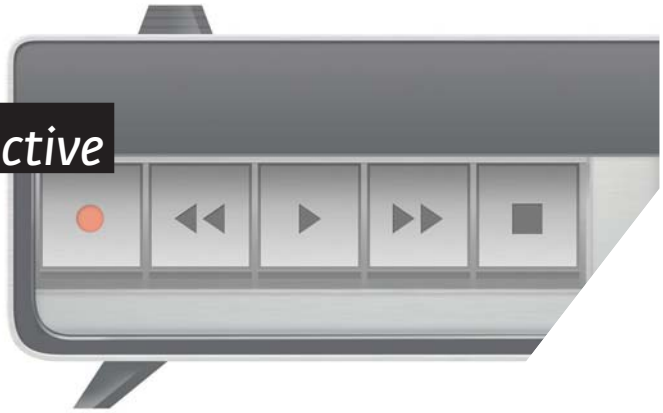
THE GESTURE AS AN ICON
Analysis of the Evolution of Interactive Elements in the Digital Field



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In the digital field, the evolution of interactive settings has always been linked to technological progress and the settling of collective use experience. Currently with the arrival of smart mobile devices we attend to a new stage in the evolution of digital settings. The icon, frequently established as key to all interaction in operative systems, has given way to new communicative resources capable of coexisting and structuring different use experiences in the service of information.

KEY WORDS: GRAPHIC DESIGN/INTERFACE/DIGITAL/MOBILE APPLICATION/TELEPHONE/TABLET/TACTILE/ICON.

The relationship between technology and user through interactive settings poses an interesting field of research. In recent years, massive social adaptation of smart mobile devices has generated a vast field for graphic experimentation. Symbols and icons, present from the beginning of domestic technology, have undergone a process of graphic, semantic evolution based on the synthesis that makes us consider the future of these cross-media elements. Is the tactile media surpassing the communicative system which has been dominant in the digital field since the 70s?

From the domestic technology boom after the industrial revolution human beings have been surrounded by machines and devices that have formed a visual grammar installed in the collective imagination. These objects, having one or several specific functions, relate with the user through the elements of interactive features such as buttons, levers, switches, menus, etc. In each act of reading an object, the user needs descriptors and symbols to give meaning to these elements which conform an interface. Thus such elements facilitate comprehension of the use of the machine. The digital field, riddled with iconograqhic elements from its beginning has used symbols and metaphors to allow connection between the individual and the machine. Paradoxically, technology has used the more primitive communication systems, such as symbols, to represent the functions of its more advanced devices.[1]

The icons we find in technological devices conform single elements provided with meaning, since they communicate a specific function that anticipates its action. In general, we understand this relationship from the point of view of communication between the human being and the hardware/software,[2] even though it spans from the physical buttons of a very simple household appliance to the home automation switches fitted in any house. Quoting Stephen Littlejohn, Semiotics incides on the manner in which the producers create symbols and how the audience understands them.[3] These symbols respond to a semiotic representation of their function, generating a graphic transcription of a physical or virtual result. The icons that make up these activators have a special capacity of being cognitively detected and are understood as "objects" due to their single character, constructing symbols through their graphic elements.[4]

We find the foundation of the communication between object and user in the relationship between the symbol and the object. An act of communication in which several actors take part is generated. The industrial and graphic designers and engineers that proposed the function and are in charge of encoding the device become transmitters in charge of synthesising its functions. These use the interface of the device as a channel to conform a visual code through its icons. The operation and use of the machine or device is the message that reaches the final receiver, the user of the machine or device. Thus a relationship is established, encoding (by the transmitter) and decoding (reading and assimilation by the receiver).[5] This relationship is essential in what we could define as "reading the object". Knowing its meaning could result essential in tasks of designing interactive settings typical of the current media. The figure of the designer is so crucial within this process that some authors such as Thomas Erickson have coined the term *superde-*

signer[6] to define the multidisciplinary creator capable of integrating, in the same project, the tasks of engineering, graphic design, communications and psychology. Followingly we will analyse the creative process of the interactive hypermedia icons as well as their aesthetic and semantic evolution.

Birth and Evolution of Icons in the Digital Field

Irruption of a new technology brings with it the creation of new user settings, these requiring, in turn, descriptors and symbols for the user, these requiring, in turn, descriptors and symbols to codify their function. In the initial range of development of the interface, the first approaches to the design are usually solved through typographical descriptors, facilitating the use of each of these elements through a lexicon system. This option, clear and direct, implies evident linguistic limitations that damage the universality of its use, as well as a greater difficulty for the sectors little accustomed to handling fundamental systems in text.[7] On the other hand, pictograms and symbols established in the collective imagination of a great part of the evolved societies have a universal feature and are capable of solving these problems in tenths of seconds, and through the use of metaphors or by schematisation through signs of the basic functions (such as the use of direction arrows for the actions of "return" of "next").

