “1. Intimacy as cognitive and emotional closeness with technology, where the technology (typically unidirectionally) may be aware of, and responsive to, our intentions, actions and feelings. Here our technologies know us intimately; we may or may not know them intimately. 2. Intimacy as physical closeness with technology, both on the body and/or within the body. 3. Intimacy through technology: technology that can express of our intentions, actions and feelings toward others” [31, p. 2].

If intimacy, understood as the presence of certain objects in the private sphere of people is a matter of fact, it is important to understand the extent to which people accept this presence and what types of relationships they establish.

Some experimental studies have observed the rise of strong engagements between people and domestic robots, such as entertainment, nursing and service robots [1, 3, 4, 30, 32]. Many of these works have found that people tend to attribute human qualities to robots such as name, gender, ethnicity, personality, and even cognitive or emotional states, interpreting their behavior as if they were governed by rational choice and desires.

The attribution of anthropomorphic or zoomorphic features to the robot “may engage them in a humanlike interaction, which implies politeness, reciprocity and self-disclosure” [4], thus favoring intimate relationships. Considering the studies in experimental psychology previously observed, the recognition of these qualities in inanimate objects could be due to movement or interactional patterns.

## **7. Conclusions**

Intimate relationships consist in the emergence of a new system given by the union between person-related and environment-related characteristics that are structurally proportionate. This union may be related not only to the individual's physical abilities and object's functional meanings, but also to emotional skills and expressive meanings. As explained above, the more object's features are proportionate to personal ones, the

more the boundary between them become negligible, making it possible to consider them as parts of a whole system.

Since individuals differ in respect to each other in many aspects, for the purpose of design, it will be necessary to identify the parameters that must be susceptible to possible customization. Therefore if “an affordance is an invariant combination of variables” [19, p. 134], and intimacy can be addressed in terms of an affordance, future research should look for the variables involved in intimacy to understand whether and how they are configured in an invariant structure.

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