FROM ALEPH TO EMOJI
SEMI-SERIOUS CRITIQUE OF ICONS' AFFORDANCE IN THE DIGITAL ECOSYSTEM DESIGN

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GRAPHICACY

The paper proposes a critical reflection on the use of icons – silent images – capable of communicating functionality, interactions and emotions, within digital communication ecosystems with particular reference to the mimesis/realism dichotomy and the concept of affordance as criteria for designing and decoding the visual message.

AT FIRST, IT WAS AN (H)O(A)X

One evening, along the shores of the Nile, in a place that seemed made for romantic rendezvous, Ramesses decided to write a papyrus to communicate his passion to a girl he had glimpsed, "cursing the Egyptians' strange way of writing, which obliged him, not very strong in drawing, to express himself by means of puppets.

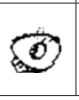
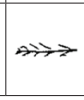
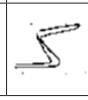
Sweet maiden…	*from the first moment I saw you…*	*my thoughts fly to you…*	*If you are not insensitive to my darts of love…*	*Find you in seven months…*	*there, where the sacred Nile makes an elbow…*	*and precisely near the temple of Anubis…*	*so that I may express to you the senses of a respectful admiration*
(And he drew a maiden at the very least trying to give her as sweet an air as possible, as gentle as possible)	(He tried to draw an open and passionate eye)	(How to express this poetic concept? Here: he drew a bird on the papyrus)	(And he drew a shot arrow)	(Seven small moons aligned on the papyrus)	(This was very easy: the lover drew a zig-zagging stream)	(This was also quite easy, the image of the god with the body of a man and the head of a dog is known to all)	(He drew himself kneeling)
							

Fig. 1a-1b-1c Achille Festa Campanile, Lettera d'amore, 1931. Retrieved July, 2022 from <https://docplayer.it/182863948-La-lettera-di-ramesse-da-in-campagna-e-un-altra-cosa-1931-di-achille-campanile.html>

'Believe me, with perfect observance, etcetera, etcetera'. […] Shortly afterwards, the suave daughter of Psammetico deciphered the not-so-successful drawings of young Ramesses, giving them the following interpretation:

							
Hateful lame	*I ate a fried egg…*	*you are a perfect goose…*	*but, in physique, you resemble rather a a fishbone…*	*I will throw stones at you*	*you're a vile little worm…*	*and you need the protection of Anubis… ('Rascal!' thought the girl. 'Anubis is the protector of mummies!')*	*I'll stop now because I have to clean my shoes*

Four thousand years have passed. The Ramesses papyrus was unearthed by a great Egyptologist, who after two lustrous years of profound study succeeded in restoring to the admiration of men the passage of sublime poetry contained in it. Here it is, in the full translation: made by the scientist:

							
O Osiris, who dances wearily	*on the lotus flower,*	*followed by the Ibis, bird sacred to you,*	*I offer to you the ear of wheat...*	*and seven small beans freshly shelled...*	*that thou mayst keep from me the serpent of envy...*	*to the supreme Anubis*	*to whom I prostrate myself.*

Beyond the *divertissement* of Achille Festa Campanile (1931), and the fact that in ancient Egypt hieroglyphic writing was only one of the notational systems –the sacred and courtly one, together with the 'demotic' and 'hieratic' scripts– the short novel exposes a fundamental problem of the semiotic process (Eco, 1975) and intertextuality (Kristeva & Waller, 1996) between different language shifting. Where, in that case, language as not just intended as an idiom linked to a cultural, territorial, or transnational identity, but a mode of communication that simultaneously uses different sign conventions and different transmission channels and sensory modalities (Bollini, 2001).

