

Introduction

Humans in today's world lack rich, embodied knowledge of their relationship to ecological systems (Pallasmaa 2011). As centers of knowledge, botanic gardens have a responsibility to acquire, preserve, research, and interpret information about plants (Hohn 2008). One of their primary ways of achieving these ends is through planted environments (Monem & Craig 2007, Hohn 2008). To effectively design botanic gardens as knowledge-building experiences, it is essential to understand how they capture visitors' attention. Attention can be defined into two types, directed and involuntary (Kaplan & Kaplan 1989, Herzog et al. 2003). In botanic gardens, directed attention is supported through programming, signage systems, and educational activities. Involuntary attention as a factor of enjoyment in of natural areas and botanic gardens is widely recognized (Berman et al 2008, Packer 2013). However, physical design to support involuntary attention through planting design, particularly in the context of botanic gardens, is poorly understood.

This project investigates how the botanic garden planting can be designed to instigate involuntary attention. A framework of design strategies to support involuntary attention will be developed through literature review and precedent study. The efficacy of the framework for informing design decisions will be tested through redesign of Chapman Botanical Garden in Apalachicola, Florida, and involvement with the Meadow on the Kansas State University Campus in Manhattan, Kansas. Understanding how physical design can instigate involuntary attention will enable designers to create botanic garden plantings with greater power to capture visitors' attention and inspire their imaginations.

Background

Botanic gardens are centers of knowledge about the relationship between humans and plants (Monem & Craig 2007, Hohn 2008, Rakow & Lee 2011). Their functions include acquiring, preserving, researching, and interpreting collections of living plants in designated places (Hohn 2008). A widespread lack of human understanding of natural system functions reveals a necessity for botanic gardens to think critically about how they communicate knowledge (Pyle 2003). Many botanic gardens already have established education and public outreach efforts (Gough & Accordino 2011). In addition, many botanic gardens have incorporated “sustainable” or “ecofriendly” gardens with interpretive signage, in the hopes of encouraging people to understand connections to landscape systems (Oudolf & Kingsbury 2013).

Visitor Motivation

Such efforts, as well-meaning as they may be, tend to concentrate primarily on cognitive knowledge. Studies conducted in a wide variety of situations have demonstrated that botanic garden visitors have little desire participate in learning experiences (Connell & Meyer 2004, Ballantyne et al 2007). Instead, their motivation often focuses on ideas of “enjoyment” and “restoration” (Ballantyne et al 2007), qualities that involve involuntary rather than cognitive attention. Gurian writes about museums in general, but her words ring especially true for botanic gardens. She says, “for the visitor, it is the experience of simultaneously being in a social and often celebratory space while focusing on a multisensory experience that makes a museum effective” (Gurian 2004, 282).

Design for Involuntary Attention

Given that experiential, non-cognitive qualities are the major motivation for people to visit botanic gardens, it becomes apparent that involuntary attention should be a major consideration for design. Extensive research in learning outcomes at science and discovery centers has demonstrated that, whether they intend to or not, people learn from and remember exhibits that stir their emotions (Edwards 2000, EcSite 2006). Instead of dismissing exhibits as a simple act of putting objects on display, contemporary museums are realizing the power of experience to shape visitor understanding (McLuhan 1967, Roberts 2004).

Driving Factors in Botanic Garden Design

Acknowledging that interpretation is an integral part of display highlights the necessity to intentionally shape involuntary and directed attention in botanic garden experiences. In medieval times and during the Renaissance, botanic gardens were often designed as physical

realizations of mental structures, such as astronomic or taxonomic concepts (Johnson 2011). By the mid-19th century, when many American botanic gardens were established, physical design of botanic gardens has often moved towards more generalized themes, often based in geography and ecology (Monem & Craig 2007). Today, most botanic gardens continue to be designed around such themes (Corner 2008). In addition to retaining a similar conceptual basis, the physical experience of many American botanic gardens continues to reflect widespread, historically-oriented landscape styles (Monem & Craig 2007).

