3-19-2015

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Theme Publication

CELA2015
March 24-28, 2015
Kansas State University

Acknowledgment

We wish to acknowledge the CELA Board particularly Charlene Lebleu, Vice President for Research and Ming-Han Li, former VPR and President – elect of CELA for their support in facilitating this special theme track publication.

Peer-Review Referees

We wish to thank the following individuals for their commentary and constructive criticism of the manuscripts submitted for review in our conference specific theme track:

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Jessica Canfield, Kansas State University
Brent Chamberlain, Kansas State University
Liska Chan, University of Oregon
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NEW prairie PRESS
open access scholarly publishing

New Prairie Press,
Kansas State University Libraries
Manhattan, Kansas

Electronic edition available online at:
http://newprairiepress.org/ebooks/

ISBN: 978-0-9915482-3-1

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Editor's Introduction

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Change is many things but ultimately it is a process; a process with physical, psychological, and often societal impacts. The criteria by which we evaluate these impacts varies across populations, varies with individuals, and varies with time and shifts in vulnerabilities. But within this simplistically complex, rhythmic yet episodic process lies beauty. The beauty of understanding; the beauty of mystery; the beauty of honesty, humility, wisdom, all borne on the processes of change. Perhaps Burke's coinage of the term "sublime" is more apt as change is often both beautiful and terrifying.

Stability, sustainability, resilience are not the enemies of change. Rather, these represent a dynamic search for quasi-equilibrium; a pulsating, creative fluctuation about some long term mean. Thus, to resist change is futile as one seeks to stand against a conception akin to fear of the dark. It seems that one of society's great losses is the energy expended in treating change as an opponent; we have much yet to learn.

In our ponderings and musings to select a theme for this gathering of educators, ideas, and perspectives we were continually drawn to the processes of change. Of these processes we are catalysts and students, instigators and evaluators, producers and consumers. And so we came to our theme listening and considering:

incite Change|Change insight.

We incite change through the teaching of our children, of our students, of those we mentor. We incite change through the acts of design, the transformation of place both physically and spiritually. We incite change when we serve others, and here I mean others in the largest sense – people, animals, plants, soils, water – which collectively we call ecosystems. Yet the term "ecosystem" has achieved a certain scientific sterility on the one hand and triteness on the other due to conscription to the realms of social banter. Might we simply go back to the term "community"? Are we not called to provide stewardship to the community of which we are a part? Thus, when we serve those we teach, the places we hold dear, the natural communities and all their inhabitants we engender change. A progression or transition to a better condition is our goal.

While we hope our actions are "evidence based" and spring from good intentions (the paving material on the road to hell) we cannot learn, grow, and steward if we do not observe the products and processes set in place by our plans. Critical observation of change informs understanding, deepens it, and allows for broadened, rigorous application to our acts, our processes, our representations in our quest to make difference. Our theme for this Council of Educators of Landscape Architecture CELA 2015 Conference: incite Change|Change insight may appear dichotomous or formulaic given the conventions of printed text but we perceive the words and ideas as constantly cyclic and representing a single construct rather than opposite sides of the coin. And so we ask: how do you incite change; how do you change insight? Some of the responses to this question are included in the manuscripts presented in this document. Other perspectives will be presented during the CELA 2015 Conference and all will hopefully spur greater understanding and the sympathetic application thereof.

Change, while bearing beauty is too often feared, perhaps more so by clerics and engineers than by poets and painters, but never-the-less change can indeed be terrifying. While I blame my occasional sleepless nights on age and proclivity I do still have trepidations about the coming practice of this discipline we call landscape architecture. I offer here my misgivings, concerns, and suggestions for change.

In what is now over three decades of teaching, researching, and serving within the discipline of landscape architecture, my greatest fear has come to be of our increasing lack of connection to place. It seems that we are caught up in or being drawn in to "the race to virtual nowhere". Increasingly, our students, our colleagues, others we serve, lack meaningful connection to place. A by-product of a more mobile society you say; to which I would counter that even nomadic hunting and gathering clans had stronger ties to the lands they inhabited. I strongly doubt that any 18-year-old Kansa (the people for which our state was named) had any question about where their food, heat, water, or entertainment came from. But inquire of your undergraduate students as to these necessities of living in a place and be prepared to endure the shrugs of indifference. It seems to me that the tap root of this living thing we call landscape architecture gains both its nourishment and its structural support by going deep and strong into the native soil. And I suspect that no

Smartphone app or "Placebook" media site will build the type of connection we need, it's up to us. Up to us to incite change in the education of the students, colleagues, professionals, and the communities we serve in the realm of landscape architecture. To incite change involves risk, yet these are risks we must take if our discipline is to maintain, vitality, significance, and relevancy during the next half-century. In short, we must look to change the ways in which we teach, practice, research, and serve this middle-aged discipline of ours as we seek to enhance our abilities to do good for places and those who inhabit them.

In changing the ways we teach connections to the larger community we must look for any means of linking our students to their surroundings. Fewer tests and more days afield seem a good start. Projects that are local and allow for multiple site visits, inventory and analysis as well as ready discussion with stake-holders (real or supposed) are appropriate. Less concern with award-worthy presentation and more with helping community through the clear and supported presentation of ideas and proposals would seem the best approach. Addressing how we inhabit our places is of the utmost importance. Carl Smith in his paper: "Studies in Denser Living: Changing student insight and inciting change in student residential aspirations" presented here, looks at the impacts of a changed way of teaching and influencing one's future choice(s) of housing. Such decisions to live with greater density and the concomitant reduction in resource consumption foster stewardship and greater affinity to place. Cera et al. speak here about interpreting their investigations into the effects of climate change on the plants we rely upon in our local environments. In this work we see a change in how we might teach, design, and react given observations lead by climate predictions.

The nature of our practice must surely change. We are rapidly becoming an urban culture and our discipline is needed more and more to provide respite from the constant (and not always positive) stimulation that is urban life. My hope is that we don't lose sight of the rural, working lands that will face increasing pressure to provide the food, clean water, energy, and refuge necessitated by our growing urban inhabitance. Nor should we shy away from the tension zone, the so-called rural-urban interface as these are particularly dynamic and exciting ecotones offering great opportunities for learning. Urban agriculture is a practice that is gaining attention and momentum. Regardless of whether urban areas can truly become self-sufficient in terms of food production, the re-connection of people to the soil, the places that produce their food and joy is of sustaining value. David de la Peña's manuscript in this document speaks to the development of an urban agriculture in Sacramento, CA and opens a discussion of the role of landscape architecture in this movement.

The ways we research, generate or increase insight will continue to change. Social media and unmanned aircraft are not going back into the bottle and we should look to how such changes can help develop understanding as well as a broader audience. I do hope our discipline can maintain some balance between field observation and predictive, conceptual modeling. Ben Shirtcliff's paper on the use of social media to provide an uninhibited picture of a little-studied urban subculture provides an example of a shift in our methods of creative inquiry. While we will no doubt have increased evidence of the "life" around us we must remain vigilant as to the rights of privacy and freedom of expression.

Perhaps the most difficult yet most needed change involves the expansion of those we serve. Such expansion is necessary on at least two counts: 1) If we are to grow the impact of our discipline, the employment of our unique blend of skills and perspective, we must serve societal needs. This service will not always be profitable economically but must aim to help sustain and enrich places and the people who inhabit them. 2) If we hope to continue to attract the best and the brightest to this discipline our efforts have to be seen, from the inner city to the conflicted borders. If the best we have to give is offered only to those who already have plenty, we will surely decline in our ability to inspire, to attract the best hearts and minds – those necessary to sustain this ever-shifting, transformational practice we call landscape architecture.

Must landscape architecture change? – of course, and not necessarily. We will change the ways by which we teach, practice, research, and serve and this succession will better connect us to the places and people we seek to "keep". These changes will be driven by shifts in the ways we think, perceive, and apply our understanding (as imperfect and incomplete as it will always be). Finally, mystery is as beautiful and necessary as is that which we understand. Be bold; incite change and allow such change to inform your insight.

We hope you enjoy the exchange of ideas, perspectives, and stories at our CELA 2015 Conference in the Flint Hills of Kansas – this special place that I pray will weather our transgressions and allow for small celebrations of understanding. We hope the papers presented in this special conference theme publication are provocative and insightful. We hope that this small document is a beginning, a first attempt at deepening and enriching the development of CELA's discourse on creative inquiry. And we hope you find increased delight in joining and pondering the processes of change.