The hieroglyphic pictorial notation was finally decodified thanks to the three transcriptions – hieroglyphic, demotic and ancient Greek– by means of the *Rosetta Stele* back in 1799 and then deciphered between 1802 and 1822 by several French scholars (Solé & Valbelle, 2002). Here, the presence of two different transcriptions in ancient Greek (whose tradition has remained alive in western culture) and demotic –already partially based on phonetic components– are the key to access and understanding the meaning both of the notation system as well as the language, although the original context able to produce it and to socialize the meanings got lost through time creating a discontinuity in the transmission code. Besides, it is interesting to emphasise how hieroglyphics and demotic, the later form of ancient Egyptian writing (a simplified form of hieratic developed from the first millennium BC) do not represent different languages, but two coexisting notational systems, i.e., graphical forms

used in specific contexts and by diverse social groups.

According to the Jakobson reflections on translation –not only linguistic but also symbolic and sign-related (Jakobson, 1959)– and his scheme about the communication functionalities, then extended by Sorice (2000) and its reinterpretation shaped on visual communication brought out by Bruno Munari (1968) – among the key factors to establish a 'communication act' the code plays a prominent role. On the other hand, in the case of pictograms and other notations based on figurative signs (ideograms, pictograms, and so on) rather than on visual, abstract and phonetics symbols, the evolution seems to follow a common pattern, in a process– shared to many transitions in the innovation field –i.e. the evolution start from a mimetic or simulative reproduction and then turn into an increasingly abstract representation of the object originally adopted in metonymic, synecdotal, or metaphorical evolution. The referent and the signifier are both and deeply rooted in the actual world mirroring each other. The phenomenic experience is reproduced, and therefore sufficiently recognizable and understandable– the 'picture', the sign that stands for the meaning. The head of an ox, depicted with few strokes (Gaur, 1995), is recognizable nevertheless as a real head to which a meaning –that shifts from the actual object to a broader 'container' including under that 'label' more meaning and concepts– is collectively produced, accepted, and transformed. In a sort of phylogenetic evolution, the process of signification and representation tends to a further synthesis of the representative process that progressively uncouples the morphology of the referent into an abstraction with continuity or discontinuity in the formal/shape of the signifier.

In such a stratified process, however, any leaps or discontinuities are metabolised at the level of the social construction of meanings attributed to the sign system. That is, in the creation and learning of the codes that allow

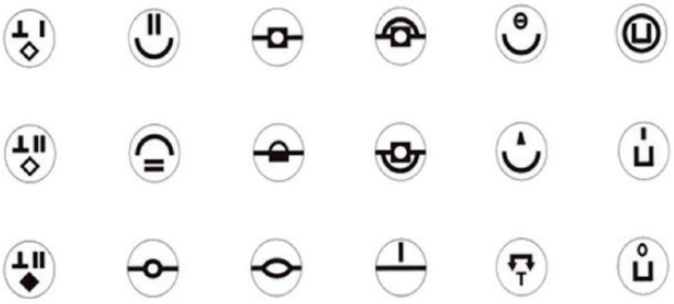


Fig. 2 Tomàs Maldonado: Data processing symbols for olivetti, 1964-1967 (Baroni, 1999)

them to converge on a shared and common meaning. However, if in verbal language and its phonetic notations –which allow a continuous permutation and combination of signs in the composition of codified and verifiable units of meaning–the meaning is sufficiently stable (this after all is the role of dictionaries) in visual language the issue is more complex.

Visual language, in fact, is by its very nature polysemous –as extensively demonstrated by the principles of Gestaltpsychologie (Kanizsa, 1997)– if not 'synsemic' (Perondi, 2012), often less codified and, above all, less acquired through formal learning processes –i.e. through graphicacy (Balchin & Coleman, 1965; Fry, 1981; Bollini, 2019)– as occurs instead in the verbal 'articulacy' and textual 'literacy' (Aldrich & Sheppard, 2000) realm.

In this respect, the visual glossaries or abacuses of pictograms designed and adopted in the various communicative contexts and ecosystems cover the extreme end of the spectrum from figurativeness, in which the real object is recognisable in its representation in a sort of sign translation – to symbolic abstraction, in which the connection with the real is personified or originally absent and the icons that make up this language must be learnt as a visual 'alphabet' in itself. This is the case, for instance, of the 'data processing symbols' (see Figure 2) designed by Tomàs Maldonado for Olivetti between 1964 and 1967 (Baroni, 1999).

