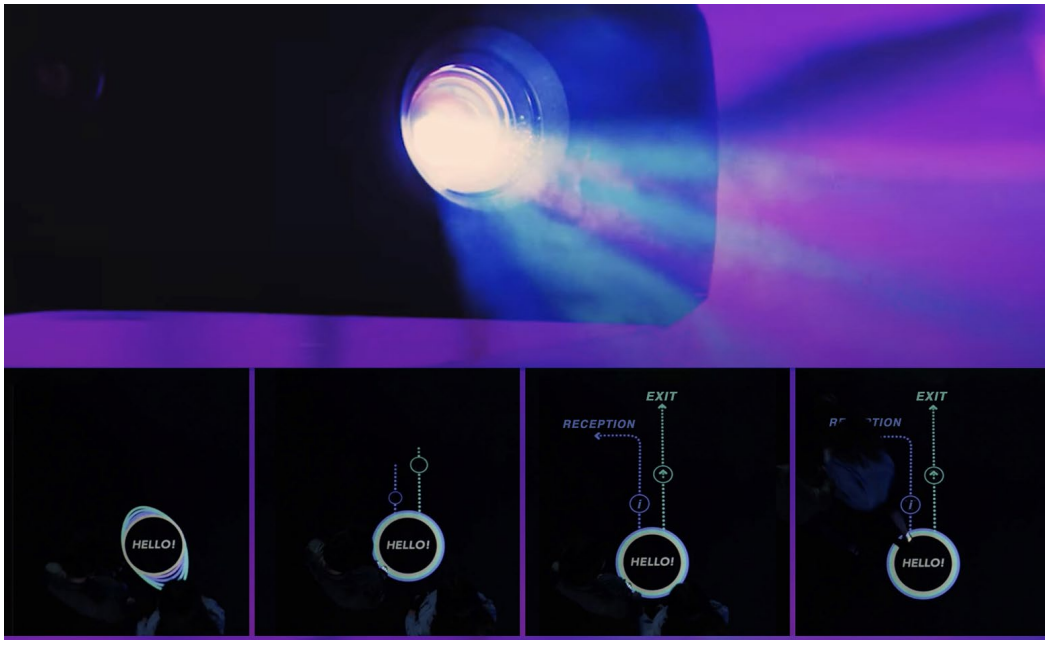
Information and Experimentation: Custom Made Visual Languages

Maria Linda Falcidieno
Maria Elisabetta Ruggiero
Ruggero Torti

Abstract

The collaboration between the Architecture and Design department and Grandi Navi Veloci, which began last year from the point of view of setting the visual perception of customer caring on board, was then developed with reference to the issue of communicating the data that are necessary in a certain situation; this occasion was emblematically identified in the often unspoken request for the reassurance of the user in the face of moments of unease or concern. From an initial cataloging of the factors that determine the state of insecurity, we moved on to their possible configuration through AR, with elements that inform passengers of the protection and safety mechanisms that are not immediately perceptible.
The project, therefore, studies visual languages and latest generation applications that, combined with the use of AI, are able to guarantee involvement through the communication of messages tailored to specific situations.

Keywords
visual language, augmented reality, artificial intelligence, perception, ships.



doi.org/10.3280/oa-845-c234

Introduction

Visual communication always presupposes some methodological and instrumental choices that give sufficient guarantees of effectiveness, immediacy and uniqueness of conveying the message, for the purpose of its optimal understanding: this means, above all, referring to the chosen target, in order to work on languages, compatible with it, in order not to create parallel and unconnected levels among information and transmission modes.
When this should happen, in fact, different hypotheses might occur, all tending to frustrate the design effort, even if well set up and valid in the execution: on the one hand a correct use of the individual elements, on the other the impossibility of incorporating them (such as would happen, for example, if a theoretical text were read by an elementary school child, able to do it from a literal point of view, but unable to understand anything due to the lack of substantial information).
A further possibility is that, on the contrary, of providing information so general to be useless for anyone, since a general target can only receive information that is for the most part generic.
Not only, but the media also have an enormous importance, since each communication vehicle makes use of suitable linguistic nuances and, on the other hand, each *medium* is preferable (as preferred for countless reasons) by each target.
In the case of communication on board passenger ships [Falcidieno et al. 2021], all of this is made explicit by the analysis of users, even if summary and carried out in large tranches: adults approaching the elderly, young couples, families. The youth target is a minority.
In essence, this allows us to identify a generalist audience, but in any case with an average computer literacy, accustomed to visual stimuli; consequently, the visual language appears suitable, despite the possible diversification of the media, to be used also at the same time, to satisfy the peculiarities of the individual bands listed above (MLF).