Agency of Experience

There is no issue with recreating historic landscapes in their own right. However, today's widespread lack of localized ecological knowledge requires that botanic gardens become active forces for landscape change (Pyle 2003, Gurian 2004). Widespread urbanization and separation from natural processes leaves many humans with almost total ignorance of landscape elements and functions (Cronon 1995, Pyle 2003, Marris 2013). As centers of knowledge regarding human relationships with plants and natural systems, botanic gardens cannot continue to perpetuate reductionist landscape norms which reflect outdated ways of understanding (Cronon 1995, Hitchmough 2008).

Attempts to Maximize Experience

Various approaches to site and experiential design have been suggested as ways to develop richer relationships between humans and ecological systems. Ecologically-influenced and native planting are widespread in the United States (Kingsbury & Oudolf 2013). Unfortunately, they are often perceived as "messy" and unattractive (Nassauer 1995). Other approaches to augmenting practical landscape knowledge at the regional level have been suggested, but few have been adopted. Urban forester Roland Gustavsson calls for the establishment of reference landscapes, gathered together in "landscape laboratories", in which landscape "concepts and management alternatives represented in a concentrated way can be studied" (Gustavsson et al. 2005, 390). Mediterranean historian and scholar Louisa Jones points to historic precedents of agriculturally-based cultures as inspiration for productive relationships between humans and their environments (Jones & Nichols 2012). However, these conceptual and stylistic approaches fall short of their full transformative potential when designers lack a clear understanding of how to support involuntary aspects of physical experience through design.

Methodology

How can the planting design of a botanic garden utilize involuntary aspects of physical experience to enable botanic gardens to have greater agency as local laboratories of landscape knowledge in the 21st century?

In order to build understanding of how planting design can support botanic gardens as local laboratories of landscape knowledge, a framework of design strategies that instigate affective experiences will be developed. Methods used in creation of the framework will include literature review to understand qualities that support different types of attention, critical drawing of transformative planting designs to understand how attention-supporting qualities are realized, and inquiry through design to understand the efficacy of the proposed framework (see Figure 1).

Figure 1. Methodology

FRAMEWORK DEVELOPMENT

Literature Review



identify overall goals
(horizontal rows)

Critical Drawing



identify physical design strategies used in precedents
(body of table)

TESTING THROUGH APPLICATION

Application to Design Process



understand efficacy for design of new space
(utilize entire table)

Application to Existing Site



understand efficacy for incremental/evaluative purposes
(utilize entire table)

REFLECTION ON FRAMEWORK

Reflection + Documentation



adapt based on efficacy, reflect on process
(update entire table)

Framework Development

Literature review on physical design that fosters involuntary attention will be used to identify overall goals for supporting informal learning through botanic garden experiences. Initial literature review suggests that most established research on involuntary attention in landscapes stems from Attention Restoration Theory, particularly as outlined by Rachel Kaplan and Stephen Kaplan. In *The Experience of Nature*, they set forth four aspects of environments that foster involuntary attention: being away, extent, fascination, and compatibility (Kaplan & Kaplan 1989). In order to develop practical understandings of these concepts for application, each concept will be defined and examined in the light of other research on physical design to foster involuntary attention.

It is important to understand that this study focuses purely on physical design strategies, rather than conceptual or narrative strategies. The idea of *affordances* suggests that objects afford potential for action or relation through a totality of their physical attributes (Gibson 1979, Ingold 2000, Tilley 2004). In the context of landscapes, a multiplicity of objects creates a mass of affordances, which relates to the potential of a site to be *affective* - its ability to provoke interest and involvement.

Directed attention relies on common knowledge to afford understanding or affect transformation (Hunt 2008). Because knowledge regarding plants and planted environments is lacking in most visitors to botanic gardens, this study approaches the affordances and affects of landscape through physical design to instigate involuntary attention. By focusing on the lowest common denominators of landscape experience, the study hopes to achieve a resulting framework that allows for wide applicability to gardens that will realize a wide variety of concepts and appeal to a wide variety of audiences.

Critical Drawing for Identification of Design Strategies to Support Involuntary Attention

To find precedents for creating environmental experiences that provoke involuntary attention, this study will look to contemporary planting design. While older gardens were often designed as free art or pure restoration that elicited the full cognitive attention of their visitors, contemporary planting design must capture the attention of media-saturated visitors (Johnson 2011, Oudolf & Kingsbury 2013). Given the conditions surrounding planting design today, planting designers have leveraged the potential of landscape to distract viewers from their cognitive concerns through rich kinesthetic experiences (Oudolf & Kingsbury 2013).

