Multidirectional and Multilevel Models of Museum Enjoyment and Use between Spatial Narration and Multisensory Perceptual Experience

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ABSTRACT: The paper reports the critical-analytical investigation on existent models and processes of enjoyment and use in the field of cultural heritage, combining space perception and experimentation, fostering knowledge transfer to a wide audience, multisensory cultural experience and interactive participation with the aim of enhancing the current models.

The acquisition of knowledge from different disciplinary cores – design, archaeology, physics, cognitive sciences, computer science, electronics, art history – allowed tracing the ongoing transformations and obtaining an overview of the current models of fruition both nationally and internationally. The challenge will be to give further emphasis to the improvement of current models and to guide the future design of interactive enjoyment and use by bringing together the various aspects analysed in order to return meaningful and customized narratives based on the users' needs, through perceptual, immersive, and multisensory experiences in the spatial dimension of the project, thus engaging the user at multiple levels.

KEYWORDS: Inclusive museum; Spatial perception; Multidimensional knowledge; Multisensory interaction; Adaptive fruition; Augmented cultural experience.

Modelos multidireccionales y multinivel de disfrute museístico entre la narrativa espacial y la experiencia perceptiva multisensorial

RESUMEN: La contribución presenta la investigación crítico-analítica sobre los modelos y los procesos de uso y disfrute existentes en el ámbito del patrimonio cultural, combinando la percepción y la experimentación del espacio, favoreciendo la transferencia de conocimientos a un amplio público, la experiencia cultural multisensorial y la participación interactiva con el objetivo de mejorar los modelos actuales.

Gracias al aporte de conocimientos de diversas disciplinas –diseño, arqueología, física, ciencias cognitivas, informática, electrónica, historia del arte– fue posible rastrear las transformaciones en proceso y obtener una visión general de los modelos actuales de disfrute museístico a nivel nacional e internacional. El desafío radicará en contribuir al perfeccionamiento de los modelos actuales, orientando el diseño futuro hacia un uso y disfrute interactivo. Para ello, se reunirán los diversos aspectos analizados, con el fin de generar narrativas significativas y personalizadas a los requerimientos del usuario, a través de experiencias perceptivas, inmersivas y multisensoriales en la dimensión espacial del proyecto, involucrando al usuario en múltiples niveles.

PALABRAS CLAVE: Museo inclusivo; Percepción espacial; Conocimiento multidimensional; Interacción multisensorial; Disfrute y uso adaptativo; Experiencia cultural aumentada.

Introduction

The paper explores the current models of museum enjoyment and use through a critical-analytical overview of more than 20 models found in literature that were classified with reference to the *users' characteristics*, the *perceptual space*, *knowledge dissemination*, *narration*, *multisensory interaction,* and *experience* [1]. Such selection is the outcome of an attentive recognition and critical analysis of more than 80 examples of enjoyment and use of the cultural heritage at an international level, enabling the identification of criteria and requirements for each of the previously mentioned categories [2]. This will enable the configuration of Golden Rules oriented towards the new paradigms of inclusive design useful for the enhancement of cultural heritage and the transfer of visible and invisible knowledge.

The current cultural context is under continuous change due to the relentless development of new technologies requiring constant updates, and due to the international emergency, that has imposed a fast adjustment to a new meaning of «normality». Some time ago, Maldonado (2015 [1992]) was already wondering whether it would be «believable, as in plausible, that our future reality will become a world consisting only of indefinable presences, a world devoid of materiality and physicality. It is unreasonable to think that humans, in their daily lives, could give up on *touching with hand* the objects of this world». (freely translated from Maldonado, 2015 [1992]: 11-12)

The cultural world is adapting to the digitisation processes, while at the same time increasing the individuals' desire to experience reality through multisensory perception, in a physical environment surrounded by art.