THEN WAS THE METAPHORICAL WORLD OF DIGITAL ICONS

The iterative loop between mimesis and abstraction becomes particularly evident in the ontogenetic process of the icon language used since the 1980s in the digital world and in the subsequent technological revolutions and evolutions.

Beginning with the formalisation of the desktop metaphor –the 'mother' of all digital metaphors– the new interaction paradigm based on visual processes of encoding, perception and interpretation –i.e., GUIs Graphical User Interfaces– the iconic component plays a foundational and fundamental role in digital communication ecosystems (Bollini, 2016). In 1982-1984, Susan Kare was called upon at Apple to design the images, imagery and imaginary of this new environment of interfaces based on direct manipulation: the possibility of moving and dragging 'windows', 'documents' and 'stacks' according to a translation of the tridimensional actual experience to the flat space of a screen, and, above all, to imagine and populate the figurative realm of the digital desktop with icons and interaction patterns.

A friendly technological world accessible even to non-experts in which the iconic and anthropomorphised computer smiles at you –it will remain the symbol of the OS Classic until version 9. A simulative environment in which

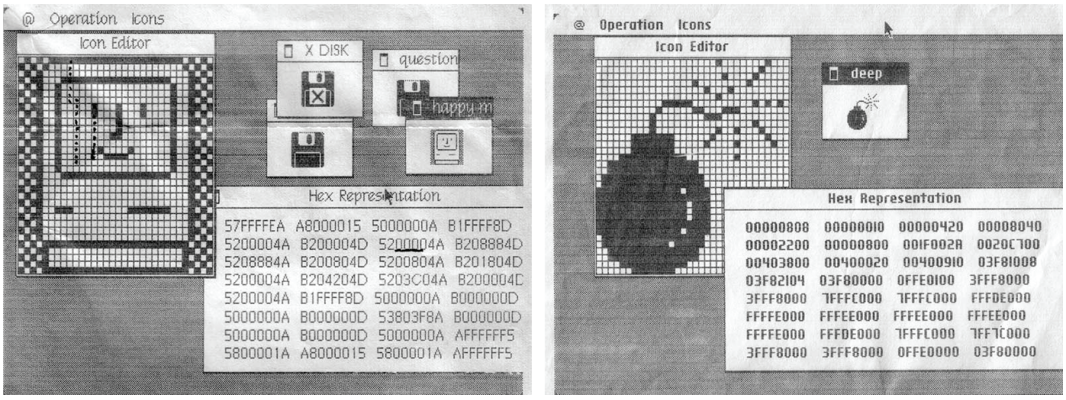


Fig. 3 Andy Hertzfeld's Icon editor based on Bill Atkinson's 'Fat Bits' pixel editing techniques used by Susan Kare to craft most of the early Mac icons. Retrieved July, 2022 from <https://www.folklore.org/StoryView.py?project=Macintosh&story=Busy_Being_Born,_Part_2.txt>

to throw a document ('file') you drag it from a 'folder' to the trash-bin and if the system crashes the bomb reminds you of Warner Bros. cartoons (see Figure 3).

Kare invented a world populated with symbols representing abstract operations and yet simple, comprehensible, human, and friendly (the concept of 'user-friendly' interfaces would only later be replaced with the functionalist and somewhat mechanical concept of 'usability'). The icons, initially accompanied by a customisable label or title, are so intuitive and soon become so familiar that they paradoxically become referents –originally object-based– of meanings that no longer exist.

Such is the case with the 'floppy disk'(the 3½ inch, high-density floppy 'diskettes') icon and its further evolution in Microsoft products, starting with Windows 93 in which Kare will once again be called upon to produce a visual and iconic world, become synonymous with 'save'. An object symbolic of back upping on an external drive, the floppy disk in fact, at a time when hard drive resources were precious and limited, soon to be replaced by more capacious and stable external supports (from DATs to DVD-Roms) and which, now gone, became for everyone, even for those who had never seen or used it, a –visual– synonym of a fundamental function, that of saving a file.