In his seminal essay "Contemporary overview of naturalistic planting design", published in Hitchmough and Dunnett's *The Dynamic*

Landscape, Noel Kingsbury sets forth a continuum of six conceptual positions relating to the relationship between aesthetic and ecological concerns in design (Kingsbury 2004). This range of conceptual approaches yields a wide variety of formal and spatial qualities to the projects (see Figure 2).

Approaches to Contemporary Planting Design

adapted from Noel Kingsbury's "Contemporary overview of naturalistic planting design"
published in *The Dynamic Landscape*, Hitchmough and Dunnett 2004

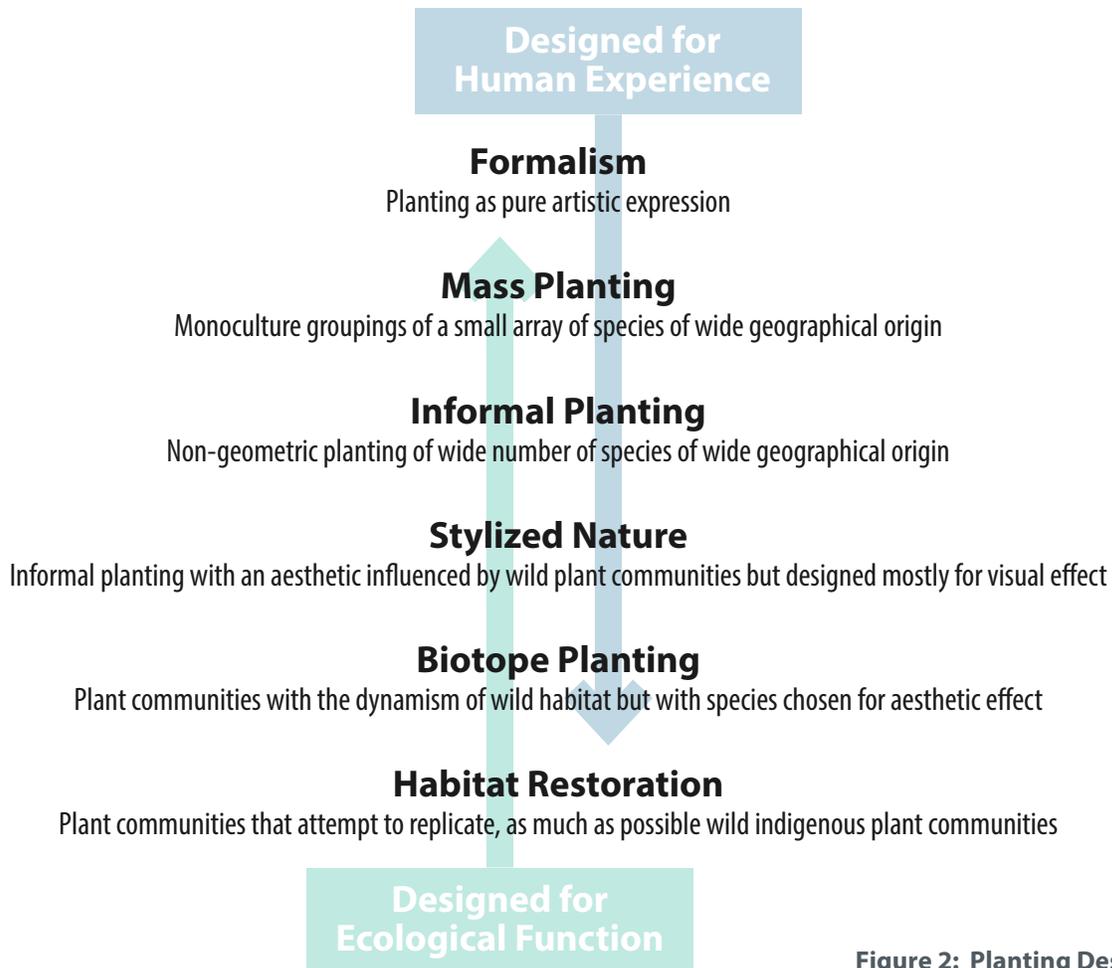


Figure 2: Planting Design Continuum

Within each of these categories, a designer has been chosen that exemplifies the approach to design and a flagship project identified. Individual projects were chosen based on their transformative quality (Chan et al. 2012). For a project to be transformative, it must be strongly apparent that nothing quite like it had ever been done before, it was widely publicized, and widespread trends in planting design followed its creation. In addition, the projects were required to be open to the public and comparable in scale. By exploring the planting designs

for these six projects and extracting physical strategies that provoke involuntary attention, new strategies for creating planting designs in botanic gardens will emerge.