All this produces more and more layers of information among real and virtual, knowledge takes new forms and it seems increasingly difficult to engage users in the visit and to find new ways for «knowledge» transfer. Despite the significant progress, the current models for enjoyment and use are still limited with regard to satisfying the different needs and totally engaging the user in the process. Indeed, they only take up some of the aspects studied within this research and not their totality. It becomes essential to update the models of enjoyment in order to create a shared space through common disciplinary languages. It is necessary to understand the existent situation to be able to improve it and go further.
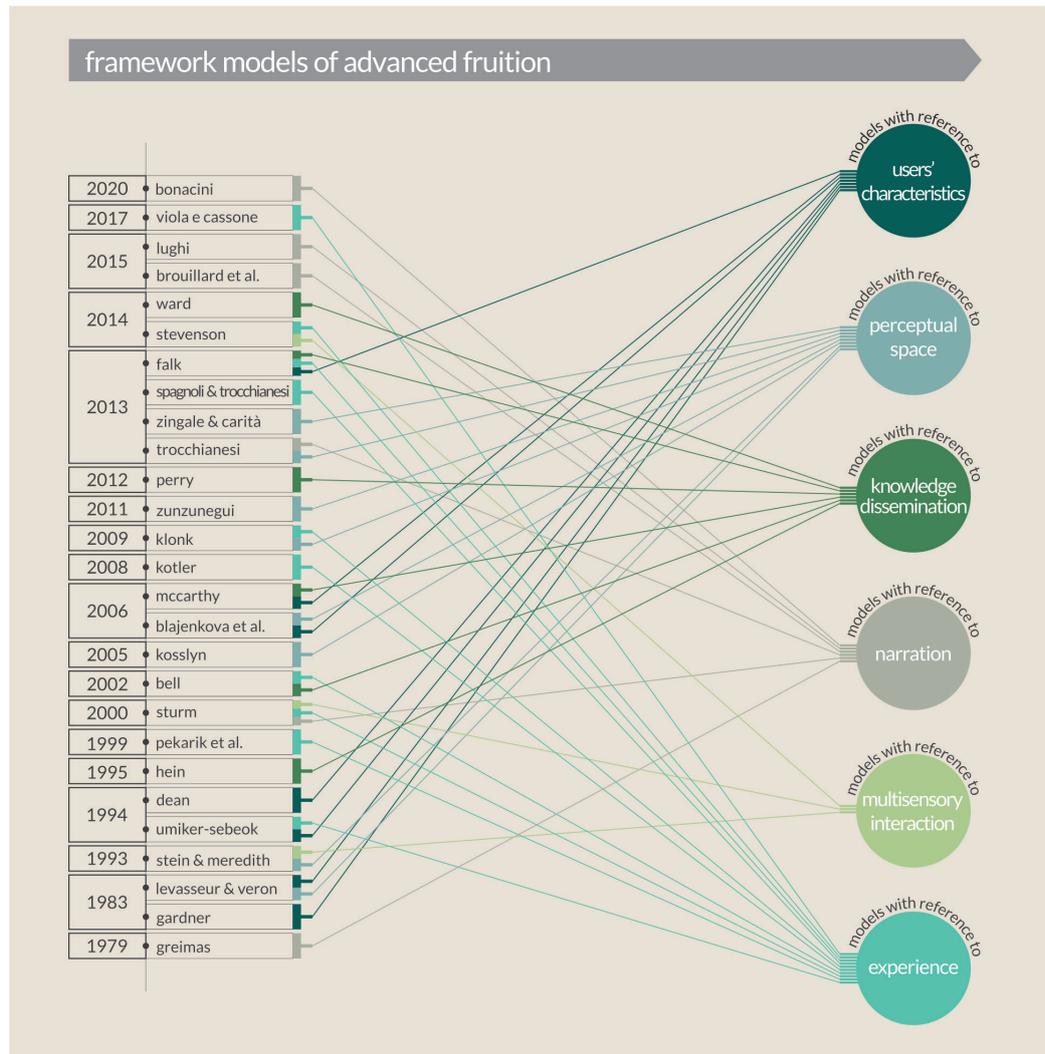
Museum Enjoyment as Multidirectional and Multilevel Space

An essential aspect of museum fruition is to manage satisfying the various needs and to offer equal opportunities for the enjoyment of cultural spaces. The numerous studies investigated in literature with reference to fruition and to the museum *users' characteristics* – tackled from different viewpoints – prove the need to facilitate the acquisition of information and to satisfy the requirements of a wide and varied audience.