TDK

STUDIES IN DENSER LIVING: Changing student insight and inciting change in student residential aspirations

Carl Smith, Ph.D.

keywords student residential aspirations; compact living; educational experiences

Abstract

Through their studies of denser living, can landscape architecture undergraduates experience not only a change of insight—a deepened appreciation of the design construct—but also an incitement to change their own residential preferences? The literature highlights changes in student values and opinions through education, and it has been suggested that specifically in architectural education, knowledge and values are acquired simultaneously as students adopt the values embodied by the professors and their pedagogy. Enriched educational experiences such as study abroad can be particularly effective in shaping student attitudes. In this study, two groups of landscape architecture students were surveyed on their understanding of basic terms and personal preferences related to residential compaction, the latter through "trade-off" scenarios that contrasted loss of personal spatial amenity with the benefits of compaction. The treatment group, who had studied and experienced denser housing during studio and study abroad, showed significantly greater levels of insight and preference for compact living than the control group yet to complete the same exercises. An inductive content analysis of interviews with the treatment group revealed that the majority were negative toward compaction prior to their studies, but highly supportive afterwards. The design studio and contact with the professor played a part in this shift in values, but it was the cultural immersion in dense communities, particularly overseas, that had the greatest resonance. Apart from the longer-term benefit of opening up the possibilities of compact living to these future housing consumers, the on-site experiences enriched these students' design process with empathy, enthusiasm, and confidence that the concept was translatable into tangible, enjoyable places.

Research Context and Rationale

Inciting change in student values and attitudes through education

This article explores the effect of urban design experiences on the residential preferences of undergraduate landscape architecture students. Can educational experiences in and out of the studio affect the views of students in relation to their acceptance of denser living? Through their education do these students experience not only a change of insight—an appreciation of residential compaction as an academic and design construct—but also an incitement to change their own personal residential aspirations?

The literature suggests that attitudes and preferences can be molded by a range of educational settings, over and above the acquisition of academic knowledge. Studies report on the enhancement of school pupils' civic values through private school curricula (Greene, Mellow, & Giammo, 1999); the morphing of university students' political opinions to match their professors' (Magee, 2009; Mariani & Hewitt, 2008; Zipp & Fenwick, 2006); and changes in high-school student political attitudes depending on the delivery style of social studies teachers and the presence of classroom debate (Ehman, 1980). It has been further suggested that, specifically in architectural education, the acquisition of skills and knowledge is in fact inseparable from the acquisition of values and attitudes (Stevens, 1995). In the studio, architectural students learn behaviors and dispositions from each other that are normative for the profession—the habitus (Stevens, 1995)—but they are most forcefully embodied in the architectural professor, who becomes a role model and figure of authority (Race & Brown, 2005; Stevens, 1995). The relationship between studio professor and student can be influential and emotional (Austerlitz, 2007; Austerlitz, Aravot, & Ben-Ze'ev, 2002; Wendler & Rogers, 1995), and some have even gone so far as to compare the dynamic with that of parent and child (Anthony, 1991, as cited in Stuart-Murray, 2009). The tastes, opinions, values, and attitudes of the architectural professor, as disseminated through lecture materials, guided readings, critiques, asides, and anecdotes, are therefore likely to be highly influential in the development

of the student. For example, as a graduate student of landscape architecture at the University of Sheffield in the UK, the author attended planting studios where recently hired instructors strongly advocated for low-maintenance, naturalistic perennial compositions in public places. This approach is now well established, but at the time, the so-called "Sheffield School" style was somewhat revolutionary and far removed from what most of the students understood as viable public planting. However, by providing a rationale for the approach and exposure to its aesthetic possibilities through design exercises and site visits, the professors seeded an appreciation and a shift in values within the students. Where the influence of professors, in and out of class, impinges on the sphere of students' nascent political orientation, there has been understandable concern (Mariani & Hewitt, 2008; Zipp & Fenwick, 2006). This article is not intended to discuss the rights or wrongs of professorial influence, but to posit that the values or preferences passed on in landscape architectural education from professor to student can, as demonstrated in the Sheffield example above, be grounded in the impartial evidence of natural and social sciences, rather than simply a matter of connoisseurship, taste-making, or acolyte creation.

Introducing denser living through educational exercises

As part of a land grant university, studios in the Department of Landscape Architecture at the University of Arkansas strive to engage with local issues that have the potential to overlap with service and outreach. A current focus is planning and design to accommodate the burgeoning population of Northwest Arkansas. If this population increase is to be accommodated sustainably, the region will have to adopt greater residential density (City of Bentonville, 2004; City of Fayetteville, 2011; Dover Kohl & Partners & City of Fayetteville, 2004, 2006). The intertwined concepts of increased residential density, compact living, and efficient development provide the key pillar of the author's urban design studio, Design VII, a mandatory part of the undergraduate professional curriculum. Among other tasks, the students are charged with creating a master plan for a speculative, relatively dense residential/mixed-use development on a local 70-acre suburban plot. In support of their design work the students attend lectures on the problems of typical American suburbs, such as resource inefficiency and auto-dependent placelessness, watch documentaries including James Howard Kunstler's TED talk "The Ghastly Tragedy of the Suburbs" (2004) and Gary Hustwit's Urbanized (2011), and are provided with a reading list that includes The Geography of Nowhere (1993), also by James Howard Kunstler, and Suburban Nation (2000) by Andres Duany, Plater-Zyberk, and Speck. The students are also exposed to the author's own ongoing research on the acceptability of residential compaction to the general public. The studio visits and critiques the ongoing development of Duany Plater-Zyberk's relatively dense, walkable "new urbanist" community in New Town, St. Charles, Missouri (Figure 1) and the historic Soulard and Lafayette Square neighborhoods of nearby St. Louis, where the dense urban form has accreted over more than 200 years (Figure 2). During the site visits, the students take measurements of critical dimensions such as road widths, block sizes, and set-backs, and photograph, draw, and make notes to capture their analytical and experiential responses.

Two months prior to the fall studio, the same group of students attends a 6-week summer study abroad tour that includes a wide range of European landscapes and settlements from antiquity to contemporary. This mandatory excursion includes visits to planned, dense neighborhoods at Poundbury "urban village" in Dorchester, England (Figure 3), and Greenwich Millennium Village in London (Figure 4).

Figure 1. New Town at St. Charles, Missouri, a "new urban" development visitedby the students as a contemporary example of American compact residential development. (Carl Smith)

Figure 2. Lafayette Square, St. Louis, Missouri, a historic counter-point to the nearby New Town. (Hunter Beckham)

Figure 3. Poundbury urban village in Dorchester, UK--a dense residential/mixed-use site constructed from the early '90s onwards that draws on earlier architectural styles and traditional materials. (Carl Smith)

Figure 4. Greenwich Millennium Village, London, UK—an exemplar compact mixed-use development featuring contemporary architectural styling in residential units and shared streets or Woonerf. (Carl Smith)

These late 20th-century examples of dense residential/mixed-use development are complemented by visits to older European fabric including the Stockbridge Colonies, tightly packed workers' cottages from the late 19th century in the north of Edinburgh (Figure 5); the narrow residential streets (vicolo, alleys) and civic spaces of Orvieto in Umbria, Italy, that date back to the 13th century and earlier (Figure 6); and the principally Medieval Roman neighborhood of Trastevere (Figure 7). Trastevere serves as "home base" during the Roman portion of the program, with the students living in neighborhood apartments for 12 nights.

In Europe the principal mode of student engagement is through an annotated sketchbook, with the emphasis on personal observation and cultural immersion. It has been suggested that students are more engaged during "enriched educational experiences" such as study abroad programs (Umbach & Wawrzynski, 2005), and time overseas can broaden students' worldview and understanding of different cultural norms, particularly if the setting is very different from the students' cultural point-of-origin (Douglas & Jones-Rikkers, 2001). The European sites were not selected for their residential compactness per se, but as part of a broader excursion objective of exposing students to overseas cultures made manifest in landscape and urban design. For most of the students, the dense, walkable fabrics of medieval Roman neighborhoods and British urban villages are indeed very different from the conventional, auto-dependent suburbs in which they were raised. The students typically originate from the type of sprawling residential environments that many American planners and politicians would like to see come to an end (Newman & Hogan, 1981; Talen, 2001).

Changing insight to incite change in residential aspirations

Despite dissenting voices from professionals concerned with the implications of sprawl, a single-family home on a large lot is consistently the preferred choice of the American housing consumer (Day, 2000; Myers & Gearin, 2001; Newman & Hogan, 1981; Talen, 2001). There are many reasons for this preference, such as associations with affluence; safety, privacy, and greenspace (see Day 2000; Jensen, 2004; Myers & Gearin, 2001; Talen, 2001). To incite change in the public perception of residential compaction and help ease denser, potentially contentious development through the planning process, more innovative developers are using exhibitions and charrettes to deepen community insight (Farr, 2008; Steuteville & Langdon, 2003). Together with experiencing exemplar compact development firsthand, such exercises can demonstrate to the public that good design, high quality of life, and increased residential density are not antithetical (Jensen, 2004). If developers are using residential compaction workshops, design exercises, and field visits to change community insight and incite change in opinion, it follows that the educational experiences of the Design VII studio and Study Abroad outlined above might provoke a similar shift in student attitudes. This article investigates whether the combination of studio design project, site visits, lectures, and overseas excursions changed the residential aspirations of students in addition to providing academic knowledge.