Critical Drawing

Critical drawing of specific garden areas within each of these precedent designs will be used as a way to get to know and understand the proposed elements for each of these planting designs (Olin 2008). Contemporary plantings often exhibit highly complex and sophisticated physical organizations, requiring careful consideration to understand (Dunnett et al. 2004). Critical drawing offers the possibility of getting to know the proposed design at both a cognitive and kinesthetic level (Dutoit 2008, Treib 2008, Dee 2012). Given that the project is intended to explore the factors which make planting designs generative and evocative experiences, it is essential to utilize a method of investigation that reflects such an approach.

Critical drawings for each project will consist of a plan and three sections (taken at the “entry”, area of primary development, and “exit” point), based on published planting design documentation. If planting plans are not available through published sources, the designers or their firms will be contacted and documentation obtained. Drawings will be conducted primarily in colored pencil, possibly with washes of charcoal, pastel, and/or watercolor (see Figure 3). The drawings will be conducted at parallel scales to ensure comparability of conclusions.

With a drawn understanding, the proposed relationships between humans and plant material will be revealed, along with the plants’ physical characteristics. Following the comprehensive drawings, different attributes will be extracted and patterns isolated according to initial functions revealed through literature review. Such diagramming will be supported through digital technology, including Illustrator and Photoshop.

Precedents

Charles Jencks: Garden of Cosmic Speculation

The Garden of Cosmic Speculation is the outcome of Jencks’ interest in the realization of scientific concepts through artistic landscapes (Jencks 2003). As an example of what Kingsbury terms *formality*, it uses vegetation as a surface texture, almost a green carpet to cover landforms. The entire site is conceived as a deeply reflective and symbolic experience. Jenck cites inspiration for its form in such wide-ranging aspects as the double helix of DNA, the stepped ziggurats of the Egyptians, and the spiral staircase at Chambord (Jencks 2003)



Figure 3: Critical Drawing
colored pencil drawing based on planting plan by Piet Oudolf
published in Piet Oudolf: *Landscapes in Landscapes*, Oudolf and Kingsbury 2011

Jencks believed that his design offered deep richness with multiple meanings “A landscape garden should not be a place through which one races on the way to somewhere else, but rather a place of imaginative exploration” (Jencks 2003, 58).

Gilles Clement: Serial Gardens, Parc Andre Citroen,

Clement’s work mediates between a wide variety of design concepts. Parc Andre Citroen is no exception. An example of *mass planting*, Clement’s approach focuses on global ecologies and cultural relevance. While most of Paris has little access to fresh water, the grounds of the decommissioned Citroen factory are adjacent to the Seine, with an abundance of fresh water (Rocca 2008). With this in mind, the gardens of the Parc are themed to display the idea of water as a precious resource, an alchemic material (Rocca 2008). The Serial Gardens are based on the alchemistic transformations of base metal into gold, sequentially representing a different metal (Filor 2004). In addition, each garden is themed according to colors, days of the week, human senses, planets and aspects of water (Filor 2004, Rocca 2008). Given the levels of meaning informing the design of this garden, it should be fruitful to examine physical strategies to attract both directed and involuntary attention.

Piet Oudolf: Lurie Garden, Millennium Park

The Lurie Garden is designed as an *informal planting* with strong graphic legibility within horticultural complexity. Oudolf’s concept diagram for the colored bands reflects the overall clear color patterning. Similarly to the majority of Oudolf’s work, it is deeply inspired by the intermingling of the North American prairie (Oudolf 2011). When installed in 2004, it was one of the first large-scale planting designs in the United States to demonstrate an intermingled planting style (Oudolf 2011). Piet replicated the violet-blue salvia river from the Dream Park, Enköping, Sweden - “it was one of the few times that I really copied myself, it had to do with the graphical quality of the concept, it had to be seen from the surrounding skyscrapers” (Oudolf & Kingsbury 2013, 55). Oudolf’s work emphasizes the evocative, sensual aspects of landscape rather than more literal concepts, having a strong emphasis on involuntary attention.