It is necessary to start from the users' analysis through the socio-demographic features, which include general information – such as visitors' age, genre, place of belonging –, useful for experience customisation. Attention needs to be paid to the communities of belonging and to the different levels of education (Najbrt & Kapounová, 2014: 18), in order to contribute to sharing information both to experts and to users with basic knowledge. As showed by the Smithsonian Museum (2010) and highlighted through the «COME-IN!» guidelines (2019), the introduction within the exhibitions of elements regarding various social categories, through activities, images, and language, including sensory aspects, proves useful to increase inclusion. It is therefore necessary to take into consideration the users' *identity* as one of the important aspects to guide the future design of inclusive fruition together with other elements further highlighted [2].

It becomes imperative to examine the psychological and physiological needs such as the level of response, intelligence, imagination (Najbrt & Kapounová, 2014: 18), which can be reconducted to the different learning styles. In fact, Gardner's «theory of multiple intelligence» (2011 [1983]) traces the various ways for learning and processing the received information, distinguishing users based on their *curiosities*, *interests,* and *cognitive approach* in acquiring knowledge and which can, therefore, be related to the museum context.

If Gardner (2011 [1983]: 251) mentions interpersonal and intrapersonal learning to explain the characteristics concerning individual or collective learning, the sociologist Umiker-Sebeok (1994) adds the preference for either the individual visit or for socializing, among the visitors' features, defining them «pragmatic», «critical», «utopian», «diversionary». Moreover, John Falk (2013: 117) identifies the «facilita-

framework models of advanced fruition

2020	bonacini
2017	viola e cassone
2015	lughi
	brouillard et al.
2014	ward
	stevenson
2013	falk
	spagnoli & trocchianesi
	zingale & carità
	trocchianesi
2012	perry
2011	zunzunegui
2009	klonk
2008	kotler
2006	mccarthy
	blajenkova et al.
2005	kosslyn
2002	bell
2000	sturm
1999	pekarik et al.
1995	hein
1994	dean
	umiker-sebeok
1993	stein & meredith
1983	levasseur & veron
	gardner
1979	greimas

models with reference to **users' characteristics**

models with reference to **perceptual space**

models with reference to **knowledge dissemination**

models with reference to **narration**

models with reference to **multisensory interaction**

models with reference to **experience**

1. Framework models of advanced fruition. Elaborated by the authors

tors» as «socially motivated users» and the «rechargers» in search of individual contemplative experiences.

Therefore, multilevel *relations* are identified among the aspects and the museum audience's features to be taken into consideration for future designs. McCarthy's «imaginative» visitor (2006) not only favours sharing and social interaction, but he also learns and expresses himself through sounds, which Gardner defines «musical intelligence» (2011 [1983]: 105). On the other hand, the more «traditional» learning through written material is related to the «linguistic» style (Gardner, 2011 [1983]: 77) and it also interests the «study visitor» (Dean, 1994) as a way to examine objects while walking through the exhibitions. Nowadays, in museums there is

the intention to get people close to objects again through direct interaction, the «kinaesthetic-bodily» intelligence (Gardner, 2011 [1983]: 217). The body needs to be considered an educational and learning «tool» (it has a memory, an intelligence) (Trocchianesi, in Irace, 2013: 65).

Based on the visitors' characteristics, objects can also have an important role for orientation inside the museum. In fact, the so-called «object imagers» generate pictorial images within their minds, referred to the real aspect of objects, the shape, or specific features of the surface, such as colour or consistency. If instead schematic images are generated starting from the spatial connections, they belong to the «spatial imagers» (Kozhevnikov *et al*., 2005: 715), a concept