Subsequent transitions –for instance the shift from Classic to OS X– would also follow the same evolution. The well-established metaphor of the desktop is less and less connected to the physical office environment, which, in turn, is being transformed by the introduction of computers, software, digital devices, and DTP. Icons retain the same imagery but evolve in visual terms. From realistic objects, albeit in low resolution –drawn pixel by pixel and in black and white on a squared grid– or increasingly abstract, but at the same time, hyper realistic, three-dimensional, prospective, coloured and shaded references (Botta, 2006) of no-more-existing references. The more the actual object disappears, the more it seems necessary to describe it visually, as if giving tangible

concreteness to a no longer perceived reality would make it real and, therefore, recognisable and comprehensible.

It is a similar process we witnessed with the introduction of mobile devices starting from the introduction of the iPhone in 2007. The first iOS adopts a hyper-realistic and hyper-metaphorical visualization, the so-called skeuomorphic language (see Figure 3.a) that combines elements directly drawn from the real world to signify new functions also in the digital one. The built-in apps –such as the weekly planner, the eBook library, or the voice notes– that underpin the first generation of (multi)touch-interfaces –based on visual perception and gestures, i.e. a tactile-manipulative interaction– creates a deep-rooted but non-existing imaginary of stitched leather objects, yellowed and torn paper or wooden shelves (Bollini, 2019).

In the second generation –the so-called flat wave (see Figure 3.b) introduced by Apple in 2011 and taken over by Google Android with the Material Design System– however, the iconic-symbolic, flat and abstract dimension prevails over the hyper realistic-figurative one. People seem to have understood the new functionalities by now and no longer in need of concrete and tautological references to the features and functionalities in a crowded mobile world now populated by devices, applications and new players. On the

Fig. 4 Apple iOS: a) skeumorphism (2007) b) flat design (2013); c) Android Nexus UI template; d) Windows 8, Metro language (2) (Mobile devices OS screenshots).

contrary, the meteor of the Windows Mobile Operating System, which adopts a completely abstract and geometric paradigm based on space proportions and colours, rather than on icons, seems to have definitively changed the design and experiential scenario.

(DIGITAL) ICONS: THE AFFORDANCE OF SILENT IMAGES

Since icons, in the digital ecosystems, play a significant role in interactions –i.e. as action triggers, call-to-actions or navigation menus– their comprehensibility becomes one of the fundamental requirements for the efficiency and effectiveness, in terms of purpose and functionality, of applications and software, but also to ensure a positive and engaging –friendly– experience for people. If in the case of a written text, i.e. typography understood as transcription of the verbal and orality, we could use parameters such as legibility and readability to assess its validity and the overall reading performance and experience –even in empirical-experimental terms– in the case of icons the issue is blurred. However, we can use another criterion that has emerged from various studies on perception and communication, namely the 'affordance' concept. Originally studied by Elanor Gibson in her pioneering experiments (Gibson & Walk, 1960, Gibson, 2002) as a visual cliff, her definition became the reference for subsequent conceptualisations and research that extended its use to the specific field of interaction and digital design (Bollini, 2018). Formalised later in 1966 in the J. J. Gibson's seminal text *The ecological approach to visual perception*

> The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, the noun affordance is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It

> implies the complementarity of the animal and the environment. (Gibson, 1979, p. 127)

Or, in psychology field, is a property of an object or an aspect of the environment, especially relating to its potential utility, which can be inferred from visual or other perceptual signals. More generally, it is a quality or utility which is readily apparent or available, i.e. that capacity that in the case of communication or interaction an artefact has in making its own function comprehensible. In his book *The Design of Everyday Things*, Norman further refers to the concept:

> When you first see something you have never seen before, how do you know what to do? The answer, I decided, was that the required information was in the world: the appearance of the device could provide the critical clues required for its proper operation. In *POET*, I argued that understanding how to operate a novel device had three major dimensions: conceptual models, constraints, and affordances. (Norman, 1988, p. 109)