Oehme van Sweden: Native Plant Garden, New York Botanic Garden

The new Native Plant Garden at New York Botanic Garden is an example of *stylized nature*, utilizing indigenous plant species in highly intentional design forms. A recent project that the designers claim to be transformative in the understanding of ecological planting, the Native

Plant Garden at New York Botanic Garden was designed with particular sensitivity to the existing elements of site with plant grouping arranged according to fragmented fractal geometries (New York Botanical Garden 2012). Sheila Brady of OvS claims that, in designing this project, the design team wanted the planting design to be understood as a highly intentional, designed space rather than the frequently expressed goal of “native” plantings to be purely ecological restorations (New York Botanical Garden 2012). Understanding how this site provokes involuntary and directed attention through its physical design could yield significant understandings to apply in other situations.

Hitchmough, Dunnett + Price: London Olympic Park Plantings

As a recent example of *biotope planting*, the London Olympic Park Plantings were divided into four garden areas with geographically-based plant palettes. According to their recent article in *Topos*, Dunnett and Hitchmough design according to what they term “stylized nature” which mediates between human and ecological systems. (Hitchmough & Dunnett 2013). Given the requirements of the Biodiversity Action Plan, Hitchmough and Dunnett resisted the notion of simply creating a “pre-development” restoration project (Hitchmough & Dunnett 2013). Instead, they “argued successfully that it was essential that this ecological requirement was combined with a realization that [they] had to create a festival landscape that would be inspiring, uplifting, and highly memorable.” (Hitchmough and Dunnett 2013, 74) Their methods involved creating thoughtful plant palettes which were physically arranged on site by planting designer Sarah Price to create colorful tapestries of flower and foliage (Hitchmough and Dunnett 2013). The notions of atmosphere and emotion which the designers cite as their motivations require physical design that evokes involuntary attention.

Darrell Morrison: Native Flora Garden, Brooklyn Botanic Garden

One of the most publicized new examples of *habitat restoration*, Darrell Morrison’s redesign of the Native Flora Garden at Brooklyn Botanic Garden seeks to reinstate indigenous plant communities using regional genotypes (Designing in the Prairie Spirit 2012). The reimagining of the landscape involves expansion to embrace a wider range of habitats, including replicated pine barrens and a meadow. The site will include over 150 native species with provision for systematic study and conservation (Schmidt 2013). The benefits of wilderness for provoking involuntary attention have been studied, often in situations far removed from urban environments (Kaplan and Kaplan 1995, Berman et al 2007). Understanding how a habitat restoration at a smaller scale can evoke the same involuntary attention could have significant impacts for designing other spaces.

Framework of Design Strategies to Support Affective Landscape Goals

Based on literature and precedent review, planting design strategies to support qualities of place that provoke involuntary attention can be ordered into a framework for design. The efficacy of the framework for informing design will then be explored through redesign of plantings for an existing botanic garden in Apalachicola, Florida, and involvement with the Meadow on the Kansas State University Campus.

Inquiry through Design of Chapman Botanical Garden, Apalachicola, Florida

In Apalachicola, Florida, the Chapman Botanical Garden is intended to memorialize a Florida botanist, Dr Alvin Wentworth Chapman (Cox 2010). Today, however, the site (approximately 10 acres) is barely a fitting tribute. It fails to support pleasurable human experience. While western Florida is home to many National Forests and other sensitive natural habitats, many of these strictly limit public access. Chapman Botanical Garden offers the potential to trigger mindful human involvement with landscape in an area that has deep ecological and social needs. Chapman Botanical Garden could be a highly utilized resource for both residents of the Apalachicola region and tourists who come to enjoy the beauty of the west Florida coast. The process for inquiry through design of Chapman Botanical Garden will involve contextual and site research, compilation of base maps, programming, and planting design development.