Operative Contest

The amount of visual stresses the passengers of a ship are subjected to is extremely numerous and heterogeneous. Decorative elements, specific elements of the shipping company, messages of various kinds and mandatory signage help to compose the whole interior of a ship, even going so far as to define the identity of a ship, if not even to decree part of its success.

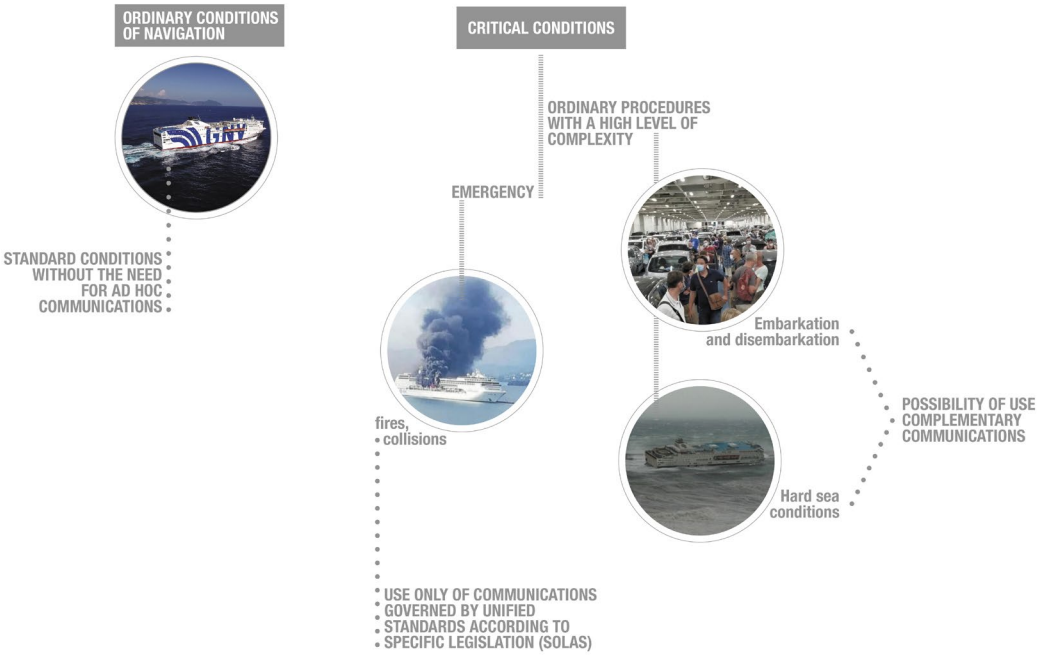


Fig. 1. Outline of possible operational contexts and types of communications.