Even so, repeating a constant pattern, the settings of interactive use are not exempt of semantic and graphic evolution: during the first stages of the use of the interface, the designers choose a visual configuration in which the setting is defined mostly by text descriptors, understanding this as an approximation to the user to help him understand its operation. When this technology takes on a universal character and their basic operation is comprehended by the group of users, it evolves towards interfaces made up by icons with an important metaphoric charge.

The design of graphic elements in the audiovisual field in the 60s is an excellent example of this discourse. The era of massive production of high fidelity devices began with the launching of the first devices that allowed playing cassette tapes. These first units had different switches for their basic functions (play, pause, fast forward). In their first versions, these switches were accompanied by a typographic descriptor that revealed its use, being possible to read *play, stop, rec, forward* on each of them (Fig. 1). Around 1963 with the system in full expansion, the appliance designed by Phillips led by the designer Phillip Orson conformed a new universal language with the incursion of the icons that we currently know and that became an immediate standard within the sector (Fig. 2). Based on these fundamental directional signs the play action was represented by a triangle pointing right, representing the movement of the tapes. From this premise, the double triangle to indicate fast forward and through its direction advance or rewind was clearly indicated. For stop function the use of the rectangle (probably supported in the stability of the square) and that is how for the pause function, the universal symbol was finally conformed by a rectangle with an empty space in its centre, dividing it in two and making it understood that it was a temporary pause in later reproduction. The simplicity of these elements represent an example of modernity and functional design, transcending the technical support to maintain current electronic reproduction systems.

Indubitably, the most interesting example of evolution of a graphic code based on icons is that of personal computer devices during the last forty years. During the decade of the 70s, after years based on the relationship between user and operative system in text interfaces, the advances of the Xerox PARC company gave place to the first metaphor of the desk,[8] considering what we know as the WYSIWYG system.[9] In it, the different functions are represented by elements that refer to the physical field such as the use of folders and files, paper basket, paint can, etc (Fig. 3). This use of a metaphoric setting implies appropriation of the previous cognitive experience of the individual in favour of better assimilation of the operation due to the mechanical similarity of mental processes.[10] In this way, the icon in the interface, established as a symbol, is the key to the cognitive interpretation between human and device.

This idea was implemented later by the *Apple* team in its computer *Lisa* with greater success and commercial distribution. At this point, it is fundamental to mention the work of the designer Susan Kare[11] responsible both of the design of the icons which first appeared in the 1984 Macintosh and of giving their final form to these metaphors installed in the present technological imagination. Kare's icons and symbols, much more humanistic and concise in character than those proposed by Xerox PARC, were conformed in a 32x32 grid in black and white, illustrating a set of actions never before represented and maintaining a coherent criteria among them (Fig. 4). In this work we find two specially critical factors, the first, the process of interpretation and codification of the tasks to be carried out by linking with highly recognisable metaphoric elements. On the other hand, it must be pointed out the excellent work of graphic codification where within a reduced grid of pixels the designer was able to construct a program of recognisable icons capable of generating an excellent visual code,[12] minimising key factors in the design of interfaces such as learning time, the speed at which tasks can be performed and percentage of user errors.[13]

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FRUTIGER, ADRIAN: *Signos, simbolos, marcas, señales (Signs, Symbols, Marks, Signals),* Madrid, GG Diseño, 2005. p. 77.

02 MANDEL, THEO: *The Elements of User Interface Design,* Nueva York, Wiley, 1997. p. 15.

03 Littlejohn, Stephen. & Foss, Karen. Theories of Human Communication. Illinois: WavelandPress, 2011.

04 MALTESE CORRADO: *Semiología del mensaje objetual (Object Message Semiology),* Madrid, Alberto Corazón, 1972. p. 166.

05 SEBEOK, THOMAS: *Signos: una introducción a la semiótica (Signs: an Introduction to Semiotics),* Madrid, Paidos, 1996. p. 25.

06 ERICKSON, THOMAS: The Art of Human Computer Interface Design . Massachussets: Addison-Wesley, 1990.

07 STEPHENSON, NEAL: *En el principio, fue la línea de comandos (In the Beginning It Was a Line of Commands).* En *Mapas,* Madrid, Traficantes de sueños, 2003. p. 24.