Norman's reflection straddles two concepts: real affordance and perceived affordance, similar to the apparent/inherent usability (Kurosu & Kashimura, 1995). In the former case, it refers to all the possibilities of action that an object allows, in the case of perceived affordance, on the other hand, it refers to the actions that a user perceives he/she/they can do. It is on the latter that the design of digital interfaces is mainly based. As a corollary of this argument, Norman (1988) defined four principles for ensuring the affordance of screen interfaces. However, the second "Use words to describe the desired action (e.g., 'click here' or use labels in front of perceived objects)" Norman, 1988, p. 109) seems to contradict the idea that visual elements, such as icons, already carry within themselves the capacity to convey their function and/or the meaning of their referent. A concept finally taken up and reworked in Living with complexity (2016), focusing, on the one hand, on the idea of the intentionality of affordance, i.e. the invitation to (do/interact), and on the other hand, on the gap

Fig. 5 Apple icons' evolution (Apple i/OS screenshots). Retrieved July, 2022 from <https://emojipedia.org/>

between the three-dimensional world and the perceptual translation to the two-dimensional one. Or, perhaps, more simply, as Polillo underline already in 1993, when speaking of human-computer interaction, it is "A well-designed system must be usable without any need for user manuals" (Polillo, 1993, p. 75) i.e., the system is able to communicate 'spontaneously' –to the people who will use it or to whom it is addressed– how it works. Moreover, affordance thus seems to be the meeting point between theories of perception and cognitive ergonomy and design, according to Bagnara:

> Looking at an object, we immediately 'see' what it is for, whether we can use it and how. Perception and action are included in a single act. This is a formidable change in cognitive psychology because the development of cognitivism had broken the link between perception and action seen as different cognitive phases and processes. […] This concept makes it possible to overcome, in most cases, the processing stages envisaged by cognitivism: we are quick, when the object is usable, we would say 'it is intuitive. (Bagnara, 2017)

A tangible application of these theoretical reflections can be well illustrated by analysing the evolution of the icons adopted, over the years in the Apple Operating Systems, to represent the possibilities of interactions referred to the acoustic/sound channel (see Figure 5).

From the original version (1984), where the acoustic dimension was predominantly represented by outputs i.e., alerts and feed-back sounds, and thus the ear-cons is represented by a loudspeaker to the first version of the microphone the deviation is not so obvious, at least in visual terms. In the second case, which is a typical example of skeuomorphic language, the reference is to a hypermetaphorical and realistic object no longer in use. It is out of contemporary experience, but at the same time strongly rooted in the collective imagery thanks, above all, to cinema and radio/TV references that make it totemic, iconic, familiar, and hence recognizable. In the first transition to a synthetic, abstract and flat representational mode, the object loses its real references, three-dimensionality, colour, details and shading, to become an abstract form in which only the silhouette seems to refer back to the original referent and the previous reference. Stripped of all detail, the icon expresses all its synthetic-narrative potential if, and only if, it is associated with the context of use, namely the newly introduced Siri app. An early form of VUI –Voice User Interface– which, relying on artificial intelligence simulates a dialogical interaction that goes beyond the mechanics of input/output dynamics or the command logic on which chatbots are generally based. In the last shift that completes the transition between skeuomorphism and flat design (2013), however, the microphone paradigm/referent is replaced by a new signifier. From the material object that produces or records/amplifies sound, we move on to the concept of sound waves, shifting from the recording device to the synthesiser display. The reference becomes from actual to abstract, from real to conceptual. Curiously, the sign-referential translation operation seems, on the contrary, to weaken the affordance of the icon. The 1950s microphone, just as foreign to our everyday life as the visual representation of the physical phenomenon can be, nevertheless seems more connected and embedded

in our memory and thus in our ability to recognise it and understand its process of rhetorical construction of signification.

As in the case of the magnifying glass –one of the first iconic elements already in use in software for creating multimedia and interactive hypertexts– which changes its meaning depending on the contexts in which it is used –synonym for search combined with text input fields in websites or apps, magnification or reduction in vector drawing, art or photo retouching software, or when associated with an image– code and context are inseparably linked in the process of decoding the meanings of visual language in terms of visual usability (Schlatter & Levinson, 2013). Not to mention the fact that in some software such as the early versions of Adobe Acrobat (1993) the concept of search, or rather find within the finite domain of the pdf document, was symbolised by a binoculars/ telescope.