models of advanced fruition with reference to users' characteristics
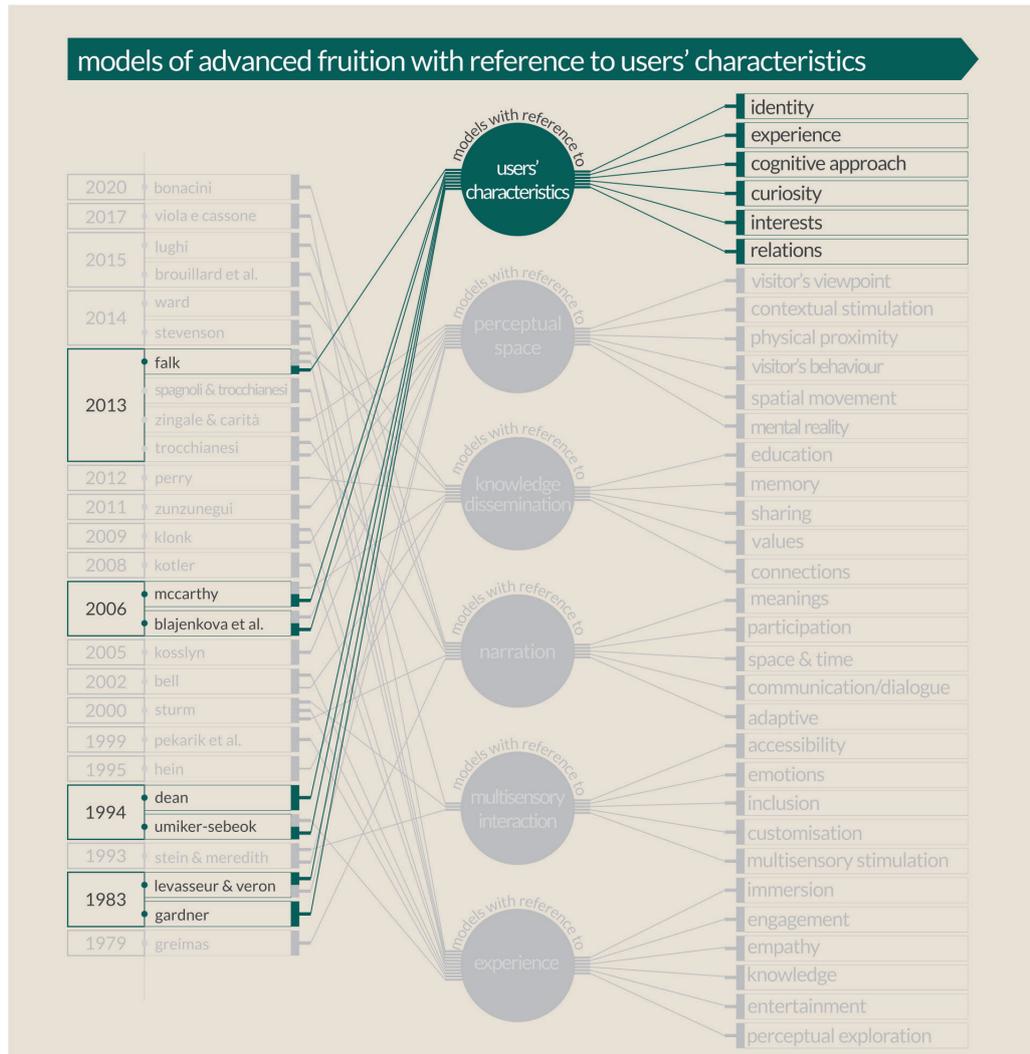
2. Models of advanced fruition with reference to users' characteristics. Elaborated by the authors

which can be related to Gardner's «spatial» intelligence (2011 [1983]: 179).

To this purpose, the Sony Wonder Technology Lab of New York creates a user's profile at the entrance of the museum, which accompanies the visitor through the use of RFID cards and it contributes to creating a customized *experience* (Knapp, 2009).

These new models of knowledge places appear as multidirectional and multilevel spaces. Even in the case of specialized and competent users, the «visiting movement» is made of interferences, zapping and transitions. It is a «plural» place, where the possibility to multiply the relations between information is as important as information itself (freely translated from Trocchianesi, 2013: 95).

Beyond Physical Space

Based on his characteristics, the individual builds a mental representation of space, useful to plan a path, the so-called «cognitive map», which generates a geometrical simplification of reality in order to facilitate its comprehension (Costa, 2016: 17). It is about a personal *mental reality* that guides the user within the environment. *Space* becomes a means to express individuality, but also to socialize.

The *visitor's behaviour*, the *physical proximity* in relation to the exhibits and the *movement within space* determine the way how the surrounding environment is perceived and the relationships that the user creates with the context and the objects **[2]**. The walls defining the surrounding space, together with the objects within, are more than just stimuli. By «penetrating» the peri-personal space, they become strong visual tools guiding the body (Bacci & Pavani, in Levent & Pascal-Leone, 2014: 24).