Application at the Meadow on the KSU Campus

My application of understanding at the Meadow will embrace practical involvement in fostering involuntary attention through planting design. The framework of design strategies will be used to inform additions to the existing planting design, both in plant selection and placement. The ability of directed attention to augment involuntary attention will be explored through development of a signage system that supports, rather than distracting from, the experience of the site. In addition, the two aspects of attention will be mediated through creation of interpretive graphics for a touch table display. The proposed display will be located overlooking the Meadow, inside the adjacent Beach Museum of Art, to create a coherent multiseason experience.

Reflect on Framework

Following testing through application at an established public garden space (The Meadow, Kansas State University, Manhattan, Kansas) and through planting design for an underdeveloped public garden (Chapman Botanic Garden, Apalachicola, Florida), the framework of physical design strategies for fostering involuntary attention in botanic

gardens will be re-examined. Its efficacy for informing design, both broad-scale and incremental, will be considered and reflections applied. Reflection will include each general goal and supporting strategies for applicability, and changes will be made as necessary. Depending on the level of change necessary, it may prove useful to present the process drafts of the strategy for effective planting design. Gaps in understanding, issues with applicability, and directions for further research will be addressed.

Products

The proposed products on this project include a report and summary document. The report itself will be framed as a narrative of the overall project that sets forth the overall argument and research process. Within the report, the framework will be synthesized with graphic and verbal presentation of literature review, precedent study, and design applications. The report is envisioned primarily as an interactive pdf with links and references to supporting drawings.

In addition to the report, the project will result in a summary document in which the project is framed for an audience primarily of designers and gardeners at botanical gardens. It will focus on the framework and its potential applications, with an emphasis on practical application. This summary document could be distributed as a print or web booklet and could also serve as the basis for a journal article.

Anticipated Findings

Through the research process, new understandings of planting design's potential to support memorable human experiences will emerge. To date, many of the affective impacts of planting design have been designed in response to individual issues of site. This study hopes to yield a systematic framework for understanding how to physically design planting plans that instigate involuntary attention. In a world of cognitive overload, botanic gardens offer the potential to facilitate richly sensual experiences which stir the memory and evoke the imagination.

Key Terms

Affective

ability of the environment to provoke awareness and involvement

Affordances

possibilities that an object signals to those who experience it

“an affordance refers to what a perceived object or scene has to offer as far as the individual perceiver is concerned” (Kaplan 79)

“an affordance is neither an objective nor a subjective property but both”. (Tilley 2004)

“the assumed mechanism(s) whereby complexity presents itself as (weak) signal(s) to consciousness” (Letiche & Lissak 2009, 62)

Botanic Garden

a repository of knowledge about plants with living collections

“a permanent institution for the purpose of acquiring, preserving, researching and interpreting to the public for its instruction and enjoyment plants of cultural, scientific, historical, technological and natural history value.” (Hohn 2008, 2-3)

Directed Attention

cognitive awareness, usually offering a limited range of possibilities for responsive action

“voluntary or directed attention, where attention is directed by cognitive-control processes” (Berman, Jonides, and Kaplan 2008, 1207)

Involuntary Attention

nondirected multisensual awareness, offering a wide range of possibilities for responsive action

“where attention is captured by inherently intriguing or important stimuli” (Berman, Jonides, and Kaplan 2008, 1207)

Landscape Aesthetic Experience

“a feeling of pleasure attributable to directly perceivable characteristics of spatially and/or temporally arrayed landscape patterns” (Bogster, Nassauer, et al 2007)

Transformative

“a thing or process can be valuable for its contribution to a transformation in values and perspectives” (Chan et al. 2012, 12)

