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Original Research Article

Revisiting the Concept of Interaction in Urban Motion and Printed Posters Based on Richard Mayer's Cognitive Theory of Multimedia Learning*

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Abstract

Problem statement: With the expansion of interactive graphics in contemporary urban spaces, particularly in Motion Posters and Printed Posters, the concept of "interaction" is linked to the active and multisensory participation of citizens. However, in the dynamic and multilayered urban environment, the interactive capacity and the agentive role of passersby in engaging with urban media have received less attention. Richard E. Mayer's Multimedia Learning theory can provide an appropriate framework for analyzing citizens' perceptual experience and enhancing the interactive function of urban posters. Therefore, revisiting the concept of interaction in posters and aligning it with Mayer's principles is necessary for analyzing the audience's processes of perception and learning. This study seeks to answer the following questions: How is interaction represented in urban Motion and Printed Posters, and what role do the principles of Multimedia Learning play in shaping the audience's interactive experience in the city?

Research objective: The objective of this article is To revisit the concept of interaction and align the principles of Multimedia Learning with urban Interactive Posters and audience experience.

Research Method: This research is fundamental in nature with a qualitative approach, using descriptive, analytical, and comparative methods, and has an applied character. Data were collected from reliable library and online sources and analyzed with a focus on Mayer's theoretical principles. In this context, two Interactive Posters were analyzed as case studies: the Motion Poster Weltformat Festival and the Printed Poster Arsenic Season Opening, both of which are applicable within urban graphics and represent significant examples of multisensory interaction in urban environments.

Conclusion: The findings indicate that interaction in urban Motion and Printed Posters manifests in both physical and perceptual forms. Applying Mayer's Multimedia Learning principles, including dual channels, limited capacity, and active processing, enables the purposeful use of citizens' sensory channels and increases message retention in their working memory. Consequently, the audience transforms from a passive recipient into an engaged, participatory, and meaning-making agent.

Keywords: *Interactive Graphics, Motion and Printed Posters, Multimedia Learning, Richard E. Mayer.*

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Introduction and Problem Statement

Graphics, as a branch of art and visual communication, plays a fundamental role in conveying messages and establishing a connection between the work and the audience. In today's metropolises, which are dynamic, vibrant, and full of visual stimuli, visual communication design relies on interaction and active audience participation that goes beyond passive reception to cognitive engagement and active meaning-making in public space. In recent decades, with the advancement of digital technologies and the development of interactive media, the role of the audience has shifted from being a mere recipient to an active participant and meaning-maker. This transformation has turned urban Interactive Posters, including both Motion Poster[1].

and Printed Posters[2], into a multidimensional, dynamic, and experience-oriented domain that, by simultaneously engaging pedestrians' sensory channels, fosters deeper and more lasting communication. Richard E. Mayer[3], a contemporary cognitive psychologist and professor at the University of California, demonstrates through his Multimedia Learning theory that learning is optimized when verbal and visual information are organized according to multimedia principles, including the Spatial Contiguity Principle, Temporal Contiguity Principle, Coherence Principle, the importance of sensory channels, Redundancy Principle, and individual differences. In this study, seven fundamental principles are examined due to their direct relevance to the topic. A comparative review of Mayer's theory with urban interactive graphics is particularly significant because, in public space, the audience is no longer passive; rather, they are active agents whose visual experience is influenced by perceptual, environmental, and interactive factors. This study addresses two main research questions: 1) How is interaction represented in urban Motion Posters and Printed Posters? 2) How are the principles of Multimedia Learning applied in the interactive processes of urban citizens? In this context, two Interactive Posters from Maximage Studio[4] were analyzed comparatively. First, the Motion Poster Weltformat Festival (2019), in both print and digital formats, employs the simultaneous integration of form and content in animation to create a dynamic and multimedia urban experience. Second, the Printed Poster Arsenic Season Opening (2023–2024), using the scratchboard technique, encourages physical and tactile interaction, providing a cognitive and participatory experience in public space. These works, combining modern and traditional technologies, demonstrate different interactive approaches in contemporary urban graphics. Based on the first author's prior experience in graphic design, and considering the audience's elevated role from passive receiver to active agent in contemporary urban graphics and urban space, this study aims to revisit the concept of "interaction" in Motion Posters and Printed Posters and conduct a comparative analysis of Richard Mayer's Multimedia Learning principles to examine the multisensory and perceptual experience of the audience and provide an analytical framework for urban Interactive Posters.