The "suspended" and out of the ordinary dimension of certain spaces has origins that date back to the first transatlantic liners and still today this heritage is collected by large cruise ships or passenger ferries which, even if compared with them may appear modest in size, easily exceed the length of over 200 meters (with a width of about 40 meters) [Ruggiero, Torti 2020].
The stratification of signs and images that can be seen on board, however, also has functional reasons such as the integration of various types of systems, or the need to diversify spaces that could appear repetitive and uninteresting, or even make less evident the contribution of different companies involved in setting up specific areas is.
This mixture of languages generates a potential situation of disorientation, especially if associated with a further growing phenomenon, that is, the increasingly evident tendency towards gigantism of certain means, where even any references with the outside – which could give an indication at least of the direction of movement and therefore of the position of the stern and bow – are mostly hidden by the formal and dimensional consistency of the ship itself. This condition becomes particularly complex in specific conditions that require, for example, a certain speed of movement or that involve a potential crowding of people with possible consequences in the efficiency of carrying out certain operations.
The aim of the research has therefore been to optimize the articulation of custom made communications for a vessel used for passenger transport relating to specifications with different levels of criticality.
The general method has been oriented towards the definition of languages and methods that can be developed in a complementary way with respect to the mandatory on-board signage complying with specific standards.
From the Methodological point of view the research started from an analysis of the *status quo*, also conducted with specific surveys aimed at passengers of different age groups, as a part of studies for the PhD in Sciences and Technologies of the Sea [1] and subsequently the research had the opportunity to explore some issues in a discussion with the Genoa shipping company GNV as part of a specific research agreement [2].
In fact, from the carried out surveys, it was found that the perception of a difficulty in orientation is not constant but is above all connected to particular conditions.
Precisely in this regard it is therefore necessary to put forward some considerations with respect to the operational context.
In fact, there are mainly two reference conditions, namely: ordinary navigation conditions and critical conditions. The former can be considered as standard conditions without any need for thoughtful communications *ad hoc*, during which actions and directions to be taken can be carried out intuitively (Fig. 1).
The second case, on the other hand, is much more complex: for it further distinctions must be made: we can consider, on the one hand, ordinary conditions with a high degree of complexity, these are – for example – boarding and disembarking conditions, or sea conditions severe, etc. for which it is possible to think about the use of complementary communications.
On the other hand, we can consider real emergencies such as fires on board or collisions; for these, obviously, communications take place according to internationally recognized protocols and make use of their own codes such as SOLAS regulation [3].
The communication for complex situations, therefore, referring to sudden or planned changes of a standard condition, can concern: the signaling of specific devices or parts of the ship itself, or, the signaling of specific actions to be undertaken or avoided.
The research project presented here, therefore, aims to establish a sort of dialogue between the ship and the passengers, modulated according to different languages.
The method used to structure these languages takes into consideration two substantial aspects: on the one hand, making the interlocutor recognizable, that is, making it clear who is the sender of certain communications; on the other hand, being able to stand out in the large amount of visual expressions that we find on board. This aspect in particular has to deal with the safety signs already present and that, in no way, they must be overshadowed or confused.
Therefore issues related to orientation or to some actions aimed at improving passenger safety or comfort will be expressed in *ad hoc* created language, currently under study (MER).

Fig. 2. Formulation of concepts based on Digital-Out-Of-Home visual communication experiences implemented by Artificial Intelligence and capable of detecting behaviors and emotional state of passengers in order to act consequently with the dissemination of interactive digital content, specifically aimed at contingent situations.

Technologies and Methods

In this context, we intend to focus on the communication problems linked to orientation on board cruise ships as, being conceived both for mobility and for the entertainment of passengers, these "floating cities" are characterized by poles of interest, squares, avenues, wisely studied, from the distribution point of view, to guarantee uninterrupted flows of travelers.
A real naval urban planning consisting of a maze of paths which, despite the presence of internal sorting signs, can confuse even the most experienced travelers.
Today the communication of these horizontal and vertical connection systems is mainly delegated to traditional type signs consisting of totems, posters, brochures and other information systems that are not always effective as they are not immediately understandable or legible.
Hence the need to combine the communication equipment on board cruise ships with an experimental visual communication of a directional and informative type [Falcidieno et al. 2020].
This, in addition to being characterized by the necessary presence of a language for images – therefore potentially universal, intuitive and specifically aimed at cruise passengers as a target of reference – is based on Information and Communication Technologies (ICT), with particular attention to the use of innovative Digital-Out-Of-Home (DOOH) experiences such as Projected Augmented Reality combined with Artificial Intelligence (AI).
This proposal integrates perfectly with traditional signage that is enhanced and implemented by these sophisticated technologies for the creation of engaging communication languages capable of capturing the user's attention, amplifying his emotional involvement, facilitating the use of spaces, as well as allowing analytical insights into the real use of collective spaces [Mongiello et al. 2017].