The spatial perception of the body with reference to its collocation in a scenically structured space has shaped new models of enjoyment and use. It is about projecting the body into a different context to enable it to perceive the experience through a physical alienation («out of place») or instead bring it to the original place of the objects for an «in place» experience. The reconstruction of a strongly defined environment to make the user re-live a certain experience is defined «enactment» (Trocchianesi, in Irace, 2013: 71).

Nowadays one can go further and talk about physical space and space «enriched» by technologies, as an «informational continuum» where the user interacts with various devices to enhance the experience (Brouillard *et al*., 2015: 12). The various facets of space, from the perceptual relationship with the body and the sensory experience until its extension through technologies and as an architectural medium, have inspired a group of artists in making the «Out of Space» exhibition (Hamburger Kunsthalle, 2021). The increasing presence of technologies does not, however, drive away from the needs for spatial stimulation, safety, and identity (Lawson, 2001: 5), typical to the individual. Therefore, the *contextual stimuli* with an impact on space perception become particularly interesting for the design process. Architecture must become a mediator between audience and exhibits. One must build with voids, with air and light as construction materials (Trocchianesi, in Irace, 2013: 70). Having the *visitor's viewpoint* within space as reference, museums can be conceived as open places, «empty» spaces that enable the user to explore freely, without having to follow a specific path, as opposed to the ordered and sequential space, the «full space».

> Museums thought from the non-full and non-empty sub-contraries as semi-determined spaces that enable a game of relations with variable schemes: non-full, therefore configurable; non-empty (not clearly articulated), labyrinthine, are between these extremes (freely translated from Zingale & Carità, in Irace, 2013: 118).

The anthropologist Paul Basu (2007) discerns the «unicursory» and «multicursory» labyrinths, namely a unique route that leaves no «dead ends» and a second one, characterised by various choices that can bring to repetitions and uncertainties. Such concept, transferred to the museum field, finds applications both for the organization of the exhibition, and for the definition of methods for knowledge transfer (Nieuwhof, 2017: 33-34). Through its «spatial nature», the museum creates a multidimensional map of knowledge, not only containing theories, but also by building them (Whitehead et al., 2012: 49).

Interconnected Knowledge from Visible to Invisible

With the advent of technologies, the supposed accessibility to an immense quantity of information is creating new forms of *knowledge*, new paradigms of cognition, aiming to eliminate barriers of all kinds. If Foucault defined three main knowledge orders, the Renaissance (circular), classical (classificatory) and modern (relational), nowadays a fourth can be identified as a «fluid, continuous, open, dynamic and diffused system, empowered by computer automation and algorithms», where both the role of advanced tools for knowledge sharing and dissemination, and that of «activating subjects», can be recognized (Santi, 2014: 28).

There is thus a transition from the traditional model for knowledge transfer – from an authoritative source to the general audience – to a «transactional model», a true revolution where data is shared through multidirectional flows (Hooper-Greenhill, 2005). Here the user has an essential role as «social actor and active producer, increasing and empowering the available cultural heritage» (Santi, 2014: 39-42). For a complete characterisation of information, various levels should be combined, important both for the «sender» and for the «receiver». These start from the lower level represented by «statistics» – a quantitative aspect regardless of meaning – to the upper levels such as «syntax», «semantics», «pragmatics» and «apobetics» – referred to the «sender»'s aim in transferring the specific information (Gitt, 2006). Since cur-

rent technologies allow to «enter within objects, within their lives, in the folds of their biographies» (Augenti, 2019: 10), nowadays one also gets to investigate layers of knowledge that used to be «invisible». The recent «Beyond the Glass» experimentation at the Musée du Louvre enables to share customized information on the reknown Da Vinci's «Mona Lisa» through visual and audio narratives that provide «invisible» details both on the painting process and on the «Mona Lisa» character. This is possible through a Virtual Reality experience on site or from home, where the painting «reveals» itself to the user (Louvre, 2021).

Design becomes a «model for knowledge production» and it requires «an intense collaboration between humanists and designers» to obtain new languages, new forms of knowledge (Burdick et al., 2014 [2012]: pos. 2521-2559).

To this purpose, it will be essential to understand the diversity of the *education* levels and the presence of the exhibited artifacts in the individual and collective *memory*. This can enhance a better museum fruition, enabling the implementation of new ways of *sharing* information, encouraging the creation of *values* and *connections* that can increase remembrance of the experience **[2]**.