ICONS, EMOTIONS, EMOJIS AND THE GENERATION GAP

Icons, images able to show and conveying functionalities, features without using words, become furthermore, emotive –expressive or affective– triggers, according to Jakobson (1959) conceptualisation: pictograms or ideograms aimed to convey the 'tone of voice' and the mood of the message.

Originally intended as typographical art the emoticons date back official to 30 March 1881 when they were presented in the humoristic US magazine Puck already

Fig. 6 Emoticon/emoji(s) evolution: a) emoticons (1881); b) smiley ASCII emoticon (1990s); c) Face with tears of Joy (2010) and d) Loudly Crying Face (2010) both in the Apple version. https://emojipedia.org/

displaying a specimen from the Studies of Passions and Emotions (see Fig. 6a). The evolution through the ASCII art culture and community reinforced the text/typographical vocabulary where "the most common ASCII art picture is the smiley (-:" (see Fig. 6b) according to the ASCII Art archive[1] and offered a possibility to visualise moods & feels even in command-line-based interfaces (1960s-1980s) and in the early years of the web revolution (1990s). It is in 1999 that the Japanese designer Shigetaka Kurita was invited by mobile telephone operator NTT DoCoMo to collaborate to a mobile-specific browser, then ending up in developing a visual vocabulary made of 176 pixeled pictograms on a 12x12 grid then included in Unicode in 2010 (and in MoMA collection in 2016) and consequently world-wide spread in Apple and Android smartphones (Prisco, 2018).

If emojis are now an integral part of the visual dimension of interfaces and interactions on many digital and social platforms, it remains an open question if they are –as other 'silent images'– a (universal) language or not.

> Language is organized into meaningful units such as words, and a system of rules –a grammar– that enables us to compose our words and express everything from the gnawing ache of unrequited love to a banal observation on the weather. […] A potentially insurmountable problem is the sheer difficulty of expressing abstract ideas using a pictographic form, underlines Evans comparing emojis vocabulary and structure whit other verbal idioms.(Evans, 2017)

Despite the common figurative basis referring to facial expressions and human emotions (Morris, 1977) that should make them perfectly recognisable, interpretable, and comprehensible, the more the visual language seems to converge towards a sign-like and meaningful stability, the more, again, the signification seems unstable and ambiguous. As in the case of the floppy disk, alien

to the post-millennial digital native generations, but comprehensible in symbolic terms, so emoji suffer a kind of generational gap at the level of the semiotic process. Depending on the cringe/boomer interpretation and with the identical figurative morphology, the same image constructs different meanings in which the context of interpretative validation is no longer shared within a diffuse social context, but rather limited and, indeed, distinctive to sub-groups and communities that identify with it.

In particular, analysing the different meaning of the most used emoji (at least on Twitter according to the real-time visualisation tool[2]) –named Word of the Year by the Oxford Dictionary in 2015– the Face with Tears of Joy (see Fig. 6c) "A yellow face with a big grin, uplifted eyebrows, and smiling eyes, each shedding a tear from laughing so hard. Widely used to show something is funny or pleasing[3]" we observe, paradoxically, different meaning when used by digital migrants (i.e., Baby Boomers and Gen X), Millennials (1984-1996) or Gen Z, born between 1997 and 2010 (Howe & Strauss, 1992). In the first case, it is understood as an alternative of the textual acronym LOL –Laughing Out Loud– and used in this meaning by Gen Y too. For Gen Z, instead, it is considered cringe and old fashioned. Late Digital Natives have replaced it with the Loudly Crying Face (see Fig. 6d) as synonym of 'overwhelming joy', Boomers use it in the label meaning, while the younger generation adopted it as 'embarrassed' alternative. Taking the test proposed by the TikToker Scarlett Alexandra (Aspler, 2022), I personally discovered that the icon of the fraternal kiss – the one without the little heart– I send to friends –actually meaning whistling (sic!)– is used as 'Sounds good to me and/or 'ohhh'!' by Centennials and Gen Alpha (born after 2010). In the generational and meaning shift, the contextual dimension of the signification and interpretation of a language seems to emerge in all its relevance, at least in the case of an idiom –such as the visual realm– so open in terms of interpretation and polysemic by nature.