Research Methods

To examine the effect of Study Abroad/Design VII on insight and residential preference, two approaches were used: the check-box survey and the recorded semi-structured interview. For the survey, all 37 landscape architecture students enrolled in the department were evaluated on their insight into residential compaction,

Figure 5. The Stockbridge Colonies: small, stone-built flats featuring separate first- and upper-story dwelling units, with each level accessing private yards on alternating sides of the building row. (Adel Vaughn)

Figure 6. The narrow vicolo of Orvieto, where homes sit beside and above stores and cafés and the street is shared by cars and pedestrians alike. (Carl Smith)

specifically, their familiarity with the key concepts of "sprawl"—the spatial antithesis of residential compaction—and "smart growth"—a term for locating and programming development through environmentally and socially driven considerations (see Farr, 2008) (Table 1). The survey then posited questions related to trade-off scenarios that test respondents' willingness to swap private spatial amenity for the benefits of compaction in their preferred place of residence (Table 2). In their own survey of perceptions of compact living, Lewis and Baldassare (2010) have shown that a richer understanding of opinions can be gained through positing trade-off scenarios compared with simply inquiring whether or not respondents hold a favorable view, as the manner of the questions more closely mimic how people make decisions in the real world.

To test for any significant difference in the percentage of students familiar with the key concepts of sprawl and smart-growth, a Fisher's Exact Test of Independence was run to compare the 12 who had completed Design VII and Study Abroad and the 25 who hadn't. This would provide a tentative indication of levels of insight in the 12 treatment students and the 25 control students. To then analyze the trade-off responses in the treatment and control groups, each respondent was assigned a score that tallied the number of times they selected the first, compaction-scenario response over the second, sprawl-scenario response or don't know. Statistically significant difference between the two mean scores was then tested for through a t test. Finally, the survey asked the students to provide demographic information related to age, gender, level of education, and whether or not they had children.

Following the survey, the treatment group was invited to attend one-on-one, private, 30-minute interviews to further investigate and clarify their insight into

Figure 7. The medieval streets of Trastevere: walkable fabric, densely arranged residences and civic buildings and spaces, and home to the study abroad students for 12 nights. (Jennifer Webb)

Have you heard of sprawl?		
-Yes	-No	
If yes: Do you have a favorable or unfavorable opinion of it?		
- Yes, favorable	-Yes, unfavorable	-Yes, don't know
Have you heard of smart growth?		
-Yes	-No	
If yes: Do you have a favorable or unfavorable opinion of it?		
-Yes, favorable	-Yes, unfavorable	-Yes, don't know

Table 1. Check-box survey questions and response options related to insight of residential compaction.

residential compaction and any role played by educational experiences in inciting change in residential preferences. Interviews were recorded with the students' permission, transcribed using Sound Organizer software, and analyzed using an inductive content analysis technique to identify a hierarchy of common themes, subthemes, and linking themes (see Thomas, 2003). The students were emailed prior to the interview with notification of the time, date, and venue and the five primary questions around which the interviews would be structured (Table 3). Although the interview questions provided prompts for the conversation, there was flexibility to develop and clarify responses with follow-up questions. This adaptability is a distinct advantage of the interview over the questionnaire (Bell, 1993), particularly if it allows the interviewee to speak freely around a loose, semi-structure of themes or topics, ensuring that all issues are covered (Bell, 1993; Burgess, 1984; Oppenheim, 1992).

Results

Descriptive statistics of demographics

All 37 students enrolled in the department at the time of the survey completed and returned the questionnaire. Ideally, differences in demographic variables between the two groups would be accounted for statistically, reducing the influence of confounding variables. Unfortunately, this was not possible to achieve with such small samples. However, the demographic responses shown in Table 4 demonstrate the broadly similar make-up of the two groups.

Table 5 presents the descriptive statistics related to insight of residential compaction and efficiency. The treatment group was significantly more familiar with the term "sprawl" than the control group, with a Fisher's Exact Test result of $p = 0.0357$. The percentage of those familiar with the term who also identified sprawl as a negative phenomenon was also significantly higher in the treatment group than the control group, with a test result of $p = 0.0432$. The treatment group was also significantly more familiar with the term "smart growth" than the control group, with a test result of $p = 3.722 \times 10\text{-}5$. However, the percentage familiar with the term that also went on to identify smart growth as a positive construct was not significantly different between groups. This last result should be treated with some caution; only a small percentage of the students in the control group (28%) were familiar with the term "smart growth." Tentatively, it would appear that the treatment group had greater insight into some of the basic concepts of residential compaction and efficiency.

Responses to trade-off scenarios relating to residential preferences

The responses from all the students to the seven trade-off scenarios showed a high level of internal consistency, with a Cronbach's alpha value of $\alpha = 0.805$ ($N = 37$). In other words, the trade-off questions related well together as a measure of the same construct—willingness to trade off private amenity for the benefits of residential compaction, and the questions provide a good level of internal reliability. Only 18 don't knows were included in the 259 trade-off responses.

Each time a student selected the compaction scenario against a trade-off question they were awarded a point, with a maximum score of 7. Although the mean score in the treatment group was 5.83 ($SD = 1.4$), the mean score for the control group was just 3.97 ($SD = 2.29$). The difference in these mean scores was statistically significant, $t(36) = 2.59$, $p \leq 0.01$. This significantly higher mean response in the treatment group could suggest that the 12 students who had undertaken the Study Abroad/Design VII exercises were more accepting of the idea of compact living than the 25 who had not. In order to clarify the residential preferences of the treatment group further, as well as better describe their levels of insight into the construct of residential compaction and efficiency, the outcomes of the inductive content analysis of semi-structured interview transcriptions are described below.

Would you choose to live where countryside is preserved in the region, even if it means living in a small home with a small backyard, or would you choose to live in a large home with a large backyard, even if it means regional countryside could be used for expanding development? -Preserved countryside, small home and small yard -Possible development in countryside, large home and large yard -Don't know
Would you choose to live where there are communal greenspaces — such as parks — in your neighborhood, even if it means living in a small home with a small backyard, or would you choose to live in a large home with a large backyard, even if it means there are no communal greenspaces – such as parks – in your neighborhood? -Communal greenspaces, small home and small yard -No communal greenspaces, large home and large yard -Don't know
Would you choose to live where there is walkable access to regional transit – such as bus or light rail, even if it means having just one or two parking spaces on or around your property, or would you choose to live where there are more than two parking spaces on or around your property, even if it means there is no walkable access to regional transit? -Walking access to transit, one or two parking spaces -No walking access to transit, more than two parking spaces -Don't know
Would you choose to live where there is walkable access to local services – such as social and civic amenities, even if it means having just one or two parking spaces for you on or around your property, or would you rather choose to live where there are more than two parking spaces for your home, even if it means there is not walkable access to local services – such as social and civic amenities? -Walking access to services, one or two parking spaces -No walking access to services, more than two parking spaces -Don't know
Would you choose to live in a high-density neighborhood, if it means you have a short commute to work, or would you choose to live in a low-density neighborhood, even if it means you would have a long commute to work? -High-density neighborhood with a short commute -Low-density neighborhood with a long commute -Don't know
Would you choose to live in a high-density neighborhood where you can walk to stores, schools, and services, or would you choose to live in a low-density neighborhood where you have to drive a car to stores, schools, and services? -High-density neighborhood, walk to amenities -Low-density neighborhood, drive to amenities -Don't know
Would you choose to live in a high-density neighborhood where it was convenient to use public transit when you travel locally, or would you choose to live in a low-density neighborhood where you would have to drive your car when you travel locally? -High-density neighborhood, use public transit -Low-density neighborhood, drive a car -Don't know

Table 2. Check-box survey questions and response options related to residential trade-off scenarios

What do you feel are the key benefits of more compact living in denser housing?
What do you feel are the key drawbacks of more compact living in denser housing?
Can you recall your attitude towards compact living in denser housing before our studies in Europe and in the Design VII studio?
If any, in what ways did our studies in Europe and in the Design VII studio change or impact on your attitude towards compact living in denser housing?
If any, what would you say were the most important aspect or aspects of your studies in terms of influencing your attitude towards compact living in denser housing?

Table 3. Primary questions forming the basis of the semi-structured interviews.