Research Background

Despite the expansion of interactive art events with urban themes in the contemporary period, theoretical and practical gaps, particularly in the field of environmental graphics in Iran, have weakened certain aspects of this domain. In this study, through a review of both domestic and international sources, it was found that no previous research has been conducted with the same focus as the present study. Domestic sources are limited, and international studies are scarce in providing a detailed and systematic analysis of audience interactive experiences in urban spaces. Nevertheless, some studies in various branches of urban interactive graphics form the research background for the present study. Petković et al. (2025), in the article "Experiential graphic design: Informing, inspiring, and integrating people in physical spaces, A review" examined the novel dimensions of environmental and experiential graphic design. This study, focusing on multisensory experience and active user interaction in physical spaces, demonstrates that experimental graphic design goes beyond mere information delivery and, through the integration of images, text, motion, and spatial elements, creates a participatory and experience-oriented environment for users. This approach, emphasizing

multisensory experience and active interaction with the environment, aligns with the present study on urban Interactive Posters. Wang & Li (2024), in their study "Research on dynamic poster design in the digital age," explored the new dimensions of poster design in digital media. Focusing on interactive and motion capabilities, the study shows that the poster has transformed from an informational medium into a multisensory, experience-oriented platform, challenging traditional boundaries of graphic design. This approach, centered on multisensory experience, aligns with the present study. Hemmati Vineh et al. (2020), in "The Application of Contemporary Interactive Graphics in the Cities through Studying "John Fiske" Theories (Approach: Environmental Development Culture)" demonstrate that environmental interactive graphics enhance audience interaction with messages and increase their sensitivity and empathy in urban environmental education and culture. From the perspective of audience interaction and message retention in working memory, this study is relevant to the present research background. Daneshgar & Taheri (2021), in the article "A composition Survey on Urban Billboards and Bridge Decks of Tehran (2015-2017)," note that content-appropriate composition increases the impact and effectiveness of urban advertising and enhances citizen satisfaction. From the perspective of audience interaction with messages and content retention in working memory, this study contributes to the present research background. Daneshgar (2017), in "The effectiveness of three-dimensional urban advertising from the perspective of iconology," shows that 3D urban advertising design increases effectiveness and that most examples interact with the urban environment. The findings are relevant to the present study in terms of visual audience interaction with messages and the effect of form on perceptual experience. Compared to previous studies, which mostly examined interactive graphics in general, the present study analyzes the concept of "interaction" in urban Motion Posters and Printed Posters based on Richard Mayer's Multimedia Learning theory. In this study, the transformation of the audience's role from a passive recipient to an engaged, participatory, and meaning-making agent is examined within Mayer's principles, and two selected Interactive Posters are comparatively analyzed to elucidate the impact of executional differences on multisensory interaction and the dynamism of the work.

Research Method

The present fundamental study adopts a qualitative approach employing descriptive-analytical and comparative methods to examine the visual and interactive structure and content of Motion Posters and Printed Posters. Data were collected from authoritative academic library and online sources and analyzed with a focus on the principles of Richard Mayer's Multimedia Learning theory. Multimedia Learning was first introduced in the first edition of Multimedia Learning (Mayer, 2001), published by Cambridge University Press, in the form of seven principles. Following a revision of its theoretical foundations and empirical evidence, Mayer expanded the framework in the second edition (ibid., 2009), increasing the number of principles to twelve. In the third edition (ibid., 2021), the theoretical model further evolved, and the principles of Multimedia Learning were expanded to fifteen. In the present article, through the analysis of the interactive characteristics of Weltformat Festival (2019) and Arsenic Season Opening (2023–2024), the process of citizen interaction is identified. Within a qualitative classification framework, the type, degree, purpose, method of execution, and compositional structure of the works are comparatively examined.

Theoretical Framework

• Multimedia learning theory and interactive graphics

Mayer's Multimedia Learning theory seeks to explain how audiences learn through the integration of words and images. "This theory is based on three key ideas: first, Dual channels, which states that humans use separate cognitive pathways to process verbal and visual information; second, limited capacity, which emphasizes the inherent limitation of working memory in simultaneously processing a certain amount of information; and third, active processing, which considers

meaningful learning as a process involving the conscious selection of relevant material for entry into working memory and its mental organization into coherent verbal and visual structures. Ultimately, the integration of these structures with one another and with prior knowledge stored in long-term memory leads to audience learning" (ibid., 2024, 1). Accordingly, verbal (perceptual) and visual (physical) representations are qualitatively distinct, and effective learning occurs when these two types of representations are simultaneously connected within working memory. The seven fundamental principles of this theory are as follows: Multimedia Principle (the simultaneous combination of words and images to construct mental models), Spatial Contiguity Principle (placing related words and images close to each other), Temporal Contiguity Principle (presenting corresponding words and images simultaneously), Coherence Principle (avoiding the inclusion of irrelevant elements to prevent cognitive distraction), Modality Principle (preferring the combination of animation and narration over animation and on-screen text), Redundancy Principle (avoiding overload of visual channels and considering learning preferences), and Personalization Principle (recognizing the differing effects of multimedia design on learners with varying levels of prior knowledge and spatial ability) (ibid., 2021, 117–281). These principles constitute a set of cognitive guidelines aimed at facilitating the simultaneous processing of verbal and visual information and preventing cognitive overload in the process of message comprehension (Fig. 1). This logic can be observed across various branches of urban Interactive Posters as a cognitive tool for improving learning and message comprehension due to the active participation of citizens, the processing of Dual channels, and coherence in the integration of image and text.

