When senses are in conflict: Hamilton Building at the Denver Art Museum

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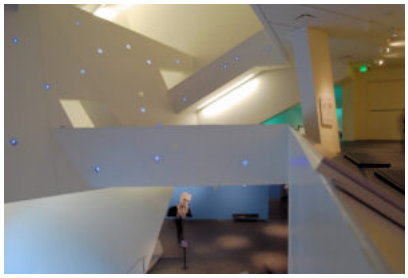
Titanium exterior of the Frederic C. Hamilton Building, Denver, Colorado. Emerging technology made it possible to construct new, angled building forms such as the Hamilton Building. Photo: Cosmin Caciuc, 2007

Daniel Libeskind's Frederic C. Hamilton Building at the Denver Art Museum opened in 2006; it was the first Libeskind building for the United States. Intended to be a statement piece for the city of Denver, its earliest concept drawings referenced angled shapes inherent in the rocky mountain landscapes west of the city. However, the Hamilton building's form strongly contrasts other buildings in the immediate surrounding urban context. Libeskind was among the first to

experiment with emerging 3D design, modelling and digital fabrication technology including using automated control for positioning the angles of the titanium and steel building elements (Johnson 2016). Prior to the emergence of these digital generation and fabrication tools, such non-orthogonal forms were largely cost prohibitive. Advances in technology supported the creation of new building forms. Users interacting with these new forms had new perceptual experiences with some unanticipated results.

Some have reported experiencing dizziness while ascending on the museum's stair where the walls, ceiling and floors converge and diverge altering one's visual sense of being upright. Photo: Meredith Banasiak, 2018

The angled interior of the Hamilton building is consistent with its exterior. Some users have reported experiencing a sense of dizziness in response to the angles, particularly on the main staircase where not only the walls and ceiling converge and diverge at angles, but also the floor plane inclines to provide the intended vertical circulation. The likely source of dizziness is a visitor's brain struggling to orient itself in space. Orientation relies on input from multiple sources. The brain attempts to integrate converging inputs from vestibular, visual, and proprioceptive systems to adjust posture and movement and maintain desired orientation. One source of input comes from vestibular structures in the inner ear. A layer of gravel-like crystals presses down on a dense bed of sensory cells in response to gravity (Baloh et al. 2010) signaling whether the head (and by association, the body) is upright or tilted. Standing on the stairs, the message from these inner ear cells to the brain is, "upright!". Meanwhile, the visual system also contributes information about body position (Witkin and Asch 1948). The disorienting visual cues from the angled planes defining the stairway signal that the body is "*not* upright!". The result can be an imperceptible experience, "Am I upright? Am I not upright?," as the brain struggles to make sense of the competing messages and adjust body position. The result is that some users report experiencing a sense of dizziness.



The four-story El Pomar Grand Atrium in the Denver Art Museum's Frederic C. Hamilton Building, Denver, Colorado. Photo: Cosmin Caciuc, 2007

Similar disorienting experiences have been documented by users of Frank Gehry's buildings such as in MIT's Strata Center where the spatial complexity of the undulating planes in the conference room reportedly cause one third of visitors to feel dizzy (Smith 2007). Such dizziness effects not only create sensory discomfort, but also physical mobility concerns potentially increasing the risk of falls for visitors who miscalculate movements resulting from conflicting sensory information. Libeskind's Contemporary Jewish Museum in San Francisco completed in 2008 also utilizes his characteristic angled forms; however, the stairs at the Contemporary Jewish Museum offer visitors one orthogonal side wall plane which helps orient visitors in space potentially reducing sensations of dizziness and subsequent falls.

Does the building emotionally bias or confuse what the experience of that same painting might be in a different physical environment? The architecture of the Hamilton building primes the user for an experience which may not be consistent with some of its visual art works and temporary exhibit themes. Studies have shown that context influences a user's ratings of beauty and preference for an artwork, and thus a museum can induce a certain way of viewing an object (van Paasschen et al. 2015). According to Chatterjee and Vartanian's model of neuroaesthetic experience which illustrates the interaction between sensory–motor, emotion–valuation, and meaning–knowledge neural systems, (Chatterjee and Vartanian 2014) building geometries can influence a user's aesthetic experience and contribute to differences in perceived emotion and meaning (Banaei et al. 2017). Hence, the container-contents relationship, described as how the exhibit space and art legitimize each other (Joy 1998), is at odds in cases where there is a conflict between the perceptual responses generated by the building and by the art. For example, neuroscience studies have shown that a fear response is triggered in the brain by sharp objects and sharply angled spaces because sharpness signals threat (Vartanian et al. 2013, Bar and Neta 2007). The perceptual experience of the Hamilton building's sharp contours, as well as the stairwell experience which may predispose a user to sensations of dizziness, likely support a state of high physiological arousal. Yet, this architectural experience could be in conflict with visual art pieces which aim to support contemplative states more closely associated with calmness.

Tuning the interaction effect so that there is not a disconnect between building and art, between container and contents, means including or commissioning exhibit material which aligns with and is supported by the building itself. Certainly, not all art intends to be calming. To the contrary, highly arousing art forms exist and can be created for which the Hamilton building is an ideal resonator. The novel architectural form and resulting new perceptual experiences have been an impetus for artists and curators to inspire new art and exhibit installations created for this specific building (Lindsay 2016). Art with themes more aligned with the building's perceptual and emotional experience have emerged such as Matthew Brannon's large scale vinyl wall mural "Last to Know" (2009) depicting sharp and serrated knives oriented in the direction of the angled plane adjacent to the stairs in the Hamilton Building, and amplifying sensations of sharpness. In addition, immersive exhibits including interactive animations projected on angled walls in cave-like spaces gives users realistic sensations of being on Arctic icebergs. In such cases, the museum's architecture and art comingle and is experienced by the whole body and multiple senses interacting.

Because the Denver Art Museum includes many temporary and rotating exhibits, exhibits which must fit into many different museum buildings along their tour, the museum faces a greater challenge in aligning perceptual experiences between container and contents than museums which house permanent collections where interactions can be better anticipated and choreographed from design inception.

Chronic detrimental effects of multisensory conflict caused by abundant and disconnected sensory information have been documented in long term residents of urban environments where it is believed that psychotic symptoms and psychiatric disorders are triggered by an inability to inhibit the constant multitude of attention-demanding dissonant stimuli in the environment (Golembiewski 2017). The acute, short term effects of sensory conflict commensurate with museum visits are less understood. No matter what the intended emotive or sensorial message, optimizing multisensory information and reducing sensory conflict between the art and the environment supports greater perceptibility of the messaging. Such a strategy not only promotes good design, but also ethical design by providing an experience supporting diverse perceptual abilities so that the museum can remain an accessible place for all.

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