Creative narration as an opportunity

From the visible to the invisible, it is therefore necessary to use *narration as* an activator of curiosity and memory (Fontana, 2010: pos. 529). The museum, as a «direct interlocutor in communication with the audiences to whom it "narrates" itself» (Milano, 2020: 3) and a «mediator generating engagement», can be considered an «inhabitable narrative space, where meanings and identities are continuously built, questioned and reinforced» (De Caro, 2015).

At the foundation of advanced narrative models, almost every time one finds Greimas' actantial model and the narrative canonical model – deeply studied by various scientists during the years (Greimas, 1979; Propp, 1985) –, which have many common elements in their basic structure.

The complexity of current storytelling due to the advancement of technologies is further analysed through the 14 categories identified by Bonacini (2020), starting with the traditional «oral and written storytelling», with an essential role for building memory. The introduction of the first tech-

nologies brings into scene the «videostorytelling» and the «visual storytelling» that uses images as a narrative support. The categories continuously evolve through the «animated», «interactive», «immersive» storytelling until the «social media», «participative» and «generative storytelling», that «practice that enables the design, sharing and participation to an experience of producing stories, also through digital development platforms». An evolution is represented by the «geolocalized storytelling», or «geo-storytelling», but also by the «multimedia mobile storytelling». The most advanced versions are defined «cross-media» and «trans-media» storytelling, based on «various communication flows of different, but intertwined contents». *Participation* at the narrative and diversification of the *communication* ways are identified as fundamental aspects for an inclusive enjoyment and use. An example in this direction is the experience at the Media Lab (Children's Museum of the Arts, 2021), where visitors create their own characters out of clay. These are further transferred into virtual reality through 3D scan, becoming alive in a world where the visitor also becomes the storyteller.

Therefore, storytelling represents on the one hand an «experience of oneself» (Johnsson, 2006), and on the other «a tool for an increasingly emotional, interactive and participative impact» (Bonacini, 2020: 49). It will be necessary to increase attention towards *meanings* created and shared through the narrative, in fluctuating *time and space*, and to provide the possibility to *adapt* the story in order to satisfy the users' needs and engage them in the visit.

Relations, Interactions, Emotions

Through their studies, Stein and Meredith (1993) have identified a tight correspondence between the spatial position of individual sensory inputs and the response of the system, as well as a temporal synchronising of such stimuli. Thus, the spatial and temporal laws have been defined as central for the *multisensory integration*, together with the law of inverse efficacy. This claims that individually, two weak unimodal stimuli would not be capable to provoke a significant effect on the neural response, while their combination proves to have more impact than a couple of strong stimuli **[3]**. It is therefore necessary to pay attention to the combination of various sensory inputs inside exhibitions to avoid obtaining an effect
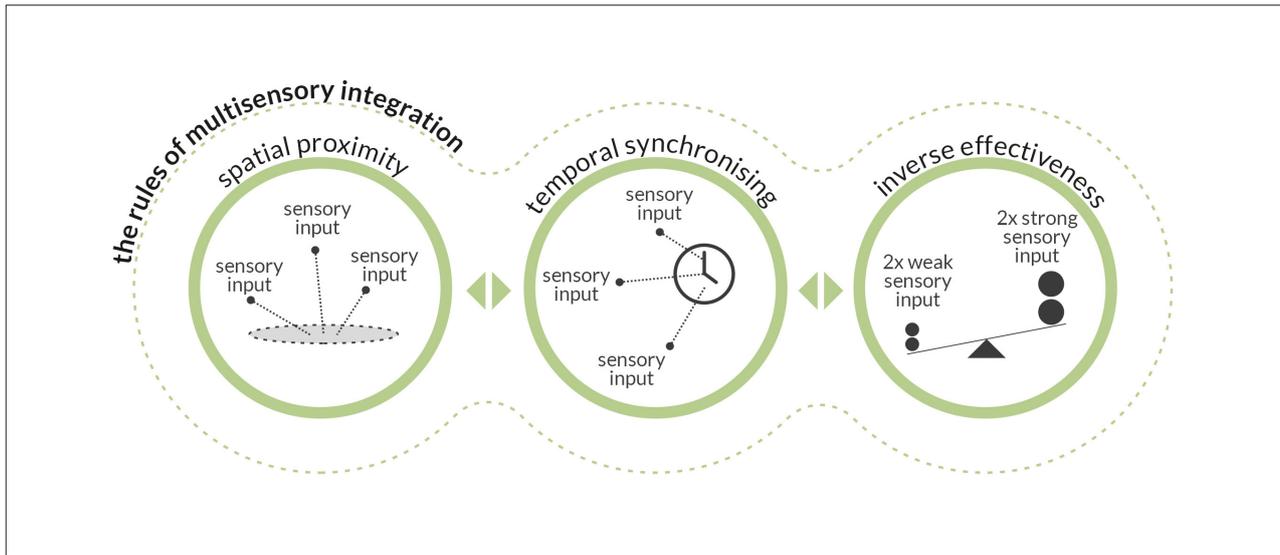
3. The rules of multisensory integration (Stein & Meredith, 1993). Scheme elaborated by the authors