Specifically, an integrated hardware and software system combined with the application of artificial intelligence would allow – through a series of cameras – not only to analyze a scene, to capture specific information and to recognize the trend of flows, and also to detect automatically facial expressions and behavior of passers-by.
Once the emotional state of individuals has been detected, it is possible to act accordingly by disseminating video and audio content specifically targeted to the contingent situation, needs or target audience, through the reproduction of digital content on LED walls, or Augmented Reality projection of the same (Fig. 2).
We are therefore faced with a communication of targeted and *ad hoc* messages capable of drawing the user's attention to the conveyed message, involving him in an increasingly active and interactive way thanks to a contextualized, rapid, simple and in-depth communication proposal continuously updating [Bistagnino, Falcidieno 2020]. This is a valid alternative to the recent touch screens which, in times of pandemic, have proved to be less safe from a hygienic point of view.
The communication mainly used on passenger transport boats is thus enhanced by technological realities that, thanks to artificial intelligence, are able to automatically analyze and produce statistical data that are considered fundamental.
For example, the data relating to the appropriate use of a route by its users or the actual turnout of a space or the mere subdivision by objective data – such as the age or origin of the various users of a place – constitute the information necessary for the implementation of the planned management of the communications to be disseminated, as well as for the best knowledge of the services to be offered.
In addition to the communication systems on ships based on Artificial Intelligence, we cannot fail to mention the latest generation projected Augmented Reality systems.
Once on board, users are guided by information elements – precisely in projected Augmented Reality – capable of generating a fusion between the real world and the virtual one, with an effective and captivating perceptual yield [Lo Turco 2018].
This is a technology that makes use of the latest generation projectors, combined with high definition 4k video cameras. These are combined with a sophisticated integrated system between hardware and software capable of managing the intelligent scanning of the visible structured light beams projected into the environment, favoring the point of view of the projector. Specifically, in line with the lens of the projector, the camera lens are fixed in order to have the same point of view between the two devices; the projector emits a visible structured light, while the video camera, through the aforementioned integrated system, proceeds to detect the deformations of the structured light beams.

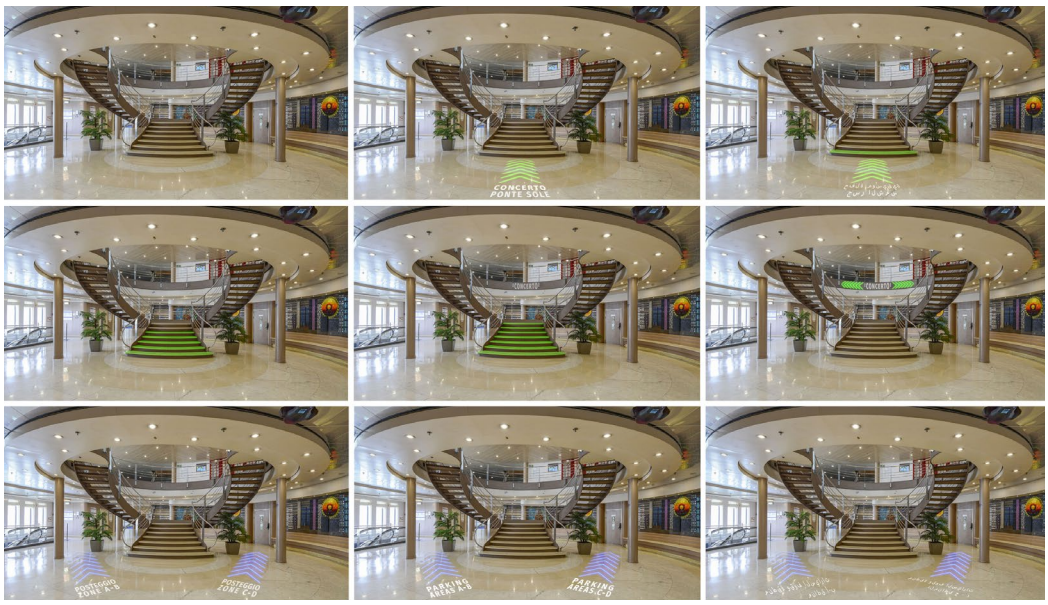


Fig. 3. Example of an orientation idea, in naval interiors, combined with Projected Augmented Reality, created for the transmission of video and audio content capable of capturing the user's attention and amplifying emotional involvement.