Works Cited

- Ballantyne, Roy, Jan Packer, and Karen Hughes. 2008. "Environmental Awareness, Interests and Motives of Botanic Gardens Visitors: Implications for Interpretive Practice." *Tourism Management* 29 (3) (June): 439–444. doi:10.1016/j.tourman.2007.05.006.
- Berman, Marc G., John Jonides, and Stephen Kaplan. 2008. "The Cognitive Benefits of Interacting With Nature." *Psychological Science* 19 (12) (December 1): 1207–1212. doi:10.1111/j.1467-9280.2008.02225.x.
- Chan, Kai M.A., Terre Satterfield, and Joshua Goldstein. 2012. "Rethinking Ecosystem Services to Better Address and Navigate Cultural Values." *Ecological Economics* 74 (February): 8–18. doi:10.1016/j.ecolecon.2011.11.011.
- Connell, Joanne, and Denny Meyer. 2004. "Modelling the Visitor Experience in the Gardens of Great Britain." *Current Issues in Tourism* 7 (3): 183–216. doi:10.1080/13683500408667979.
- Corner, James. 2008. "The Hengchun Tropical Botanical Gardens, Taiwan." *Topos: European Landscape Magazine*.
- Cox, Dale. 2010. "Chapman Botanical Garden - Apalachicola, Florida." *Explore Southern History.com*. <http://www.exploresouthernhistory.com/chapmangarden.html>.
- Cronon, William. 1995. *Uncommon Ground: Toward Reinventing Nature*. 1st ed. New York: W.W. Norton & Co.
- Dee, Catherine. 2008. "Plus and Minus: Critical Drawing for Landscape Design." In *Drawing/thinking Confronting an Electronic Age*, 60–71. London; New York: Routledge. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=511849>.
- . 2012. *To Design Landscape Art, Nature & Utility*. London; New York: Routledge. <http://ezproxy.library.arizona.edu/login?url=http://lib.myilibrary.com/detail.asp?ID=383341>.
- Designing in the Prairie Spirit: A Conversation with Darrel Morrison. 2012. http://www.youtube.com/watch?v=WYAdTQIU110&feature=youtube_gdata_player.
- Dunnett, Nigel, Wolfram Kircher, and Noel Kingsbury. 2004. "Communicating Naturalistic Plantings: Plans and Specifications." In *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*, 244–255. London ; New York: Spon Press.
- Dutoit, Allison. 2008. "Looking as Inquiry: Drawing the Implied Urban Realm." In *Drawing/thinking Confronting an Electronic Age*, 148–159. London; New York: Routledge. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=511849>.
- ECSite: European Network of Science Centres and Museums. 2006. "The Impact of Science & Discovery Centres: A Review of Worldwide Studies."
- Edwards, I. Darwin. 2000. "Education by Stealth: The Subtle Art of Educating People Who Didn't Come to Learn." *Roots* 20 (July): 37–40.
- Filor, Seamus. 2004. "Parc Andre Citroen." *Urbane Landscapsarchitektur Als Aufgabe*: 179–181.
- Gibson, James J. 1979. *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.
- Gough, Meghan Z., and John Accordini. 2011. "The Role of Public Gardens in Sustainable Community Development." In , 79. Association of Public Gardens (APGA). <http://publicgardens.org/files/files/Sustainable%20Communities%202011.pdf>.
- Gurian, Elaine Heumann. 2004. "What Is the Object of This Exercise? A Meandering Exploration of the Many Meanings of Objects in Museums." In *Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift*, edited by Gail Anderson, 269–283. Walnut Creek, Calif.: AltaMira Press.
- Gustavsson, Roland, Martin Hermy, C.C. Konijnendijk, and Anne Steidle-Schwahn. 2005. "Management of Urban Woodland and Parks - Searching for Creative and Sustainable Concepts." In *Urban Forests and Trees: a Reference Book*, edited by C. C. Konijnendijk, 369–397. Berlin: Springer.
- Herzog, Thomas R., Colleen, P. Maguire, and Mary B. Nebel. 2003. "Assessing the Restorative Components of Environments." *Journal of Environmental Psychology* 23 (2) (June): 159–170. doi:10.1016/S0272-4944(02)00113-5.
- Hitchmough, James. 2008. "New Approaches to Ecologically Based, Designed Urban Plant Communities in Britain: Do These Have Any Relevance in the United States?" *Cities and the Environment (CATE)* 1 (2) (November 20). <http://digitalcommons.lmu.edu/cate/vol1/iss2/10>.
- Hitchmough, James, and Nigel Dunnett. 2013. "Design and Planting Strategy in the Olympic Park, London." *Topos: European Landscape Magazine*.
- Hohn, Timothy C. 2008. *Curatorial Practices for Botanical Gardens*. Lanham, MD: AltaMira Press.
- Hunt, John Dixon. 2008. *Nature over Again: The Garden Art of Ian Hamilton Finlay*. London: Reaktion.
- Ingold, Tim. 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*. London ; New York: Routledge.
- Jencks, Charles. 2003. *The Garden of Cosmic Speculation*. London: Frances Lincoln.
- Johnson, Nuala Christina. 2011. *Nature Displaced, Nature Displayed: Order and Beauty in Botanical Gardens*. Tauris Historical Geography Series 7. London ; New York: I.B. Tauris.
- Jones, Louisa, and Clive Nichols. 2012. *Mediterranean Landscape Design: Vernacular Contemporary*. London; New York: Thames & Hudson.
- Kaplan, Rachel, and Stephen Kaplan. 1989. *The Experience of Nature: a Psychological Perspective*. Cambridge; New York: Cambridge University Press.
- Kingsbury, Noël. 2004. "Contemporary Overview of Naturalistic Planting Design." In *The Dynamic Landscape: Design, Ecology and Management of Naturalistic Urban Planting*, edited by Nigel Dunnett and James Hitchmough, 58–96. London ; New York: Spon Press.
- Marris, Emma. 2013. *Rambunctious Garden: Saving Nature in a Post-wild World*.
- McLuhan, Marshall. 1967. *The Medium Is the Message*. New York: Bantam Books.
- Monem, Nadine Käthe, and Blanche Craig, ed. 2007. *Botanic Gardens: a Living History*. London: Black Dog.
- Nassauer, Joan Iverson. 1995. "Messy Ecosystems, Orderly Frames." *Landscape Journal* 14 (2) (September 21): 161–170. doi:10.3368/lj.14.2.161.
- New York Botanical Garden. 2012. *Native Plant Garden Video*. <http://vimeo.com/51244678>.
- Olin, Laurie. 2008. "More Than Wriggling Your Wrist (or Your Mouse): Thinking, Seeing, Drawing." In *Drawing/thinking*