• Interaction in Contemporary graphics, From one-way communication to active participation

Interaction in contemporary graphics is a process that goes beyond one-way message transmission; within this process, the audience is invited to actively participate in the creation of meaning and experience. This fundamental transformation in communicative structure elevates the audience from passivity to active agency, aligning with theories of interactive art, whereby the relationship between the work and the audience becomes dynamic and participatory. The artistic experience of the audience reaches completion when the viewer actively engages in the processes of reception and meaning-making, a process grounded in reciprocal interaction. Audience interaction with graphic works involves the engagement of multiple senses. Sensory stimuli, whether operating independently or in mutual interaction, generate dynamic responses and foster innovative activities. "On the other hand, new actions and consequences reactivate sensory organs, indicating a reciprocal relationship between sensation and action" (Hakim & Rahbarnia, 2022, 13). This characteristic gains greater significance in posters installed in public spaces, where the audience, through movement, pause, or momentary interaction with the work, creates experiences that are often distinct and sometimes unpredictable. In summary, interaction in contemporary urban graphics reflects a shift from one-way communication to active and dynamic audience participation, and emerging technologies have transformed it into a field for creating participatory experiences. "Interactivity is one of the distinctive and significant aspects of virtual graphic design. Within virtual environments, technologies such as V.R[5] and Modeling language can be employed to achieve interaction in graphic design" (Du & Xu, 2022, 1).

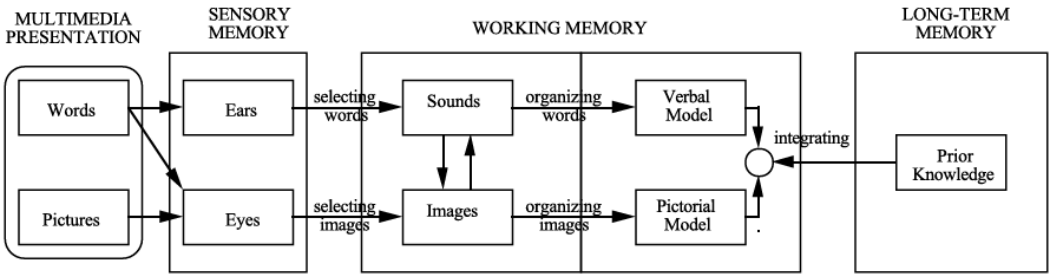


Fig.1. Cognitive theory of multimedia learning. Source: Mayer, 2001, 103.

Contemporary technologies make interactive design in public spaces possible, reducing the boundaries between the work, the designer, and passersby, and generating a dynamic experience.

• Physical interaction and audience participation in public spaces

The physical participation of audiences in interactive graphic design within urban environments refers to creating opportunities for direct and unmediated engagement with the work in order to establish a more effective connection with the concept and purpose of the design. Through the completion of this process of physical interaction between passersby and interactive graphic works, a form of embodied experiential reality is defined. In fact, "the functioning and mode of bodily interaction play a role in the formation of meaningful experiences, and embodiment can be considered influential in the comprehension of meanings and concepts" (Madadi & Rahbarnia, 2024, 124). In motion posters, this interaction is realized through sensory and kinetic actions facilitated by technological tools, whereas in static posters, touch, displacement, or the spontaneous responses of passersby generate a cognitive and lasting experience within working memory.

• Perceptual interaction: From passive reception to active decoding

Perceptual interaction between passersby and interactive graphic works constitutes a form of cognitive engagement with the visual and conceptual structure of the piece, transforming passive reception into active decoding. This type of interaction, which emerges through the use of metaphorical strategies in urban graphic design, is "a cognitive process related to human understanding and the mind" (Lakoff & Johnson, 1980/2020, 14). It generates a multilayered and narrative experience comparable to the reading of literary texts. In effect, "a form of visual gap (White reading)[6] is created between the constructed visual field of the work and the outcome of audience participation, such that viewers fill perceptual gaps, omit certain elements, highlight others, and ultimately receive the message in a personalized manner" (Fatemi & Mousavilar, 2021, 35). Such an experience transforms passersby from passive recipients into active agents within the process of meaning-making and strengthens their cognitive comprehension.

Case Study

• The motion poster "Weltformat" and the process of passerby interaction

The motion poster "Weltformat"[7] (2019) was commissioned for the annual graphic design festival and developed in collaboration with Milk Technology Development Agency. The project is associated with the Weltformat Graphic Design Festival. This work represents a responsive design approach that reflects the theme of the event while creating opportunities for interaction and learning among passersby. The festival's theme, Tools and Rules, explored the relationship between tools, regulations, and creative processes in graphic design, thereby establishing a platform for engagement and experiential discovery. The poster was produced in both printed and motion-based versions. In its printed format, a series of large green rectangular surfaces without textual elements was displayed in the urban environment, accompanied by a Q.R code[8]. Utilizing the green screen technique[9], the design expanded the capacities of motion graphics while simultaneously attracting public attention. The typography of the poster becomes visible only after scanning the code within a digital software environment. In the first stage of encounter, the audience's attention is drawn to the expansive green rectangular fields positioned within the cityscape. In the second stage, prompted by the active and inquisitive mindset of the passerby, scanning the code initiates perceptual interaction through a dynamic and repetitive experience of animated typography appearing unpredictably across various surfaces. In the final stage of interaction, viewers receive animated and transformable textual information presented through unique compositional arrangements, as the digital display integrates with diverse backgrounds. In this work, the green screen method functions not merely as a visual strategy for attracting attention and isolating animated typography from its background, but also as a connective platform linking print media, digital animation processes, and audience participation. The animated textual elements, combined with interactive environments