In fact, the projection of a series of coded light grids – which usually consist of vertical and horizontal lines – is exploited by the high resolution video camera to evaluate the position and size of the environment and of the present objects, in accordance with the deformation of the lines recorded by the camera itself.
Finally, the video camera captures an image as if it had been taken with the optical parameters and the same point of view as the projector.
The information thus obtained is processed through a computer and converted into 3d maps of the surfaces, on which it is possible to project the light in a timely and calibrated manner. The projector therefore offers a virtual image of the environment perfectly aligned with the real environment [Factura et al. 2018].
This integrated system assumes significant importance, as it allows the processed information to be transmitted, converted into 3D maps directly on the real surfaces, which become possible screens on which to project the information. With the help of dedicated software, in addition to controlling the projection, it is possible to produce captivating and engaging visual experiences through the creative and synchronized design of visual and audio procedural effects (Figs. 3-4).
In summary, the projection of high-resolution plays of light, colors, shapes and images adapts to real surfaces, "increasing" reality with constantly updated contents.
The strengths of this technology lie in the visibility of the contents in both night and day light conditions and in not requiring the aid of devices for viewing the augmented content as is the case, however, for some other forms of augmented reality [4].

Fig. 4. Sophisticated communication system in projected Augmented Reality characterized by the projection, into the environment, of effective information elements capable of generating a fusion between the real world and the virtual world.

This particularity opens its use not only in the field of visual communication on cruise ships – which become a vector of articulated narratives according to the different needs of its users –, but also in many other fields of application, which can range from artistic installations, to the promotion of the territory, from the urban redevelopment of "non-places", to way finding and much more [Torti 2021].

Conclusions

From all the carried out considerations, it is clear that the choice of the visual language for communication is decisive with respect to the information to be conveyed and in this sense the case of passenger ship signage is emblematic, precisely because of its initial articulation and differentiation; as stated at the beginning, in fact, three levels of status are clearly identifiable, from ordinary navigation conditions, to critical conditions, passing through complex situations.
The latter are precisely the object of the research, illustrated in the attached iconographic apparatus: in detail, we worked with the complex situation of the moment of embarkation and disembarkation and with the situation of rough sea, not yet in a state of emergency, but of warning and closure of some spaces of the naval vessel.
In conclusion, these digital "navigation" tools potentially usable inside passenger transport ships make it possible to make on-board communication visible without the aid of touch screens – now obsolete for safety reasons due to the pandemic – or device or, alternatively, directly on the displays of their smartphones, tablets and viewers, thus allowing users to look at the usual horizon to relate to a space that, although delimited, is certainly complex and the object of unavoidably less intuitive knowledge (RT).

Notes

[1] PhD student Dr. Arch Nicoletta Sorrentino is conducting a research entitled *Communication, orientation and wayfinding aboard large boats: towards an integrated and user-centered digital system*; she is at second year of the docotorate courses in Sciences and Technologies for the Sea, University of Genoa, XXXV cycle, Tutor Prof. M.E. Ruggiero. The first part of the study involved the elaboration of specific surveys aimed at passengers on cruise ships or large ferries. The purpose of the survey was to identify critical phases and contexts in the perception of on-board environments.

[2] GNV Grandi Navi Veloci is a Genoese shipping company, founded in 1992. Its fleet is made up of 25 ships used for the transport of passengers, vehicles and goods. Each year it handles millions of passengers within the Mediterranean.