	Demographic Variables											
	Age		Gender		Ethnicity			Education level			Children	
	18-24	24-34	M	F	Cauc'	Hisp'	N. Am'	At College	First degree	Graduate degree	Yes	No
% of Treatment group (n = 12)	92	8	33	67	92	0	8	92	8	0	0	100
% of Control group (n = 25)	92	8	52	48	80	12	8	96	0	4	4	96

Table 4. Demographic information.

	Survey responses									
	Have you heard of sprawl?		*If yes: do you have a favorable or unfavorable opinion of* [sprawl]*?*			*Have you heard of smart growth?*		*If yes: do you have a favorable or unfavorable opinion of* [smart growth]*?*		
	Yes	No	Favorable	Unfavorable	Don't know	Yes	No	Favorable	Unfavorable	Don't know
% of Treatment group (n= 12)	100	0	8	92	0	100	0	92	8	0
% of Control group (n = 25, 17, 25, 7)	68	32	47	53	0	28	72	86	14	0

Table 5. Survey responses related to insight of residential compaction.

Inductive content analysis of semi-structured nterview transcriptions

Of the 12 members of the treatment group invited to interview, 11 agreed. The following tables (Tables 6, 7, 8, 9, 10) summarize the emerging themes, subthemes and linking themes that were found through an inductive content analysis of the transcriptions, and include illustrative quotations. Ad hoc questions used to follow up primary questions are not listed.

Discussion

During the interviews, the majority of the treatment group recalled having negative feelings toward compact living before their studies in the United States and overseas. Prior to the Study Abroad and Design VII, they had felt that density was antithetical to their long-term residential aspirations and the values that had been instilled in them growing up. At the same time, the majority admitted to having little or no firsthand experience that informed their opinion. Only 2 of the 11 remembered having any prior enthusiasm for compact living—and in both cases they had extrapolated this from experiences of walkable, convenient off-campus apartments—though their positivity was tempered by concern that it would represent a compromised existence post-graduation. Although the experience of living in a student village or a rented student home of multiple occupancy is unlikely to provide a full understanding of the possibilities of compact living—and thus perhaps the two students' initial feelings that compaction is best suited for younger, low-income individuals—it did provide a spark of appreciation and hinted at how important lived experience is to the formation of attitudes towards residential density. It may

Key emergent themes and subthemes	• Access to amenities such as food and greenspace. - Convenience of proximity. - Reduced car use. • Sense of community. - Avoidance of isolation. - Getting to know immediate neighbors.
Key emergent linking themes and subthemes	• Residents' physical and mental well-being. - Encourages exercise through walking. - Sense of safety through informal surveillance and chance encounters. - Increased vitality of streets and lived experience.

Quotations:

- *I think mainly the interaction you have with your neighbors, rather than being secluded on your own plot of land. Getting to know the people around your unit and those passive interactions that you have.*
- *I think the key benefits are just being able to walk to places, being able to walk to the grocery store, being able to get to a park. I remember living in the suburbs as a little kid, and it felt isolated. I think the key benefit of compact living is that you can go other places and see other things.*
- *Health of the people that are living there, they are able to walk to their needs more easily. Mental health as well. Just being around other people makes me happy, personally, rather than feel alienated from people. Health and safety - having people that you know around you, you feel safer - I know them so I feel safe because they will keep an eye on me.*

Table 6. Content analysis of response to "What do you feel are the key benefits of more compact living in denser housing?"

Emergent themes and sub-themes	• Lack of privacy. - Impact of neighbors on your privacy (views and noise). - Impact of your lifestyle on your neighbors. - Conflict between neighbors. • Lack of outdoor space to call your own. • Limitations on lifestyle choices. - Restricts car ownership through lack of parking. - Lack of choice in walkable amenities.
Emergent linking themes and subthemes	• Residential compaction is 'un-American'. - Size of private land equates to success. - Space to keep and display material possessions. - Space to get away from neighbors.
Quotations: - *In America, people want their own piece of land, and with more compact living you're not going to get that big piece of land that people have dreamed of. You're not using your money to display your land. I've lived in different situations and with more space comes more privacy for me; I don't have to worry about what I do impacting on my neighbors.* - *If it's a situation like in Rome where it is very compact, you maybe won't be able to have a car, and in Greenwich Millennium Village there is not really enough amenities close by… limiting lifestyle choices, but it depends on where the compactness is located.* - [That loss of] *personal space. In America that personal bubble is quite large. I know everybody really likes to have their things and having enough space to put their stuff.* - [Lack of] *private outdoor space. I know a lot of the areas we looked at* [in Europe] *didn't have it but maybe in America that doesn't necessarily translate.* - *Everyone is so dependent on cars, so the potential lack of parking, and what other people might see as lack of parking and lack of yard, and a smaller yard, because it takes away from the American Dream.*	

Table 7. Content analysis of response to "What do you feel are the key drawbacks of more compact living in denser housing?"

have been equivocal, but these two students were relatively positive compared with their inexperienced classmates. Furthermore, a few students recalled a nascent intellectual understanding of compact living prior to the classes in question, but at that time, they were not enthusiastic about living there themselves, having never previously experienced it firsthand. Clearly, for these students, the validity of compact living as a residential option required something more than just an abstract appreciation.

Having been introduced to residential compaction and efficiency as an academic and design construct and experienced firsthand through site visits, the treatment group, unsurprisingly, appeared to have more insight than the control group, or at least they were more familiar with some basic terminology. However, the interview responses provided evidence that the treatment group had in fact developed quite a sophisticated level of understanding and insight. When discussing the key drawbacks of residential compaction, the students touched upon issues shown to be of concern to those living in dense neighborhoods, such as lack of yard space and privacy and limited lifestyle choices (see Day, 2000, and Williams, Burton, & Jenks, 2000).

Although these concerns were introduced during the Design VII studio, the transcriptions suggested a deep insight and empathy, rather than by-rote responses, touching on broader ruminations on American culture and their own residential aspirations growing up. Furthermore, their responses drew on observations and critiques of what they had seen on the ground, most especially concerns regarding the translation of European typologies into American development. Similarly the

Emergent themes and sub-themes	• Uninformed aversion. - Negative views but have never lived in a denser environment. - Inherited negative views from family who have never lived in denser environment. • Aspirations away from density. - Associations of lower density with success. - Associations of higher density with low socio-economic status. - Meeting family expectations. • Ambivalence towards density. - Recognized theoretical benefits. - No desire to live there themselves. • Prior tentative enthusiasm or acceptance. - Informed by college life in off-campus apartments. - Doubts as to suitability post-college.
Emergent linking themes and subthemes	• The impact of lived experience. - College experience can trigger independence from family attitudes. - Importance of personal experiences over theoretical understanding.

Quotations:

- *I would have said that I would never want to live in a denser environment, just because I had never lived that way before. And I still see that in my family's reaction to it... they don't want to live close to people. So that's what I would have thought too.*
- *I was comfortable with the idea of high density housing, but I wasn't completely sold on the idea of living there myself. I understood the benefit, but as a person...*
- *I was really for the idea that, when I grew up, I really wanted my own piece of land, that my parents would be proud of me, and that's what I thought was the American Dream. I've always seen growing up, that if I was successful in life then where I would live would have rolling hills or a meadow.*
- *I grew up in a suburb but I already was really into compact living, just because I went looking for my own apartment and found one in a fairly dense neighborhood. I felt like maybe it can be uncomfortable though, like if I didn't have the yard and space for the car and everything.*
- *I wasn't sure without the experience. I would see* [density] *in a map or in a photograph and learned that these people lived in a much denser way than how I live. So I was kind of wary, because I didn't know how pleasant it would be.*
- *Moving to Fayetteville and living in an apartment was a complete radical shift in how I saw housing. Not everyone has to live in a single family home on an acre of land. That was just how I was bred for 18 years until I moved. When I leave school I won't be able to afford the kind of housing that I would like to live in and so I feel I might be forced to live in a higher density area.*
- *I think it was easier for me to assess those things remotely "well yes this might be good from a pragmatic standpoint," but would I want to live there... maybe not.* [When] *I saw something like that I thought it may be reserved for the lower income people.*

Table 8. Content analysis of response to "Can you recall your attitude towards compact living in denser housing before our studies in Europe and in the Design VII studio?"

Emergent themes and sub-themes	• Recognition of a possible home environment for themselves. - Offers a viable alternative to typical suburbia. - Could provide a place to live in which they can be proud, safe and comfortable. - Walkable and convenient. - Could integrate them with a community. • Reaffirmation of prior interest in density. - Design studio and precedent studies showed theoretical possibilities of density. - Site visits demonstrated that theory can deliver quality in practice for a range of occupants.
Emergent linking themes and subthemes	• Recognition that density needs to be experienced to be appreciated. - Recollections of dense places experienced in Europe. - Idea that density needs to be experienced by the American public to overturn skepticism.