Table 1. Summary of key theories and models. Source: Authors.

Row	Poster title	Interaction Type	Interaction Level	Interaction Purpose	Methode	Composition
1	Arsenic Season Opening (2023-24)	Physical/ Printed ---- Scratching the poster surface by hand or tools	 Pedestrian interaction solely through physical azction	Simultaneous tesxt-image reveal via scratching and pedestrian interaction	Printed/ Static ---- Scratch-off ink printing	Static/ Multilayered ---- Physically changeable with user participation
2	Weltformat Festival (2019)	Digital/ Motion ---- Interaction via smartphones and code scanning	 Pedestrian interaction through physical and digital actions	Gradual discovery of content with retention via pedestrians physical and cognitive engagement	Printed/ static Digital/ Motion ---- Green screen, animation software programming	Variable interaction dependent ---- Real-time changeability

and customizable background visual effects within the software space, generate a sense of immersion in the digital environment (Fig. 2).

• The printed poster "Arsenic season opening" and the process of passerby interaction

The printed poster "Arsenic Season Opening" (2024) was commissioned by the Arsenic Contemporary Performing Arts Centre[10] contemporain to promote and produce innovative works in the field of performing arts through a creative approach aligned with the institution's objectives. Created within the physical context of urban interactive graphic design, the poster embodies distinctive interactive qualities and was awarded first prize at the International Poster Competition[11] in 2024. The use of scratch-off ink on the poster's surface extends engagement with the work beyond a purely visual experience into a tangible and interactive dimension. Upon first encounter, passersby's attention is drawn to the expansive black surfaces integrated into the urban setting. Subsequently, as curiosity is stimulated and the desire to uncover the message emerges, viewers feel compelled to touch the poster to complete their perceptual experience. The initial act of interaction holds particular significance; traces of previous participants' scratches reveal the poster's scratchable nature to new viewers, thereby initiating a process of active decoding. Ultimately, by scratching designated colored areas and engaging physically through proximity to the surface, the hidden textual information becomes visible. This method transforms passersby from mere spectators into active agents in discovering and interpreting the poster's message. Perception thus shifts from passive observation to embodied interaction, and

Fig. 2. Printed–motion poster of the Weltformat Festival.
Source: www.maximage.biz.

the poster evolves into an interactive and progressively completed phenomenon in which meaning emerges through the physical and perceptual actions of the audience. The accumulated scratch marks resembling natural erosion in public spaces render each iteration of the poster a unique formalistic artifact. By stimulating the sense of touch, the work creates a platform for the personalized construction of meaning (Fig. 3).

Alignment of Multimedia Learning Principles with Motion and Printed Posters in Urban Spaces.

• Multimedia principle

This principle states that "People learn better from words and pictures than from words alone" (Mayer, 2024, 8). In other words, when words and images are presented together, learners are afforded the opportunity to construct both verbal and visual mental models and to establish connections between them (Rahbarnia, 2021, 96). Accordingly, motion and static posters in public spaces, through the simultaneous integration of text and image, generate multilayered mental models that contribute to a

deeper understanding of the message. In the Weltformat poster, although the printed version remains static, the digital version, through animated typography, chromatic layers, and dynamic textual transformations, converts text into an active visual element, thereby fostering an integrated verbal–visual mental model in the audience (Fig. 4-a). In the Arsenic Season Opening poster, the combination of text and image within scratchable layers produces a simultaneous visual and tactile experience; through direct participation, passersby construct a multidimensional mental model that connects image, text, and sensory perception, resulting in a more durable transfer of meaning (Fig. 4-b).

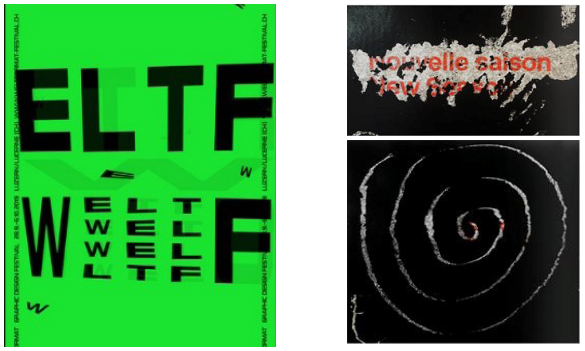
- **Spatial contiguity principle**

Mayer states in this principle that "learning is more effective when corresponding words and pictures are presented near rather than far from each other on the page or screen" (ibid., 2021, 207). In urban interactive graphic design, this principle is realized when the audience, through active engagement in the juxtaposition of textual and visual elements, perceives the message more coherently and retains it within working memory. In the Weltformat poster, the proximity of words and typographic components, together with the continuity of motion in the animated version, reinforces perceptual coherence (Fig. 5-a). In the Arsenic Season Opening poster, the close integration of text and image, combined with the use of scratch-off ink, enables dynamic interaction and strengthens the stabilization of the message within the viewer's working memory (Fig. 5-b).