- Confronting an Electronic Age, 82–99. London; New York: Routledge. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=511849>.
- Oudolf, Piet. 2011. *Piet Oudolf: Landscapes in Landscapes*. London: Thames & Hudson.
- Oudolf, Piet, and Noël Kingsbury. 2013. *Planting: a New Perspective*. 1st ed. Portland, Or: Timber Press.
- Packer, Jan. 2013. "Visitors' Restorative Experiences in Museum and Botanic Garden Environments." In *Tourist Experience and Fulfilment: Insights from Positive Psychology*, edited by Sebastian Filep and Philip Pearce, 202–213. Routledge.
- Pallasmaa, Juhani. 2011. "Selfhood and the World: Lived Space, Vision, and Hapticity." In *Senses and the City an Interdisciplinary Approach to Urban Sense-scapes*, 49–62. Wien; Berlin; Münster: Lit.
- Pyle, Robert Michael. 2003. "Nature Matrix: Reconnecting People and Nature." *Oryx* 37 (02): 206–214. doi:10.1017/S0030605303000383.
- Rakow, Donald Andrew, and Sharon A Lee. 2011. *Public Garden Management*. Hoboken, N.J.: John Wiley & Sons.
- Roberts, Lisa C. 2004. "Changing Practices of Interpretation." In *Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift*, edited by Gail Anderson, 212–232. Walnut Creek, Calif.: AltaMira Press.
- Rocca, Alessandro. 2008. *Planetary Gardens: The Landscape Architecture of Gilles Clément*. Basel; Boston: Birkhäuser.
- Schmidt, Sarah. 2013. "Native Flora Garden Expansion: A Link to Our Natural History." *Brooklyn Botanic Garden*. February 28. http://www.bbg.org/news/native_flora_garden_expansion.
- Tilley, Christopher Y. 2004. *The Materiality of Stone: Explorations in Landscape Phenomenology* 1. Oxford ; New York: Berg.
- Treib, Marc. 2008. "Paper or Plastic? Five Thoughts on the Subject of Drawing." In *Drawing/thinking Confronting an Electronic Age*, 12–27. London; New York: Routledge. <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=511849>.

**Planting Design Strategies
to
Trigger Involuntary Attention
of
Visitors
at
American Botanic Gardens**