Quotations:

- *It made me realize that isolating yourself and being spread out is actually not a good thing. You get your own space but then you're not interacting with other people; you're not engaged in the world.*
- *I still like that idea of low density living, but now it's where that isn't all... now there are more possibilities because now I see the benefits of denser communities. You can create a place that would be comfortable for me, and that I would still be proud of, and that would be more convenient.*
- *I definitely started to see it in a more positive light and something that people could really like if they were given a chance to really experience it. Before I imagined myself living more in like suburbs, that kind of area, but I could see myself living in a more dense area.*
- *I found it was much pleasant than I thought it was going to be. It is possible to create dense places and it still be comfortable. Before I wasn't sure these are places I would want to live, but seeing how it worked and meeting people that lived in it, I would definitely live in it now.*
- *It basically opened my eyes. I'm from a small town where everybody loves their yard but I don't know my neighbors, so I thought the colony flats in Scotland were really cool. It caused you to communicate with your neighbors because you were living in such close quarters and form this connection. It's not just a silly thing - which I thought it was before. I've tried to explain it to my parents but I think actually having visualized it and experiencing it is important.*
- *After experiencing this and going through the studio, my perception of denser communities really changed. I loved being in these dense communities. There were always things to do, and see. So I felt that I could really see myself living there. But it would take time to thrive* [in the US]. *You'd have to get people out there and recognize what it is.*

Table 9. Content analysis of response to "In what ways if any, did our studies in Europe and in the Design VII studio change or impact on your attitude towards compact living in denser housing?"

Emergent themes and sub-themes	• Experiencing compact living firsthand. - Living in Trastevere, Rome, for 12 days provided time to observe and immerse within compact living. - Meeting and interacting with residents of denser neighborhoods. - Authentic places generally preferred to planned places. - Demonstrated compact living can translate to American lifestyles. - Timing prior to studio design exercise was important. • Studio design exercises reinforced compact living as a viable alternative. - Readings, precedents and background information reinforced suitability as an American model. - Reinforced the benefits to residents – drawing on personal experiences of compact living to inform design process and enrich empathy for hypothetical end-users of designs.
Emergent linking themes and subthemes	• Personal experiences are fundamental to changing attitudes and aspirations relating to compact living, and enrich the academic study of this development pattern.
Quotations: - *The thing that had the most impact was living in Rome. That's not to say that going to the towns in England and Scotland didn't have an effect, but we didn't get to stay there for very long, whereas in Rome we were there for a week and a half, so it was long enough to get a feel for it. And I would say that designing a place; that really reiterated a lot of important things. I think that it challenged me as an American who has grown up living in a certain way and I saw that it's not just a European thing.* - *Probably the free time in Rome, and being able to wander around and see what I could see. I think that density can be a hard concept to grasp if you've not really experienced it because, prior to going to Europe, I didn't really have any experiences to draw from. But then actually being able to do a design helped solidify the idea that 'yes this could work, even in Fayetteville, Arkansas'. But I think probably the experience had a lot more impact because I was there and I was living it for two weeks, and it made me see that, yes I could live like this - this is great.* - *I guess the most impactful things were maybe seeing other people obviously living very rich lives. New Town was initially positive, but it's kind of scary because there are no people there. And then you see these organically formed places and it's obvious that they're functioning and you see some of the things that New Town doesn't have. There are layers that are missing at New Town, complexities that Trastevere has. Extra textures. Without seeing density for real, I think my doubts would not have been answered… I feel like I got the experience of whether or not it works.* - *I think that taking us to those places and letting us experience them for ourselves, rather than just telling us these are the principles. I really enjoyed Stockbridge flats in Scotland a lot. I liked Poundbury - I remember that pretty well. I think Greenwich Millennium Village - that was alright, but I wish we'd seen people using it because it was in the middle of the day, and people were at work, but being able to see it in use would have been totally different. We got to talk to a couple of people in Stockbridge, and ask them about their space. Poundbury we had a tour guide, so we had a more insider to feel of it, but Greenwich, we didn't really have that. And at Poundbury we saw people walking around. It made it more human. Not just a project, but that life was actually going on there. The class helped me to learn the principles and understand better what I had been seeing and create a better design, but before going the site visits I wasn't sure these are places I would want to live, but seeing how it worked and meeting people that lived in it, I would definitely live in it now.*	

Table 10. Content analysis of response to "What, if any, would you say were the most important aspect or aspects of your studies in terms of influencing your attitude towards compact living in denser housing?"

students' views on the benefits of compact living also drew on personal reflection, taking in comparisons with the suburban environments where they had grown up and thoughts on their own future residential lifestyle. Interestingly, the group tended to focus on benefits related to physical and mental well-being, such as connectedness of communities and walkability, rather than more obviously environmental benefits such as the preservation of land and resources, even though these benefits were granted similar weight in the studio. Given their emphasis it is unsurprising, compared with the control group, that the treatment group was significantly more supportive of compact living in the trade-off section of the survey; five of the seven scenarios related to the walkability and access benefits that appear to have resonated with them strongly.

When comparing the treatment group's attitudes before and after their urban design studies, it seems clear that they were incited to change their views about where they might wish to live in the future. The two students who had lived in denser off-campus accommodation such as student apartments had their appreciation for a compact lifestyle broadened; it was no longer simply an option for college students but an environment offering convenience and a sense of community across demographics. The majority of the other, inexperienced, students echoed this acquisition of appreciation for walkability and convenience, and spoke positively about the possibilities of finding comfort and a sense of community in denser environments. Some had even become advocates trying to persuade their families of the benefits of compact living, and expressed some frustration that more Americans have not experienced walkable, denser neighborhoods.

This brings the discussion to a crucial point: It was the experience of visiting, walking, and especially living in denser environments that chiefly precipitated the students' shift in attitude. The 12 days of living in Trastevere, Rome, where the students were imbedded within a vibrant, dense neighborhood, had an especially profound effect on their residential aspirations. This reiterates previous work pointing to the important influence that visiting overseas cultures can have in the forming of student views and attitudes. Other, shorter, European site visits—Stockbridge Colonies and Poundbury Urban Village—were also influential. Although brief, these excursions exposed the students to life being lived and communities thriving in denser environments. The visit to Greenwich Millennium Village in London, and then subsequently to the New Town in Missouri as part of the Design VII studio, had less effect, however. Both these visits took place at times when the students were unable to observe the residents and the perceived artificiality, and the geographic isolation of New Town seems to have been particularly off-putting.

On the other hand, the students appeared to respond well to a sense of authenticity in neighborhoods, and in this regard, the excursions to older parts of St. Louis during the Design VII studio contributed to their positive experiential immersion and also helped transpose the idea of compact living to an American context. This effect was reinforced by the studio's design project, background readings, films, and lectures, all of which made the case for denser living in the United States. However, it seemed important to the students that this rather more academic focus on compaction followed on from the experiential exposure to dense neighborhoods. This sequence allowed them to experience and engage with density largely unfettered by the need to be highly analytical and cognizant of the "rules" of good urbanism; it was only by the time the group visited New Town and St. Louis that their observations had to be framed by studio-related readings and lectures on the theory and best practice of denser neighborhood design and planning.

Their initial immersion, especially in Europe, allowed the students to develop a well of experiences that could be subsequently drawn upon in the studio project, enriching their design proposals through a sense of empathy and their own aspirations, rather than mechanically aping precedent studies or looking to embody theory and best practice. The students attested to the importance of the studio and classroom-bound part of the curriculum, but expressed that it was only in combination with their lived experiences in dense neighborhoods that their studio and class time attained the most value.

Conclusion

This small study cannot be extrapolated to make a general case, but it does suggest that landscape architecture undergraduates' educational experiences not only can provide insight into residential compaction, but also can incite a change in their residential preferences and attitudes. Arguably, the first order of a professor's business is to provide insight that can then be applied as required through the remaining curriculum and post-graduation. It was therefore reassuring that the Design VII /Study Abroad students were relatively familiar with key, basic concepts related to residential compaction and efficiency, and during their interviews, demonstrated a very real and thoughtful level of insight. Nevertheless, the same students' incitement to change their residential aspirations towards compaction was marked and noteworthy. The design studio's content both reflected the professor's values and though not explicitly intended, played a part in shaping the students' values by providing a substantive underpinning to the positive experiential immersion in compact neighborhoods.