CONCLUSIONS

The idea, the utopia or, perhaps, the illusion of creating a visual glossary that is meaningful and over-cultural seems as old as digital, or at least as old as the web. The once famous Michael Herrick's Q-bullets project, a set of minimal, animated icons developed in 1994 "that tell you what a link will do before you click on it [...] and that attach to hypertext links to indicate their function" (Herrick, 1994) is a fundamental as well as unsuccessful exploration of the universality of iconic language, just as, on the other hand, this same attempt is successful in its synthetic power in software and app interfaces or in those interactive contexts with a high intensity of use and/or a conscious learning process.

The visual language, in fact, like any language, lives and functions because it is based on known and shared codes within the community that generates it, transforms it, and passes it on. Graphicacy, i.e., the learning of the ability to decode and "write" down ideas, information, and messages in visual terms, therefore, becomes the decisive element and a fundamental skill in an increasingly image-oriented and image-based society.

NOTES

1 https://www.asciiart.eu/faq
2 http://emojitracker.com/
3 definition by https://emojipedia.org/

REFERENCES

Aldrich, F. & Sheppard, L. (2000). Graphicacy; The fourth 'R'? *Primary Science Review*, 64, 8–11.

Anceschi, G. (1992). *Monogrammi e figure*. Milano: Etas Libri

Archer, L. B. (1979). Whatever Became of Design Methodology? *Design Studies*, 1(1), 17

Aspler, S. (2022). Gen Z'ers Have Completely Different Meanings For These Emojis Than Millennials. *BuzzFeed*. Retrieved September 19,

2022, from https://www.buzzfeed.com/sarahaspler/gen-z-emoji-meaning-trivia-quiz.

Balchin, W., & Coleman, A. (1965). Graphicacy: tho fourth "ace" in the pack. *The Times Educational Supplement*, 947.

Bagnara, S. (2017, 6 novembre). Psicologia cognitiva, design e nuove tecnologie. *Medium*. Retrieved September 19, 2022, from https://medium.com/bsd-stories/psicologia-cognitiva-design-e-nuove-tecnologie-37d4c4a92a1c

Bertin, J. (1967). *Sémiologie Graphique. Les diagrammes, les réseaux, les cartes*. Gauthier-Villars.

Benjamin, W. (2012). *Aura e choc. Saggi sulla teoria dei media*. Torino: Einaudi

Baroni, D. (1999). *Il manuale del design grafico*. Milano: Longanesi

Bollini, L. (2019). *Graphicacy. Thinking, drawing, communicate in the design practice / Graphicacy. Pensiero, disegno, comunicazione nella pratica progettuale*. In Belardi, P. (Ed.) Riflessioni: l'arte del disegno/il disegno del'arte - Reflections: the art of drawing/the drawing of art (1435-1438). Roma: Gangemi editore

Bollini, L. (2018). *Affordance. Da Gibson a Bagnara, passando per le porte antincendio.* Retrieved September 19, 2022, from: https://progetto-amnesia.it/affordance-da-gibson-a-bagnara-e-porte-antincendio/

Bollini, L. (2016). From skeuomorphism to material design and back. The language of colours in the 2nd generation of mobile interface design. In *Colour and colorimetry. Multidisciplinary contributions*, 12, 309-320.

Bollini, L. (2016). *Large, small, medium. Il design della comunicazione nell'ecosistema digitale*. Rimini: Maggioli Editore

Bollini, L. (2001). Multimodalità vs. multimedialità. *Il Verri*, 16, 144-148.