opposite to the desired one, specifically alienating the user through excessive or too low stimulation, instead of encouraging him to the visit.

To understand the importance of each of the senses within cultural spaces, and to comprehend how to design exhibitions that can properly stimulate them, an overall analysis would be necessary. The multimodal, multidirectional approach and *multisensory stimulation* become crucial, even more when considering that neurosciences studies proved how any experience of the context is perceived not only through one of the senses, but through their combination. An interesting approach to this purpose is the example of the Tactile Orchestra at the Smithsonian Museum (Studio Roos Meerman, 2018), where sound and touch are simultaneously stimulated to increase perception and engage in the experience [4]. As pointed in Caro Verbeek's description, the olfactive sensation can actually be considered multisensory:

When I smell a perfume, I start tasting and seeing, I even feel something between tactile and visual: shapes that are both tangible and visual appear in front of me» (freely translated from Nieuwhof, 2017: 11).

In fact, even if it is not often considered within museums, smell has a strong impact on generating *emotions* and

recalling memories (Stevenson, in Levent & Pascual-Leone, 2014: 153-159) both in a direct and subtle way, it can be a strong educational tool which contributes to *accessibility* and *inclusion* (Nieuwhof, 2017: 2).

The memory of a familiar object is composed from different types of information, such as visual characteristics (colour), non-visual (smell, taste) and the ones common to more senses (for example shape and dimension). Such information is integrated by name, function, and it defines the semantic memory which, contextualised in a specific time and space, shapes the episodic or autobiographic memory. «Experiencing an episodic memory means partially reconstructing the sensory, conceptual, emotional model, and the details of the context that have characterised the initial episode» (Ward, in Levent & Pascual-Leone: 274-275). This model can support the understanding of how the user creates memories and how these can be influenced and/ or evoked through the museum layout. Multisensory stimulation can therefore be a useful tool for the *customisation* of the visit.

The capacity to generate the sensation of being in a certain place (also for example re-living the atmosphere of past societies), namely the «phenomenological proximity», is only one of the reasons why smell can find functionalities within a museum, contributing to the visitor's immersion in

4. Multisensory museum experiences. Tactile Orchestra, Studio Roos Meerman, 2017-2018, Cooper Hewitt, Smithsonian Museum; Au-delà des limites, teamLab, 2018, Grande Halle de La Villette Paris

the experience. The potential to induce negative emotions for increasing users' awareness is also interesting, as well as the smell's capacity to be used as a «subliminal tool» in order to guide visitors towards certain exhibitions or to help orienting people with specific needs inside spaces (Stevenson, in Levent & Pascual-Leone, 2014: 161-162).

Smell is «a radical example of what Deleuze calls affective image», an image directly connected with the body (Marks, 2002: 114, in Nieuwhof, 2017: 10). The use of «embodiment» in art or «biofeedback» techniques, that use touch or are based on proprioception (Sherrington, 1906: 129-135), increases the sense of self-awareness having a strong impact on the visiting experience and stimulating interaction (Bacci & Pavani, in Levent & Pascual-Leone, 2014: 20).

> Through interaction, individual memories merge and blend; sound, image, body and space subvert the conventional spatial-temporal orders and represent new and transforming ones, giving birth in real time to the tangible-intangible relationship specific to interaction itself as a practice and experiencing connections and interweaving between different universes (Costanzo & Di Franco, 2008) (freely translated from Riva, in Irace, 2013: 212).