At the same time, this immersion provided the interest, curiosity, and emotional investment to enrich the students' time in the studio during discussions,

readings, and lectures, and fired their empathy through the design process as they master planned their own dense development. The traditional architectural studio components of study and the cultural immersion were therefore synergistic in developing the students' knowledge and design skills, changing insight and affecting a shift in their values and aspirations—inciting change. However, in isolation, it was undoubtedly the immersion in compact communities that had the greatest effect on the personal aspirations of these students: their interaction with people living in these places, a burgeoning appreciation for the design quality and comfort that can be achieved with density, and the simple pleasures and conveniences of walking.

This study reiterates the importance of overseas travel in the shaping of students' personal attitudes, but there could be a danger in drawing too much from enthusiasm for time spent in exotic locations such as Rome, Edinburgh, and London. However, the American site visits were also valuable, not only for their own experiential qualities but also in adding credence to the lecture and reading material in transposing higher residential density to an American context. The students' responses frequently and explicitly suggested that their views were pragmatic and grounded in a sense that compact living is a viable option for them and for other Americans.

Regarding further research, longitudinal studies could evaluate the trajectory of the students' shift in opinion, and whether changing lifestyle and life-stage variables post-graduation further affect their residential preferences. It would also be instructive to evaluate the relative effect on student knowledge and values when compact living is introduced in a purely class-bound approach and is not enriched through immersive experiences. On the other hand, what would be the effect of educational experiences that provided cultural immersion outside the frame of a design degree? Do students from other fields who visit denser communities without a parallel or subsequent academic framing through a design studio, also experience changes in their residential preferences?

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MAKING CHANGE: Designing a new model for climate change interpretation and experimentation

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keywords climate change, climate change education, interpretive design, resilience, high tunnel

Abstract

Many people are aware of climate change, but have limited understanding of what climate impacts to expect, and what effects these impacts may have on their local environment. This uncertainty is often accompanied by frustration about the ambiguity of climate change as something that is intangible and therefore out of our control. With these concerns in mind, faculty in landscape architecture and horticulture in partnership with Cornell's botanical garden developed a project to make climate change impacts more visually and experientially available to visitors. The result was the installation of (to our knowledge) the nation's first interpretive "climate change garden" demonstration with the explicit intent of increasing visitor interest in and understanding of climate change.

Botanical gardens have an established record of data collection and research on plants and climate and are poised to share climate change knowledge with the public (Primack and Miller-Rushing, 2009). This paper outlines our process for defining an emerging garden genre, and how to link the science of climate change to a dynamic and compelling interpretive and demonstrative garden installation in a botanic garden setting. It describes the project as an installation of carefully selected planting beds embedded in both a high tunnel greenhouse (with degrees of control over temperature and precipitation) and an ambient open-air installation for comparison. It discusses lessons learned in combining experimental inquiry with interpretive design, while navigating the logistical constraints of crafting the right message for visitors to a garden of tomorrow within the opportunities and constraints of the world as it exists today.

Three overarching interpretive goals for the installation were crafted with the objective of affecting visitors' experiences and attitudes by a) informing visitors about climate change and what they can expect; b) physically demonstrating possible changes and impacts to plants so that visitors can understand them; and c) providing an interactive opportunity for visitors to interpret climate impacts by documenting their observations. This project also has a longer-term goal; as something of a "designed experiment" (Felson and Pickett, 2005, Felson and Pollack, 2010), the physical, botanical, and visitor experience data collected and observations made will be used to "tune" the installation's performance and impact, and may ultimately inform more significant experimental research investigations into resilient landscape planting selection and design (Hunter, 2011).

Introduction

Climate change is a complex phenomenon with far-reaching implications that are at once global and site-specific. Many people may have a conceptual grasp of climate change, but may not know what climate effects to expect in the region, and what impacts climate change may have on their day-to-day environment. As the urgency and significance of climate change continues to mount, new approaches are needed for interpreting and visualizing climate change with the public that are tangible and approachable beyond the abstract.

Botanical gardens have made longstanding contributions to climate change research, particularly with respect to temperature and its effects on the timing of plant flowering and leaf out by participating in phenological networks of botanical gardens, monitoring standardized plantings in phenological gardens, and studying and examining herbarium specimens and historical photographs (Primack and Miller-Rushing, 2009). In addition to research, botanical gardens have responsibility to share valuable information with the public about climate change and its impact on plants, ecosystems, and people (Primack and Miller-Rushing, 2009, Sellmann and Bogner, 2013). According to Dr. Casey Sclar, Executive Director of the American Public Garden Association, "Public gardens are uniquely positioned to be THE place to learn more about and EXPERIENCE climate change" (Lewis, 2012, p.5). Sclar adds that public gardens are places where visitors can make local connections to this global issue (Lewis, 2012).

Cornell University's botanical garden, Cornell Plantations, has a strong educational mission and a focus on contemporary botanical topics. It also enjoys a long-standing rapport with Cornell faculty, some of whom are

leaders in climate science research. In 2011, the authors began exploring the possibility of designing and installing an interactive climate change demonstration garden within the botanical garden. At the time, no precedent for an interpretive 'climate change garden' existed, with the possible exception of phenological gardens, which are research installations of specific plant species for standardized comparison with other participating installations in an organized network (Primack and Ziller, 2009). Gardens such as The Chicago Botanic Garden, Wellesley College and others for example are participating in a program known as "The Floral Report Card" which offers citizen science opportunities for monitoring a garden of selected native wildflowers and grasses (Dunne, 2012, Project Budburst, 2015) Syracuse University also recently installed a climate change garden comprised of 34 different species of trees and shrubs, some native, some adapted to warmer climates. They plan to monitor the health and vitality of these plants over the course of years (Syracuse University, 2013). The American Public Garden Association's Youtopia program offers gardens and garden visitors information about climate change and possible solutions (Carlin, 2012). But Cornell Plantations was looking for something more demonstrative, interactive, and compelling. They were looking to find a way to "bring" climate change to a garden installation by allowing comparison between a present-day garden and a "garden of the future" influenced by aspects of a changing climate.

Many devices have been used to approximate the anticipated effects of climate change in scientific research, including phytotron growth chambers, greenhouses, open top chambers, infrared heating and other techniques. Some of these techniques however can be costly, logistically challenging or have limited interpretive potential. High tunnels (steel frames with clear plastic films stretched over them) can be erected over growing plants, utilizing radiant energy to increase air temperature with relatively low cost. In temperate environments, these structures are used to extend the growing season at both ends through protection from low temperatures and allowing early plantings and late season harvests. Currently, about 1 million ha of high tunnels cover vegetable, flower and fruit production areas of China, and it is estimated that 150,000 ha of protected cultivation is practiced in winter around the Mediterranean region (Jiang et al., 2004; Castilla and Montero, 2008). In the United States, use of high tunnels for crop production has recently received a major boost through a federal program that partially subsidizes high tunnel acquisition by farmers (NRCS, 2014).

High tunnels lack the precise environmental controls of expensive greenhouses, but are nevertheless able to influence temperatures experienced by plants to levels projected for our changing climates by trapping heat generated from solar radiation and regulating temperatures via ventilation. The structure also sheds rain, and thus allows the user to select the watering regime inside through irrigation. More mechanized high tunnels with exact temperature control and equipment that manipulates air CO2 concentration have been used by scientists to explore the combined effects of important climate change variables on crop performance (e.g. Dias de Oliveira et al., 2013). While less-equipped high tunnel setups cannot emulate projected climate change effects as comprehensively and accurately as these more expensive setups, we saw the potential for a lower-tech setup to provide an interpretive and demonstrative environment for visitors to experience the possible impacts of certain anticipated climate change effects, notably those of projected shifts in temperature and/or precipitation patterns on vegetation, as a means for engaging visitors in a dialogue about climate change. There were a few environmental limitations of the high tunnel, such as reduced air movement and differences in day and night temperatures, that would not be typical of climate change effects, but we judged that these limitations would not be major factors in plant growth during the season and refrained from specifically interpreting these limitations during the pilot season.

Cornell Plantation's interest in a dynamic and interpretive climate change installation paired with international-level expertise in high tunnel-based horticultural research and other expertise at Cornell led to a series of partnerships exploring the design and installation of (to our knowledge) the nation's first climate change demonstration garden. This investigation was based on two basic research questions: a) How might we define a climate change garden and its characteristics as an interpretive and demonstrative installation?; and b) How might a high tunnel be used in a climate change garden to interpret climate change effects? In this paper we describe our process for defining our own climate change garden project, our investigation into the materials and methods for siting such an installation, our initial observations, and the complexities and lessons learned from such an installation as we chart our course forward.