- **Temporal contiguity principle**

This principle emphasizes that "People learn better when corresponding words and pictures are presented simultaneously rather than successively 1.31[8] Principles for managing essential processing" (ibid., 2024, 20). Mayer further refers to the Immersive Principle, stating that immersive "virtual environments, such as three-dimensional virtual reality videos, can significantly enhance learning when they are aligned with multimedia principles" (Makransky & Mayer, 2022, 1772). In urban environments, the presence of interactive graphic design enables the simultaneous experience of text and image, thereby accelerating information processing and fostering stable connections within working memory. The Weltformat poster effectively demonstrates this principle through the integration of its printed layer and interactive digital motion version. The dedicated application software designed for this poster transforms

Fig. 3. Printed–motion poster of the Weltformat Graphic Design Festival. Source : www.maximage.biz.



(a) (b)

Fig. 4. Multimedia Principle in the Weltformat Poster. Source: www.maximage.biz/ b. Multimedia Principle in the Arsenic Poster. Source: Wilson & Gilchrist, 2024, 200.

urban space into a dynamic platform for interaction. By scanning the smart code, the audience is connected to an animated and typographic digital environment, where visual–interactive simultaneity facilitates faster cognitive processing and reinforces message retention (Fig. 6-a). In the Arsenic Season Opening poster, the act of scratching the ink surface generates abstract visual forms, while physical interaction activates the simultaneous processing of textual and visual elements, leading to deeper and more enduring encoding of the message in memory (Fig. 6-b).

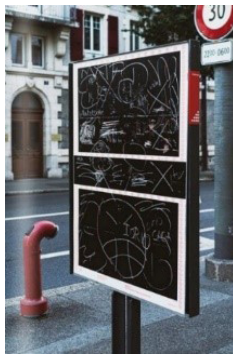
- **Coherence principle**

Mayer states in this principle that "people learn better when extraneous material is excluded rather than included" (Mayer & Fiorella, 2022, 185). Accordingly, eliminating irrelevant elements in multimedia presentations enhances passersby's focus, reduces cognitive load, and improves the quality of message reception within urban environments. Interactive urban posters, composed of visual, kinetic, and textual layers, may disrupt the audience's interaction pathway if overcrowded with excessive elements. Emphasizing key components and maintaining a coherent structure ensures message clarity and provides an integrated perceptual experience for viewers. In the Weltformat poster, the animated typography is designed without superfluous details, and all components function in service of communicating the event's concept. Similarly, in the Arsenic Season Opening poster, the act of scratching the ink and revealing hidden textual and visual elements transforms the composition into a unified whole, generating a coherent and comprehensible experience for the audience.

- **Modality principle**

Mayer states that "People learn better from graphics and narration than from graphics and on-screen text" (Mayer, 2021, 281). This principle is grounded in the dual-channel assumption, emphasizing the reception of information through both visual and verbal sensory channels. The simultaneous activation of these channels enables more efficient processing and retention of concepts within working memory.

(a)



(b)

Fig. 5. a. Spatial Contiguity Principle in the Weltformat Poster . Source: www.maximage.biz/ b. Spatial Contiguity Principle in the Arsenic Poster. Source: Wilson & Gilchrist,2024, 196.

(a)

(b)

Fig. 6. a. Temporal Contiguity Principle in the Weltformat Poster. Source: www.instagram.com/tv/B3Frbk8hNg1/?igsh=Z2VlaThxMTA2ODAz/ b. Temporal Contiguity Principle in the Arsenic Poster. Source: www .intl.international.

Moreover, based on spatial cognition, the presentation of text and image together leads to meaningful learning (Rahbarnia, 2020, 99). In interactive urban posters, engaging multiple sensory modalities plays a significant role in transmitting and reinforcing the message within public space. The sense of touch, as an emerging dimension, strengthens participatory experience in interactive graphic design. Although touch can perceive only a limited portion of an object at any given time, its immediacy and reliability allow direct verification and testing of what is visually perceived (Korsmeyer, 2004/2020, 178). Compared with vision and hearing, traditionally regarded as rational senses, touch has historically been considered a secondary sense (ibid., 177). Nevertheless, tactile interaction with motion and static posters in urban spaces, whether through movement of elements or scratching surfaces, enhances active processing and leads to deeper engagement and stronger message retention. In the Weltformat poster, the printed version activates the visual channel primarily, whereas the interactive motion version simultaneously engages visual and motor–tactile channels (through smartphone movement and physical interaction), creating a more comprehensive participatory experience. In the Arsenic Season Opening poster, the act of scratching the ink surface activates not only visual perception but also tactile sensation, thereby reinforcing the learning process and rendering message comprehension more durable.