The strong interconnection between senses, experience and perceptual space has brought to the definition of «acoustemology» at the intersection between acoustic and musicology, as a «way to simultaneously investigate the place of sound and the sound of place» (Feld, 2010: 35-36).

As a matter of fact, place has the capacity to stimulate a tension of symbolic appropriation of a – sound – image within the subject, to insert it in his own experiential path, subtracting it to the «indifferent» (Cassatella, 2001).

Experiential Engagement

In a museum, the multisensory design can enhance richness and even memorability for the visitor's *experience* (Vi et al., 2017: 2). In fact, nowadays the concept of experiential knowledge parallel to the intellectual one is often debated (Falcinelli, 2020 [2011]: 127). This kind of cultural experience will be able to «engage the mind» and will bring to higher levels of empathy and comprehension of the artifacts made in times and spaces different than ours (Axel & Feldman, in Levent & Pascual-Leone, 2014: 353).

The *empathic function* of *engagement* is structured into attraction, interaction, and experience. The experiential engagement is the one that varies most from one person to another and it is the result of a long process of elaboration and re-elaboration (Viola & Cassone, 2017: 5-18, in Bonacini, 2020: 50).

With reference to the museum experience, through the contextual model of learning, Falk (2013) claimed the coexistence of the personal, socio-cultural, physical, and temporal contexts.

When building the experience, it is necessary to combine the users' characteristics – his motivations, interests, knowledge, values –, the interaction both with the museum as an institution and with other persons inside it, and the physical elements with which the individual makes contact. The visit includes both experiences matured inside the museum and transformations taking place after the person exits the museum.

> We experience through senses, through the knowledge we have, through the cultural context from where we originate and which has built us as subjects, with reference to previous experiences processed through living (Celaschi in Buiatti, 2014: pos. 4134).

Pekarik *et al.* (1999) highlight on the one hand the existence of «social» experiences, focused on sharing the visit, and on the other hand the «cognitive» ones, which emphasise the interpretative or intellectual aspects, *knowledge*, and learning. The «introspective» experiences provide more interest to individual thought, to the connections that can be made by the visitor, while the «object experience» is focused on the artifact (Milano, 2020: 29). In fact, connecting the sought experience with the user's characteristics, Kotler (2007) identified the recreational-socializing experience, the learning, aesthetic, celebrative experiences, the one oriented to a specific purpose, and the emotional one.

Nowadays technologies enable increasing *immersion* into experiences to augment knowledge transfer, while also fostering *perceptual exploration*. In this direction, the approaches of the TeamLAB design group are of interest, such as the recent «Continuity» exhibition at the Asian Art Museum in San Francisco or the «Au-delà des limits» in Paris **[4]**, where the user is dynamically immersed into art (TeamLAB, 2021).

Conclusion

Despite the increasing interest for multisensory interaction and narrative in museums, there are still various limitations in understanding the integration of different sensory stimuli to augment the user's experience and engage him in the visit.

The current cultural context and the development of society require continuous updates to find new ways to satisfy the users' needs. While defining new models of fruition, it is necessary to take into consideration the diversity and the extent of the museum audience, the need to find new ways to share knowledge through customized stories inside flexible, open spaces, that overcome the physical boundaries and expand in the virtual world such as *interreality*, while engaging the senses to increase experience.

As illustrated through the paper, the framework of the existent models highlights the current complexity in the field of use and enjoyment of cultural heritage. The analysis of the current context helps identifying the main aspects approached in the museum world. The directions are various and the studies, even if they sometimes combine more than one of the analysed aspects, do not seem to manage to guide designers or the museum staff towards a clear fruition process for engaging the user and efficiently transferring knowledge. The challenge will be that of giving further emphasis to the enhancement of current models and returning meaningful and customised narratives to the users' needs, through perceptual, immersive and multisensory experiences in the spatial dimension of the project, which engage the user at several levels. It will be necessary to pay attention to the totality of the analysed aspects, since each of them has a fundamental role in defining the experience of enjoyment and use at the museum. Aiming to enhance this experience and to adjust the process to the individual's needs, it will be useful to define the Golden Rules for designing the user-artifact interaction and the multisensory fruition from the physical to the digital. Various layers of information are to be included to provide flexibility to the overall process.

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