Approach

A grant by the Toward Sustainability Foundation in Spring 2014 catalyzed an interdisciplinary effort to envision, design and install an interpretive climate change garden at Cornell Plantations. During the course of its development, it became evident that this project would be a dynamic exercise- one of iterative design, construction and learning- where the results would be unique and possibly the first of its kind. To begin, we had to first define for ourselves what a climate change garden actually is. While a climate change garden can generally be defined as a garden installation with a combination of plants and

other materials with an overall climate-based theme, there can be much more embedded within it. We surmised that there are four fundamental influences that drive the design of a climate change garden: the designer and her capacities as space-maker and generator of conceptual intent, the garden space with its locational opportunities and constraints that impact the potential of the project as a composed and intentional landscape, the visitor as an observer and interpreter of space and meaning, and finally climate change itself as a present and future agent of change within the garden. While the first three are certainly not unique to project development, particularly in interpretive settings, climate change, as an arbiter or force of change that is both global and local, is unique for the physical conditions it dynamically defines as well as the revelatory interpretive opportunities it can provide.

To define our own vision for a climate change garden, we posed the following six questions. Those endeavoring to design their own climate change gardens may also want to consider these questions in order to optimize their own project.

What are the regional impacts of climate change?

A specific understanding of climate change and its projected impacts on climate in the project region provide the basis for design. Whether the garden will actively engage these impacts or address them more passively, knowing what can be anticipated with climate change is critical for moving a design concept forward. State-level models that make specific predictions for climate change in regional locations throughout a given state may be available, and if not, national assessments like the 2014 National Climate Assessment Development and Advisory Committee Report (Melillo et al, 2014) provide multistate-level assessments of climate change effects and impacts that may provide enough resolution to anticipate changing climate patterns.

What is the intent of the garden?

Fundamentally, the purpose of the garden must be clear and evident to the designer and the visitor. For example, is the primary intent to collect scientific data on climate change as an experimental design, or will it be about interpreting these effects for visitors? Are there other objectives? How are these objectives exclusive of one another, or not?

What is the message you intend to send your visitors?

Climate change will upend many aspects of our environment and our lifestyle. Its impacts can be dramatic, confusing, frightening, and/or controversial for those who confront it. The intent or purpose of a garden, as it is experienced by the visitor, ultimately sends a message to visitors who must process this information and make something of it. Is this message one of hope, concern, or despair? Is it about information, understanding, or action?

How will the garden communicate this message?

A garden as a landscape is essentially the medium of the climate change garden designer. What combination of landform, vegetation and structure will be used to communicate your intent and how? How will dynamic and static elements come together to tell "the story" you intend to share? How will the design of the garden, both in terms of selection of garden elements as well as their spatial arrangement, facilitate this story and impact visitor perception? Will the garden be a display, interactive, or even more engaged?

Who are the visitors to the garden?

Different types of visitors will have different sets of interests and knowledge of climate change. Their personal lives and priorities will vary. The purpose of their visit to the botanical garden-at-large- why they are at the botanical garden- will also be different. A persons' relationship to the issue of climate change, as something that affects us all collectively and each of us individually, will ultimately be a different experience for everyone. By anticipating who the garden visitors may be and their interests in the garden, we can better tune the experience of the installation so its message is more clear, legible, and relevant to visitors.

Will the garden by climate-dynamic or static, and at what temporal scale?

As an exercise in revealing the future, the site is consistently subject to a fourth dimension- time. How might a garden be designed with an eye toward the future, under the conditions of today? While all gardens are necessarily dynamic, how might the agency of climate change be best anticipated, represented, or interpreted for the benefit of the project?

Defining our approach

In defining our project, we answered these questions through the course of multiple meetings, conversations, and email dialogues. For the region of our project location in Ithaca, NY, the anticipated effects of climate change are well studied. Statewide, New York is projected to experience increases in total annual precipitation. Much of this precipitation increase may be in winter and precipitation may slightly decrease in late summer or early fall, though seasonal projections have greater uncertainty than annual projections (Horton et al, 2014). In New York's Southern Tier Region 3 where the project is located, increases are projected in annual precipitation of +4 to +10% by the 2050's and +6 to +14% by the 2080's) (Horton et al, 2014). Although these annual increases may seem relatively incremental, larger

increases in the frequency, intensity, and duration of extreme precipitation events are projected (Horton et al, 2014). By the end of the century statewide, the number of drought events is likely to increase during the warm months, though with relatively high uncertainty (Horton et al, 2011). Increases in average annual temperatures are also expected statewide. In New York's Southern Tier Region 3, mid-range projections indicate increases in average temperature of +4.4° to +6.3° F by the 2050's and +5.7° to +9.9° F by the 2080's (Horton et al, 2014). A greater frequency and duration of heat waves (three or more consecutive days of maximum temperatures at or above 90 degrees F) is also projected (Horton et al, 2014).

We knew early on that while our garden would possess aspects of scientific interest and investigation, it would be primarily interpretive in its intent. We were concerned about visitors' general unfamiliarity with climate change and its projected impacts on the region, and wanted to send a message that was both bold and unequivocal: that climate change is coming, it will have impacts, and those impacts will affect our local environment and daily life. While we understood this message could be daunting for visitors, our intent was to share with visitors what climate change phenomena are projected for the region, so that the notion of climate change, as a large-scale process all-too-often defined in the abstract, would seem immediately relevant and visible to the visitor.To do so, we were looking for a way to demonstrate the impacts of climate change in a comparative setting, so that aspects of climate change could be contrasted with current conditions. While basic high tunnel equipment could not provide an actual simulation of all climate change factors, it could provide reasonable control over average temperature, high temperature extremes associated with heat waves, and extremes in precipitation. We hypothesized that manipulation of these environmental factors associated with climate change in a high tunnel environment would significantly impact plant survival and vigor, indicating possible future climate impacts. A demonstration of these impacts could open a dialogue about climate change where visitors might be interested in learning additional information about climate change, and perhaps how to mitigate and adapt to its effects.

Based on surveys of visitors to Cornell Plantations, we knew that many visitors to the garden have an interest in gardening and horticulture, so demonstrating climate change impacts through plant response seemed an appropriate strategy. We also wanted the project to be dynamic, high impact, and constantly changing, so that these visitors could return to the garden multiple times during the season in order to view and interpret different impacts. Finally, we further sought to provide a way for visitors to interact with the installation, so that they could make their own observations of impacts first-hand, develop conclusions, share them, and take ownership of that understanding. This final point had the secondary purpose of providing feedback to us on the effectiveness of the installation in providing knowledge about climate change in an interpretable and useable format for visitors, so that we could continue to refine and tune it.

Materials and Methods

Site design layout

The climate change garden design concept was developed in Winter 2014 and was installed in May 2014. The project was composed of a garden area inside of a high tunnel, on which some measures of environmental control would be imposed (primarily temperature and irrigation), and another identical garden area directly outside of the high tunnel that was subject to ambient environmental conditions. In this initial season, the objective was to create a moderately warmer environment in the high tunnel, similar to average temperature increases projected for this location in the 2050's. We located the garden in the southeast corner of Plantations' Sustainable Backyard Garden so that beds inside and outside the high tunnel had equal and adequate solar access for comparative growing conditions. The high tunnel itself consists of a steel frame unit of 24' length, 20' width, and 12' height, and was covered with a 0.15 mm thick translucent polyethylene plastic skin. Solar energy penetrated this skin and warmed the inside of the tunnel. Ventilation and temperature control was achieved by gable-end vents and sides that could be rolled up or down based on the desired environmental conditions.

Six 4'x6' raised planting beds were constructed of 2"x6" black locust planks within each of the garden areas and filled with soil amended with manure compost at a ratio of two parts soil to one part compost. Identical plant species were planted in each of the six beds in the planting areas both inside and outside of the high tunnel, so that all aspects of plant layout- plant species, form, numbers, their spacing and their arrangement- within the beds was identical inside and outside the high tunnel so that visitors could make comparative observations about the differences in plant conditions both inside and outside the tunnel. See Figure 1 for an illustration of the project plan. Figure 2 and Figure 3 provide photo views of the installation.

When selecting plants for each of the beds, we wanted to demonstrate impacts of changing environmental conditions on plant survival, phenology, and vigor both inside and outside the tunnel. We knew that many plants- landscape plants, garden plants, perennials, and members of New York native plant communities- will be subject to the impacts of climate change. What we didn't know was how individual species would respond to changing environmental variables. We chose a broad spectrum of species to include in the beds to develop

our understanding of how different plants would react to climate change-associated variables and show visitors the effect of climate change on each. Each of the six beds had a unique organizing theme. For example, Bed 1 held plants that we anticipated would grow well inside the tunnel while not so well outside of the tunnel, while Bed 2 was composed of plants adapted to regions that we anticipated would grow well outside the tunnel but not so well inside the tunnel. Other beds had specific themes or types of plantings, including landscape, vegetable garden and native plants beds, each harboring a selection of plants that we anticipated would have a mixture of discernable reactions to climate change. Table 1 provides a description of each of these beds and the species placed within them.