- **Redundancy principle**

"People do not learn better when printed text is added to graphics and narration; people learn better from graphics and narration than from graphics, narration, and printed text, when the lesson is fast-paced" (Mayer, 2024, 20). This principle emphasizes maximizing visual capacity by integrating static and dynamic elements while avoiding extraneous information. In urban interactive posters, this approach, combined with concise presentation, enhances message retention in working memory. In Weltformat, the printed version attracts attention with simple visuals, and the animated version consolidates the message through interaction and clear, concise text. In the Arsenic poster, concise static information enables effective message reception.

- **Personalization principle**

This principle states that "learning from multimedia lessons is more effective when words are in conversational style rather than formal style" (ibid., 2021, 305). In interactive urban posters, citizens who possess prior knowledge of art, the event, or the poster's message are better able to compensate for gaps in multimedia guidance within the urban setting and to construct visual representations through participatory experience. In contrast, individuals with limited prior knowledge or lower spatial ability tend to allocate a greater portion of their cognitive capacity to retaining the message itself, resulting in reduced depth of processing. In the Weltformat poster, the coexistence of printed and motion-based versions enables adaptation to varying levels of prior knowledge and spatial ability among passersby; more proficient users tend to benefit from the digital interactive version, while general audiences may engage more readily with the printed format. In the static Arsenic Season Opening poster, attentive viewers reveal hidden layers through the scratchable surface, not only uncovering the message but also stimulating the curiosity of less active audiences. Thus, each passerby, according to their prior knowledge, perceptual capacity, and the influence of the urban environment, may experience a unique spectrum of interaction, ranging from simple engagement to more complex interpretive involvement with text and image.

Comparative Analysis of the Case Studies

The findings indicate that the concept of interaction in each poster is represented differently in alignment with Mayer's principles, directly and purposefully influencing the audience's experience of encountering the posters in urban space. A primary common feature of both works lies in the use of flat framing and solid color fields to attract initial attention within the public environment. At first glance, passersby do not receive explicit information; rather, the poster's principal function, conveying meaning is revealed through active engagement. The Weltformat poster, through its dual printed and digital design, applies the principles of sensory channel simultaneity as well as spatial and temporal contiguity. By engaging both the digital

environment and the urban setting simultaneously, viewers encounter animated imagery and typography, and through tactile and visual movements experience a multisensory and immersive process that reinforces multilayered mental models. In contrast, the Arsenic Season Opening poster, despite its apparent stillness, emphasizes physical and sensory interaction to prompt a moment of pause among passersby. The scratchable ink activates tactile perception and reinforces spatial proximity between elements, enabling direct participation and generating a personalized and unique experience. Consequently, each viewer determines the type and intensity of interaction according to their prior knowledge and attentiveness. From a comparative perspective, the Weltformat poster centers on digital immersion and the simultaneous activation of multiple sensory channels, making it particularly suitable for technologically familiar users. The Arsenic Season Opening poster, however, foregrounds physical interaction, offering a more tactile and individualized experience that remains accessible to a broader range of audiences within public spaces (Table 2).

Discussion

Based on Richard Mayer's Cognitive Theory of Multimedia Learning, which is grounded in the three core assumptions of dual channels, limited capacity, and active processing, interaction in urban interactive graphic design engages simultaneous sensory involvement and active mental participation. In motion and static interactive posters, this interaction manifests in two forms: physical interaction, accompanied by kinetic and tactile actions that generate cognitive experience and active agency; and perceptual interaction, which operates through mental processing and cognitive mechanisms, enabling decoding and personal meaning-making. Accordingly, alignment of these works with Mayer's principles activates multiple sensory channels, strengthens cognitive and perceptual processes, and enhances the durability of the message in the minds of passersby (Fig. 7).

Conclusion

The purposeful integration of multimedia principles in the design of urban interactive posters enhances the cognitive, perceptual, and sensory capacities of viewers, creating a lasting, participatory, and personalized experience. Utilizing these capabilities in urban interactive graphics not only contributes to the creation of more innovative works and reduces the boundaries between the client, designer, artwork, and audience, but also strengthens citizens' sense of belonging to the city. This study aimed to reinterpret the concept of interaction and align the principles of Richard Mayer's Multimedia Learning theory with Motion Posters and Printed Posters in urban environments. The findings, based on theoretical analysis and case studies, demonstrate the correspondence of Mayer's fundamental principles with the processes of interaction, perception, and learning of citizens as social learners engaging with interactive graphic

Table 2. Alignment of Mayer's Principles with the Two Interactive Poster Case Studies. Source: Authors .