08 Outstanding in the development team were technicians such as Alan Kay, Larry Tesler and Dan Ingalls who implemented their advances in the creation of graphic interfaces in Xerox Star, a very advanced computer although it had small commercial success.

09 WYSIWYG (WhatYouSeeIsWhatYou Get) is a term related with the research of XeroxPark during the 70s, led by Warren Teiltelman. It is based on the screen representation through a graphic work system carried out by the user, relying on visual interface metaphors.

10 FELIP MIRALLES, FRANCISCO: *La metáfora interactiva. Arquitectura funcional y cognitiva de la interface (The Interactive Metaphor. Functional and Cognitive Interface Architecture),* Doctoral thesis not yet published, Valencia, Universitat Politècnica de València , Faculty of Fine Arts, 2008.

11 Susan Kare. Born in 1954, this artist and graphic designer has an extensive trajectory in the design of icons and graphic interfaces with projects among which outstanding are icons for operative systems for the firms Apple, IBM, NeXT, Microsoft and Motorola. More information in www.kare.com.

12 VIT, ARMIN: *Es sencillo lo que nace sencillo: la obra de Susan Kare (Simple Is What Is Born Simple; the work of Susan Kare)* in *Experimenta* issue 51, Madrid, 2005, p. 59.

This media developed continuously during the next decades refining the graphic aspect in the entire setting, experiencing a slow but constant movement towards the current more normalised state. The evolution of the aspect of computer icons was marked by the accelerated power increase of computers. During a long time icon designers were conditioned by the limitation of the visualisation devices.[14] From a first low resolution, monochromatic phase the change was to use colours (from a maximum of 4, 16 and 256 in a palette, to the current TRUE COLOR of more than 16 million), as the Atari TOS (1985) interfaces, the AMIGA (1985) system or Windows 1.0 (1985, Fig. 5). Even so, the allegorical visual system beginning in the 70s has remained practically intact, growing in visual complexity and nuances but conserving the key codes previously mentioned. We must highlight, the set of icons designed in 1989 in the firm NeXT for NeXTstep, work of the designer Susan Kare supervised by Steve Jobs himself. We can state that it is the first icon ecosystem with evident skeumorphic vocation, which uses an incredible graphic power to represent icons of realistic aspect, similar to the real buttons of realistic photo aspect. The skeumorphism,[15] which we shall speak of later, supposes by some analysts such as Jason Mesut an aesthetic resource based on the use of reference to obsolescence to minimise the shock the user might suffer in facing an unknown interface.[16]

At the end of the 90s we attend a graphic refinement process in favour of more user-friendly interfaces in which graphic design has a fundamental role in differentiating between competitors. Besides, in this stage, the first design trends appear in the media, existing in the decade of the 2000s a clear evolution toward addition of reflections, surfaces similar to glass and transparencies (Fig. 6). This responded to a wager for taking the maximum advantage of the display possibilities and to continue nudging the user toward discriminating settings of familiar and attractive aspect[17] (see cases such as the interface aqua presented by Apple in 2000 or Windows Vista in 2007).

New Media, New Icons. The Path Towards Creating a New Code

Between the beginning of the desk metaphor in the 70s to the end of the decade of the 2000s, the line of interactive icons traced a clear slope towards standards. In 2007 the incursion of new technology opened a new field of experimentation to interface designers. Tactile technology was implemented with the first iPhone (Fig. 7) and, later, in all tactile devices, changing the designers' concept of interactivity of users and device. With clear similarities to the desk setting known in desktop computers, these new interfaces had a dramatic conditioning: the reduced size of their screens and limited pixel density required re-thinking the media to allow adequate cognitive reading and therefore a satisfactory use experience.

Just as we found a style evolution in the icons of technological fields previously mentioned, in the case of tactile interfaces we can find two clearly differentiated itineraries: the first, an aesthetic progress defined by the bond of graphic trends of these last years together with an important semantic evolution in which symbols have progressed from a completely evident aspect linked to the text descriptor to the current more synthetic state that is supported in the experience of collective use of the devices.

Besides, the stores selling new mobile technologies allowed development of applications by third parties. This meant that users would not only find interfaces designed by the great software companies, but also by independent development teams that were able to publish their projects and therefore, allowing media permeability directly from global design trends. This, together with the enormous adaptation of tactile mobile devices had between 2007 and 2009, made the media evolve at a pace unknown until then in the digital field.