Bonsiepe, G. (1994). *Dall'oggetto all'interfaccia. Mutazioni del design*. Milano: Feltrinelli

Botta, M. (2006). *Design dell'informazione. Tassonomie per la progettazione di sistemi grafici auto-nomatici*. Valentina Trentini editore

Eco, U. (1985). *Sugli specchi e altri saggi. Il segno, la rappresentazione, l'illusione, l'immagine*. Torino: Bompiani

Eco, U. (1975). Chi ha paura del cannocchiale, *Op. Cit.* 35

Evans, V. (2017). *The Emoji Code: The Linguistics Behind Smiley Faces and Scaredy Cats*. Picador

Evans, V. (2017, 17 July). The power of the emoji, Japan's most transformative modern design. *CNN*. Retrieved September 19, 2022, from https://edition.cnn.com/style/article/emoji-digital-language/index.html

Festa Campanile, A. (1931). Lettera d'amore. In *In campagna è tutta un'altra cosa. (C'è più gusto)*. Milano: Treves.

Fry, E. (1981). Graphical Literacy. *Journal of Reading*. 24(5), 383-389.

Gaur, A. (1995). Scripts and writing systems: A historical perspective. In *Scripts and literacy* (19-30). Springer, Dordrecht.

Gibson, E. (2002). *Perceiving the Affordances: A Portrait of Two Psychologists*. Routledge

Gibson, E. J., & Walk, R. D. (1960). The "visual cliff". *Scientific American*, 202(4), 64-71. doi:10.1038/scientificamerican0460

Gibson, J.J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.
Herrick, M. (1994). *Cue them in with QBullets™*. Retrieved September 19, 2022, from http://mac.matterform.com/mac_software/free_web_icons/index.html
Howe, N. & Strauss, W. (1992). *Generations. The history of American's future, 1584 to 2069*. Quill
Jakobson, R. (1959). Sign and system of Language. *Verbal art, verbal sign, verbal time*, 28-33.
Kanizsa, G. (1997). *Grammatica del vedere. Saggi su percezione e Gestalt*. Bologna: Il Mulino
Kristeva, J., & Waller, M. (1996). Intertextuality and literary interpretation. *Julia Kristeva Interviews*, 188-203.
Kurosu, M., & Kashimura, K. (1995). Apparent usability vs. inherent usability: experimental analysis on the determinants of the apparent usability. In Conference companion on Human factors in computing systems (292-293).
Maldonado, T. (1974). Appunti sull'iconicità. In *Avanguardia e razionalità*. Torino: Einaudi Ambiente e società
Morris, D. (1977). *Manwatching: a field guide to human behaviour*. (trad. ita.: L'uomo e i suoi gesti: la comunicazione non-verbale nella specie umana. Milano, Mondadori, 1978)
Munari, B. (1968) *Design e comunicazione visiva*. Bari: Laterza
Norman, D. (2016). *Living with complexity*. Boston: MIT Press
Norman, D. A. (1988). *The Psychology of Everyday Things*. New York: Basic Books.
Norman, D. (s.d.). Affordance and design. *Jjg*. Retrieved September 19, 2022, from: https://jnd.org/affordances_and_design/
Perondi, L. (2012). *Sinsemie: Scritture nello spazio*. Stampa alternativa/Nuovi equilibri.
Polillo, R. (1993). *Il design dell'interazione*. In G. Anceschi (Ed.). Il progetto delle interfacce. Oggetti colloquiali e protesi virtuali. Milano: Domus Academy
Prisco, J. (2018, 23 May). Shigetaka Kurita: The man who invented emoji. *CNN*. Retrieved September 19, 2022, from https://edition.cnn.com/style/article/emoji-shigetaka-kurita-standards-manual/index.html
Schlatter, T. & Levinson, D. (2013). *Visual Usability. Principles and Practices for Designing Digital Applications*. Elsevier
Solé R. and Valbelle, D. (2002). *The Rosetta Stone: the story of the decoding of hieroglyphics, Four Walls Eight Windows*. Retrieved September 19, 2022, from: https://archive.org/details/rosettastone0000sole
Sorice, M. (2000). *Le comunicazioni di massa: storia, teorie, tecniche*. Editori Riuniti

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