[3] The first international conference on the safety of life at sea was held in London in January of 1914 at the invitation of the British Government. This has been translated into approval, after the accident of Titanic, of the first International Maritime Convention, the International Convention for the Safety of Life at Sea, the SOLAS Convention, and it would certainly have been decisive, years later, to the establishment of the International Maritime Organization. The intention would be to keep the Convention updated through regular amendments so a completely new Convention was adopted in 1974, which included not only the amendments agreed up to that date but also a new amendment procedure – the tacit acceptance procedure – designed to ensure that the changes were made in a given period time, preferably short.
The SOLAS Convention is one of the three most important pillars of the international instruments, which regulate questions relating to maritime safety and pollution prevention, the other two are the International Convention for the Prevention of Pollution from Ships, the MARPOL Convention, and the International Convention on Standards of Training, Certification and Watch keeping for Seafarers, STCW Convention, and undoubtedly the most important convention in the field of maritime transport.

[4] This part of the research is supported by Ateneo 2020 Research Funds of the University of Genoa as part of the study: "Experience design" conducted by R.Torti.

References

Bistagnino Enrica, Falcidieno Maria Linda (2020). From Sound to Sign. Graphic Experimenting for the Visual Transcription of Sound Expression. In Cicalò Enrico (ed.). *Proceedings of the 2nd International and Interdisciplinary Conference on Image and Imagination*. Cham: Springer, pp. 330-339.

Factura Brittany, LaPerche Laura, Reyneri Phil, Bret Jones, Karsch Kevin (2018). Lightform: Procedural Effects for Projected. https://www.semanticscholar.org/paper/Lightform%3A-procedural-effects-for-projected-AR-Factura-LaPerche/1cf31abbbb5635305aae4bdae09da46744013dc2 (29 February 2020).

Falcidieno Maria Linda, Malagugini Massimo, Torti Ruggero (2020). La comunicazione visiva nell'era digitale, tra diffusione e formazione. In Arena Adriana, Arena Marinella, Brandolino Rosario Giovanni, Colistra Daniele, Ginex Gaetano, Mediati Domenico, Nucifora Sebastiano, Raffa Paola (eds.). *Connettere, Un disegno per annodare e tessere*. Milano: FrancoAngeli, pp. 2130-2141.

Falcidieno Maria Linda, Ruggiero Maria Elisabetta, Torti Ruggero (2021). *V*isual Languages: On-Board Communication as a Perception of Customercaring. In Giordano Andrea, Russo Michele, Spallone Roberta (ed.). *Representation Challenges. Augmented Reality and Artificial Intelligence in Cultural Heritage and Innovative Design Domains*. Milano: FrancoAngeli, pp. 397-401.

Lo Turco Massimiliano (2018). Teatri urbani, affreschi di luce. Raccontare il territorio con le tecnologie digitali. In Luigini Alessandro, Panciroli Chiara (ed.). *Ambienti digitali per l'educazione all'arte e al patrimonio*. Milano: FrancoAngeli, pp. 151-171.

Mongiello Giovanni, Morea Alessandra, Tavolare Riccardo, Verdoscia Cesare (2017). L'architettura reale come tela per l'architettura rappresentata: il video mapping. In Empler Tommaso (ed.). *3D Modeling & BIM. Progettazione, Design, Proposte per la Ricostruzione*. Roma: DEI – Tipografia Genio Civile, pp. 454-465.

Ruggiero Maria Elisabetta, Torti Ruggero (2020). Sea, cruises and cities: images and communication of a new status. In Gambardella Carmine (ed.). *World Heritage and Contaminations*. Roma: Gangemi, pp. 1166-1171.

Torti Ruggero (2021). Moto apparente. In *GUD – SGUARDI a magazine about Architecture, Design and Cities*, numero speciale, 2021, pp. 204-209.

Authors
Maria Linda Falcidieno, Dept. of Architecture and Design, University of Genoa, marialinda.falcidieno@unige.it
Maria Elisabetta Ruggiero, Dept. of Architecture and Design, University of Genoa, mariaelisabetta.ruggiero@unige.it
Ruggero Torti, Dept. of Architecture and Design, University of Genoa, ruggero.torti@unige.it

Isbn 9788835141945