This evolution and maturity in the tactile field has generated its own standards and codes. These allow and facilitate the evolution of the media since under the synthetic and light aspect of the current applications there are a number of key conventions that allow us to carry the synthesis of these cross-media elements to their limit. It is easy to find clear cases of symbols becoming standards in the apps that we use daily as is the case of the magnifying glass to represent all action linked to data search or filter. This symbol that appeared as binoculars in the first web navigators, has become finally the standard and we find it in the immense majority of current apps (Fig. 8). Similar cases are the icons linked to the functions of locating. The board with the downward pointer (rounded or square) is the key symbol to describe this function. Other examples are the configuration icons (represented by bolts or mechanical systems), the profile pages (silhouettes of characters), or the omnipresent icon of home to represent the function of return to square one.

An interesting case of symbolic representation of a function is found in the icon known as hamburger. With its three horizontal stripes it has become standard to describe unfolding menus. It appeared for the first time in the XeroxStar interface, and after some years in disuse it was rescued by the Apple design team for its first version of the iOS. In few years it has become a new standard in the sector which appears as an unfolding hidden menu, as in many web and software navigators in the current desk.[18]

Tactile technology has had great social penetration thanks to the principle of 'direct manipulation' as opposed to the 'indirect' one of the mouse.

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SHNEIDERMAN, BEN Y PLAISANT, CATHERINE: *Diseño de interfaces de usuario, estrategias para una interacción persona-computadora efectiva. (Design of User Interfaces, Strategies for Computer-User Interaction),* Washington, Pearson Educación, 2005. p. 17.

14 MOLINA RUIZ, JUAN LUIS: *25 años de la revolución de los iconos en el escritorio (25 Years from the Desk Icon Revolution).* In *Revista I+Diseño*, Vol. 2, Nº. 2. Madrid, 2010, p.13-17

15 Skeumorfismo. This word comes from the Latin *skeus* (tool) and *morphe* (shape) and it define a specific design style promoted by Apple itself in the last years, which is base do giving graphic elements an aspect similar to what they would have in the real world, evidently according to the use and function of the application.

16 More information in: http://www.slideshare.net/jasonmesut/the-future-of-user-interfaces/

17 More information on the evolution of the desk icons in: http://www.pencilscoop.com/2013/12/the-evolution-of-icon-design-from-1981-2013/

18 The hamburger icon (hamburguericon) was designed by Norm Cox in XeroxStar development group. Its aspect responds to a synthesis of a menu with several options, and it has become the standard of a key element in the current design of applications. More information online in: http://www.blog.placeit.net/history-of-the-hamburguer-icon/

This has allowed bringing these devices closer to population sectors never before familiar with domestic computers, independently of age and education. We can take for granted that the collective imagination created by the development of these platforms has reached true levels of universality.

Return to Synthesis. Flat Design

We have shown how the tactile media has generated a vast code of its own symbols and cannot neglect the graphic evolution that these icons have undergone in the last years. In the evolution of desk interfaces previously analysed we have seen a clear ascending curve with respect to the complexity of visual detail of the interactive icons. Starting with clearly limited systems that obliged proposing synthetic solutions, the technical evolution of the devices took us to settings of great variety of details and clear skeumorphic inspiration. The trend continued in a similar mode with the arrival of smart mobile devices; we should understand that the interfaces proposed by the designers implied in the first versions of iOS and Android held a clear visual connection with the desk metaphor previously remarked. This responded to the media's quest for universality, facilitating access of the interface to the greatest span of possible public.[19] Besides, the basic signage elements (controlling functions such as "return", "next" or "more information") were determined in their majority by text descriptors encased in the arrows, symptoms that indicate a clear introductory intention countering the lack of knowledge of the media. This approach, maintaining these metaphors was successful and these interfaces had great acceptance, after a few years these settings showed signs of stagnation and it became necessary to radically reassess their aspect.

From 2010 a new trend contrary to the skeumorphic design of icons and symbols so widely extended in the beginning of the media. In this occasion the synthesis of the elements seems a key pretext for graphic experimentation. We can summarise the motives for this change of paradigm in two key points: first the mature use of this media determined a familiarity on the part of users with the basic functions, therefore making it easier to represent graphically with less elements. On the other hand, we also find a clear need of differentiation from some of the key companies in this setting, being Google (which developed its own style guide for webs and apps called *material*[20]) and Microsoft (with its interface *Metro*) the pioneers in suggesting visual systems different from the skeumorphic setting present in Apple designs (Fig.s 9 and 10). In these systems a clear synthesis of visual elements of the interfaces became prominent, from icons to work windows themselves, discarding fade-outs and effects to concentrate on the power of flat colours, contrast between shapes and a precise typographic work.