Row	Poster title	Multimedia	Spatial Contiguity	Temporal Contiguity	Coherence	Modality	Redundancy	Pers
1	Arsenic Season Opening (2023-24)	Multisensory experience ---- Combining text and visuals with tactile sense	Coherent comopsition ---- Text and visuals through user interaction	Simultaneous visual display ---- Simultaneous text-image revael via poster ink scratching	Coherent interactive structure ---- Coherent message reception	Mutisensory engagement ---- Enhanced perception through visual-tactile intergration	Remove duplicates ---- Physical interaction with staged content	Free participation ---- Interaction levels by motivation and background
2	Weltformat Festival (2019)	Multisensory experience ---- Animated combination of text and visuals	Coherent comopsition ---- Prosimity of text and visual elements in comopsition	Simultaneous visual ---- Simultaneous dynamic and static visuals with interaction	Remove unnecessary ---- Focus on effective structured message delivery	Mutisensory engagement ---- Enhanced multisensory perception	Avoid Simultaneous presentation ---- Avoiding redundant info in interactive layout	Interactive experience ---- Personalized interactive experience

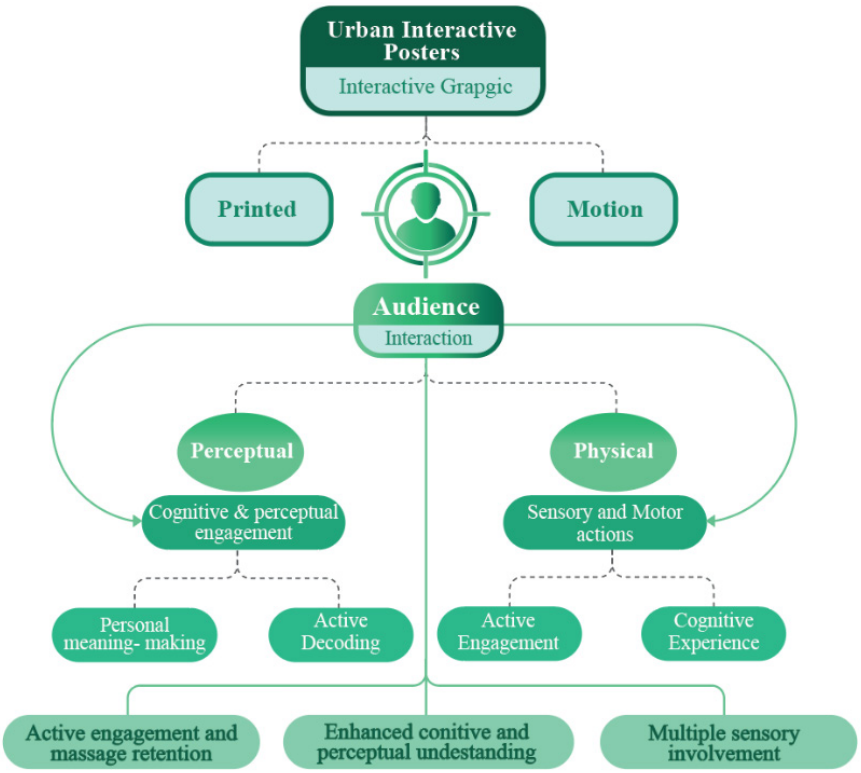


Fig. 7. Alignment of the Cognitive Theory of Multimedia Learning with Urban Interactive Posters. Source: Authors.

works. Accordingly, effective interaction between the audience and graphic elements in urban spaces requires the deliberate use of multiple sensory channels, enabling active decoding and personalized interpretations tied to lived urban experience. In response to the research questions regarding how interaction occurs in urban Motion Posters and Printed Posters, and the role of multimedia learning principles in audience engagement, the study shows that interaction manifests both physically through sensory and motor actionsand cognitively, through mental and semantic engagement, transforming passive viewers into active participants. The analysis of two case studies, Weltformat Festival poster (print–motion) and Arsenic Season Opening poster (print–static), reveals the creation of a multisensory, dynamic experience in both the design and display of these works in the urban context. These works, as integral parts of the urban fabric, generate layered, multisensory experiences, fostering participation in the flow of the city and reinforcing the human role as an influential agent in the environment. Future research could explore a comparative evaluation of embodiment in audience experience and assess interactivity across other types of urban interactive graphics, offering new perspectives for the development of multisensory design.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Endnotes

1. Motion posters: Contemporary graphic posters that, by utilizing digital technologies and new media, go beyond the limitations of printed posters and create a dynamic, multidimensional experience for the audience through the combination of images, motion, and sound.
2. Printed posters: Static posters that, since the introduction of visual communication into the field of visual arts, have primarily been presented in public spaces using printing tools (Ding, 2022, 14).
3. Richard E. Mayer (Born 1947)
4. Maximage: A leading studio in Switzerland, active in various fields of interactive graphics, including poster design, visual identity, book publishing, typeface design, and digital solutions.
5. V.R: Virtual Reality
6. Indeterminate texts contain ambiguities and gaps that the reader fills in using their own experience and understanding. Wolfgang Iser calls this process “white reading” (Taslimi, 2022, 109).
7. An annual graphic design festival in Lucerne, Switzerland (since 2009), featuring exhibitions and events that facilitate professional interaction between designers and a global audience.
8. Q.R code: A Quick Response code, a type of two-dimensional barcode that can be scanned by smartphones or digital devices to provide instant access to information, websites, or interactive content.

9. Green screen technique: A digital method that replaces green or blue backgrounds with visual layers, adapted from cinema to motion graphics.
10. A multi-purpose venue in Lausanne, Switzerland, dedicated to contemporary performing arts and supporting innovative artistic productions.
11. INTL: International Poster Competition

References list

• Daneshgar, F. (2017). The effectiveness of three-dimensional urban advertising from the perspective of iconology. *International Journal of Urban and Rural Management, 15*(45), 249–258. http://ijurm.imo.org.ir/article-11463--en.html

• Daneshgar, F., & Taheri, M. (2021). A composition Survey on Urban Billboards and Bridge Decks of Tehran (2015–2017). *Painting Graphic Research, 3*(5), 53–65. https://doi.org/10.22051/PGR.2020.33322.1088

• Ding, W., Fan, W., & Zhenhai, L. (2022). The future prospect of dynamic poster design in the context of new media. *Symposium on Creative Technology and Digital Media,* (27), 13–22. https://doi.org/10.54941/ahfe1001436

• Du, Y., & Xu, D. (2022). Analysis of graphic design based on AI interaction technology. *Journal of Environmental and Public Health,* (22), 1–7. https://doi.org/10.11558493528/2022/

• Fatemi, F., & Mousavilar, A. S. (2021). The aesthetic of Reception in interactive installation art, read based on Wolfgang Iser's theory. *Kimia Honar, 10*(39), 23–35. https://doi.org/10.52547/kimiahonar.10.39.23

• Hakim, A., & Rahbarnia, Z. (2022). Aesthetic experience in interactive art (Based on John Dewey›s theory). *Fine Arts: Visual Arts, 26*(3), 5–15. https://doi.org/10.22059/jfava.2018.253942.665890

• Hemmati Vineh, M., Khazaie, M., & Hatam, G. (2020). The application of contemporary interactive graphics in the cities through studying «John Fiske» theories (Approach: Environmental development culture). *Theoretical Principles of Visual Arts, 5*(10), 81–97. https://doi.org/10.22051/JTPVA.2021.33073.1234

• Korsmeyer, C. (2020). *Gender and Aesthetics: An Introduction* (M. Dasturi, Trans.). Maneshour-e Solh. (Original work published 2004)

• Lakoff, G., & Johnson, M. (2020). *Metaphors we live by* (R. Gandomkar, Trans.). Elmi Publications. (Original work published 1980)

• Madadi, S., & Rahbarnia, Z. (2024). The metaphorical concept of time in interactive art installations centered around Van Gogh›s works. Glory of Art (Jelve-y Honar). *Alzahra Scientific Quarterly Journal, 16*(3), 121–136. https://doi.org/10.22051/jjh.2024.47140.2169

• Makransky, G., & Mayer, R, E. (2022). Benefits of taking a virtual field trip in immersive virtual reality: Evidence for the immersion principle in multimedia learning. *Educational Psychology Review,* (34), 1771–1798. https://doi.org/10.1007/s106484-09675-022-

• Mayer, R. E. (2001). *Multimedia learning*. Cambridge University Press.

• Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.

• Mayer, R. E. (2021). *Multimedia learning* (3rd ed.). Cambridge University Press.

• Mayer, R. E. (2024). The past, present, and future of the cognitive theory of multimedia learning. *Educational Psychology Review, 36*(1), 2–25. https://doi.org/10.1007/s106481-09842-023-

• Mayer, R. E., & Fiorella, L. (Eds.). (2022). *The Cambridge handbook of multimedia learning* (3rd ed.). Cambridge University Press.

• Petković, G., Pasanec Preprotić, S., & Kozjan Cindrić, A. (2025). Experiential graphic design: Informing, inspiring, and integrating people in physical spaces—A review. *Buildings, 15*(11), 1862. https://doi.org/10.3390/buildings15111862

• Rahbarnia, Z. (2020). *Apporoaching transformation of art exhibitions: through learning theories.* Alzahra University.

• Taslimi, A. (2022). *(شعر): پیشامدرن، مدرن، پست‌مدرن گزاره‌هایی از ادبیات معاصر ایران* [Some of the propositions of contemporary iranian literature (poem): premodern , modern , postmodern]. Akhtaran. [in Persian]

• Wang, Y., & Li, Y. (2024). Research on dynamic poster design in the digital age. *Highlights in Art and Design, 7*(2), 12–16. https://doi.org/10.54097/e3mmwv49

• Wilson, B., & Gilchrist, J. (2024). *The International Book Poster 9*. Pureprint Group.

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