The work of synthesis carried out by both companies had consequences: the entire graphic design world understood the changes of direction and the trend has also extended to web design, as well as to the icons themselves in operative systems. The trend, called *Flat Design* has become even more evident and did not only have rapid growth in the mobile interfaces but also infected the other media previously stagnated such as web design, design of operative systems and even corporate graphic design. There are good cases of this trend like the icon redesign for the Chrome navigator in 2012 (Fig. 12). Apple itself has reassessed its principles launching in September 2013 a new version of its mobile operative system iOS7 clearly renewed, and of *flat* inspiration. From the modernisation of the Microsoft logotype done by Pentagram (Fig. 13), to the restyling of the icons in iOSMaveriks (see the "finder" in Fig. 14 or that of Safari in Fig. 15) we attend to a complete turn with respect to the complexity of symbols or icons in the digital realm.

Besides, another factor that is generating clear conventions in the design of applications for smartphones and tablets stems not so much from the aspect of key icons as in their location within the physical space of the device screens. For example, it is difficult to find applications where the *home* button is not placed on the left hand of the screen. In the same way, configuration icons and those of profiles usually occupy the right side, leaving a intermediate space reserved for icons linked to the services of camera, galleries, geolocation, etc. The universality of these parameters besides the aesthetic criteria previously mentioned are aspects which can serve us to classify the design of applications as good or poor in accordance with criteria of usability, modernity and structuring of contents.[21]

Tactile Resources Behind the Traditional Icon

The merging of the two aspects analysed above (creation of aesthetic convictions together with the predetermined distribution of elements) has given place in the last few years to new design strategies that occasionally take the place of icons. We are attending a process of synthesis that is encoding the aspect of interactive symbols to their minimum expression. Some are beginning to lose the metaphoric link with their function becoming cognitive appeals that the user, based on his previous use experience, is already capable of decoding. For example, a circular symbol in the middle of a mobile application can be understood as the activator of a camera function (see the comparison between the *Instagram* icon and that of the *Phhhoto* in Fig. 16), while the same symbol on the upper right of the screen can be surmised as an activator to unfold user options.

Besides, it is possible to find alternative solutions to the stagnated use of icons in all the apps func-

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NORMAN, DONALD: *Diseño emocional. Por qué nos gustan o no los objetos cotidianos, (Emotional Design. Why We Like or Dislike Everyday Objects),* Madrid, Paidós Transiciones, 2005.

20 *Material* is the name Google has given its latest style guide in which it recommends a series of premises to achieve a renewed aspect in applications, webs and other interfaces. Flat colours predominate, with projected shadows, information according to levels and pills and an interest for synthesis and use of directional gestures. More information in: http://www.google.com/design/spec/material-design/introduction.html

21 NIELSEN, JAKOB & BUDIU, RALUCA: *Usabilidad en dispositivos móviles. (Usability in Mobile Devices),* Madrid, Ediciones Anaya Multimedia, 2013, p. 75.

tions, as in the phenomena of "invisible activators". These allow interactions through the gesture of sliding or intuitive touches on the screen borders. In this manner, the mobile navigator Safari shows the search bar only when the user slides the scroll to the beginning of the web page, keeping it hidden the rest of the time. Videos and galleries on the Facebook mobile app have dispensed with the characteristic "close" symbol (cross). This function is done sliding the element up or down, generating a more natural navigation experience.

In this manner, responding to the unknown we proposed at the beginning of this article, the evolution of the tactile interfaces and their symbols is moving towards discriminating of the symbol in favour of the gesture, since the nature of the tactile media has begun to dispense with the interaction through icons that has been dominant in the graphic interfaces during the last forty years. Although it is risky to predict the disappearance of the icon in digital settings (the very tactile nature still requires its use to construct visual itineraries), the incursion of gesture interactions helps us sense a future in which information will be predominant in favour of a minimally invasive interface fundamental in the collective use experience. Besides, the appearance of new devices with different formats and sizes from those already known may result key to the trend that interactive symbols will bring us in the coming years. Media such as wearable technology[22] are bringing operative systems to the surfaces of watches, bracelets and all types of complements, where we find millimetric icons of great visual synthesis. Besides these devises are based on the use of *haptics* that allow notifying the user using small stimuli perceived by the individual through their skin, generating new channels of communication between user and interface that would work coexisting with the visual codes we have analysed.

The realm of interactive element design has shown an evident permeability with respect to technological, cultural and aesthetic advances. The characteristics of the new devices together with the codes generated by the collective use of the media itself generate new design paradigms. The predominance of icons leaves way to a new stage where the use experience, tactile gestures and sensorial interaction with the devices are the key resources in service of information ●

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Wearable should be understood as the technology linked to apparel and complements such as watches, bracelets and other accessories.