Environmental controls and data collection

At the outset of the project, it was unclear to us precisely how the tunnel would perform in emulating aspects of climate change and how plants would respond to these variables. Therefore we limited manipulation of the environmental variables to just average temperature within the tunnel, and sought an average temperature increase similar to future climate change projections for the 2050's. We controlled temperature by opening the gable vents and keeping the sides open for most of the growing season. Temperatures inside and outside the tunnel were monitored by temperature sensors linked to a weather station (Onset Computer Model U30 Hobo), with sensors placed at 10 cm and 28 cm depth in the soil, and 122 cm above ground. The aerial sensors were protected from the sun by a shading screen. A quantum sensor measured photosynthetically active radiation (PAR) in the tunnel during the growing season. We chose to provide comparable bed irrigation adequate for growth, and not to experiment with the effects of either drought or excess water this first season. Beds in the tunnel were watered by hand twice weekly, and the outside beds were watered when needed to also keep them comparatively well hydrated.

Plant data collection

To monitor the performance of plants inside and out of the tunnel, growth rates were measured by determining plant heights with a meter stick, dates of fruiting were noted, and the yields of ripe fruits were counted where applicable. Photos from all beds were periodically taken from set locations. No other indications of plant phenology were taken this season.

Interpretation and visitor data collection

The overarching goal of this project was to share the story of climate change with visitors to Cornell Plantations through the lens of a garden, and explore how to best convey it. Prior visitor surveys indicated that those visiting Plantations have a strong interest in

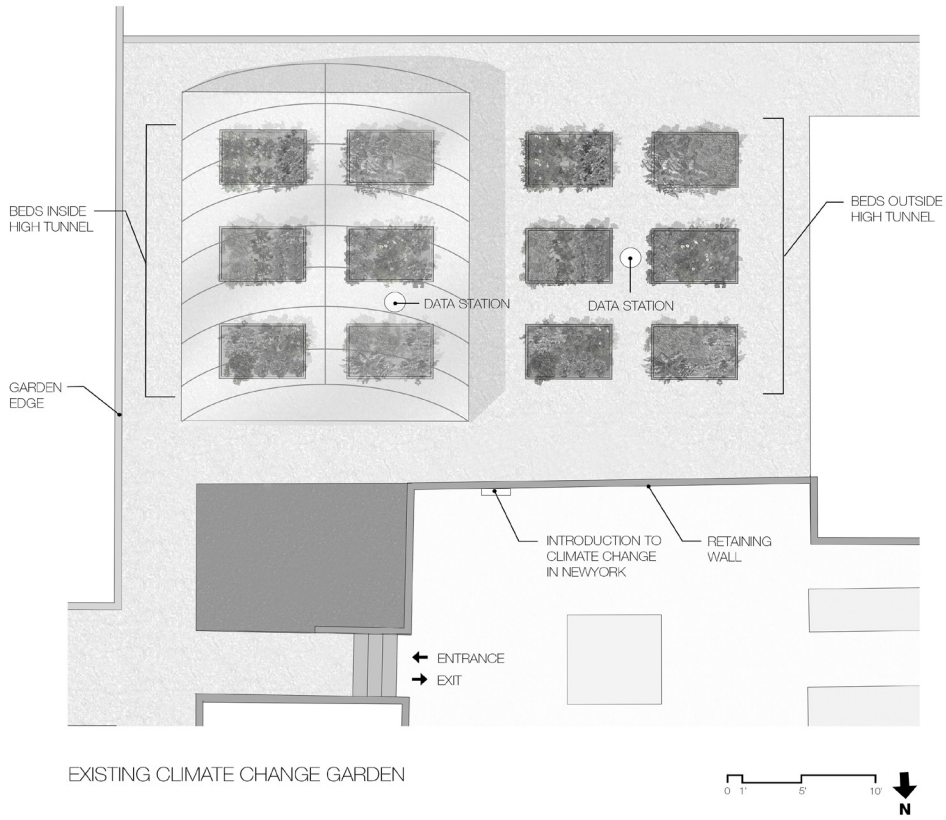

Figure 1. Plan for the 2014 climate change garden. (Morouj Akbar, MLA '15)

Figure 2. Photo of the 2014 climate change garden installation. The outside beds are in the foreground. (J. Cera)

Figure 3. Photo of the 2014 climate change garden installation. The inside beds are in the foreground. (J. Cera)

horticulture and gardening. The climate change garden is located in a section of the botanical garden that is home to Plantations' vegetable garden, and a teen environmental education garden called the "Sustainable Backyard". Additionally, the teen program used the climate change garden to support their understanding of climate change principles.

We knew that it would be necessary to introduce the garden and the topic of climate change to visitors; to do this we installed a kiosk that included an introductory sign along with a brochure that included a visitor survey and small pencils. The sign introduced fundamental aspects of climate change- extreme fluctuations in temperature and precipitation, as well as longer-term changes in climate conditions in the region. It also invited visitors

to observe, compare, and take note of how well plant species grew inside and outside the tunnel. The available brochure outlined specific climate change projections for the region in greater depth, and stated that while the high tunnel can't provide an actual comparison of the differences between today's environmental condition and anticipated future conditions, it can approximate some of the effects of climate change projected for the region including extended periods of higher temperature and drought. Intended as a take-home piece, the brochure also directed readers to Cornell's climate change website, a clearinghouse of reputable sources about climate change as well as citations for climate change effects and predictions about climate change.

A detachable visitor survey was also included in the brochure. We had two main objectives for the survey a) to provide an interactive opportunity for visitors to make and record observations about the plants and b) to gather baseline information about what visitors would like to know about climate change. There were five questions on the survey, two were rating questions using a Likert scale and three were open-ended questions. We asked visitors to "rate the overall condition of the plants in each bed. 5=excellent; 1=poor" for the beds inside and outside the high tunnel. Following the rating questions, visitors were asked to provide open-ended responses, "use this space to add any specific observations." We then asked, "Which plants did you see growing better INSIDE the high tunnel? What are the difference that you see?" and asked the same question for plants OUTSIDE the high tunnel. The final question simply asked, "What would you like to know about climate change?" We expected the survey would take approximately 10 minutes for visitors to complete. Our intent for the open-ended questions was that visitors' responses would provide us with objective baseline data about what our visitors knew and wanted to know about climate change. We were hesitant to provide answer choices so as not to bias visitors' observations or to restrict their answers to what additional information about climate change they might like to have. Visitors were invited to leave the completed survey in a box provided on the introductory kiosk.

In addition to the introductory sign and the brochure, each bed was labeled with a description of the types of plants in the bed using the bed descriptions in Table 1. Finally, a Cornell University student intern was employed by Cornell Plantations over the summer months to care for and interpret the garden to visitors. This intern often spoke with visiting tour groups, visitors, and students about the garden and its intent, and shared the interpretive messages outlined above. She recorded her visitor observations and interactions in a journal and shared her observations with staff during and at the end of the season.

Initial Observations

Our first year was primarily an initial investigation into the process of designing, installing, and maintaining an interpretive climate change garden. However we did make some preliminary observations, both qualitative and quantitative, that inform our lessons learned from this process and the steps we plan to take moving forward.

Environmental Controls

In this first, mainly observational season, tunnel ventilation was not severely restricted and the air and soil temperatures were only modified to a small extent by maintaining some ventilation through tunnel sides and roof vents (Table 2). Over the growing season, daytime air temperatures were only 3.4°F higher in the tunnel, and overall, the difference was only 1.5° F. Soil temperatures fluctuated less, but showed a similar overall difference. In comparison, a 3.5°F increase in temperature was on the low end of the average annual temperature increase projected for the Ithaca Southern Tier region in the 2050's due to climate change by the latest projections available at the time of the study (Rosenzweig et al, 2011). Since initiating the project the mid-range projection for change in temperature by the 2050's has been revised upward to between +4.4 to +6.3°F (Horton et al, 2014). Finally, comparative readings inside and outside the tunnel with a line quantum sensor (Model LI-191SB, LICOR, Lincoln NE) in early October established that the high tunnel structure reduced incident PAR (Photosynthetically Active Radiation) by 29%.

Plant response

Given the moderate conditions in the tunnel, most plants showed some increase in plant growth. In particular, the plants adapted to warm climates showed the greatest growth stimulation, but growth stimulation was also observed in those that would normally do best in a temperate environment. At this stage of the project, we did conclude however that a comparative high tunnel setup such as this installation has the potential to elicit differences in plant response inside and outside the tunnel by manipulating environmental variables inside the tunnel. We would assume that in another growing season, in which a more restricted ventilation would raise air temperatures for the temperate crops to above their optimum, temperate crops would grow less well in the warmer environment.

Design layout and interpretation

From a design layout standpoint, we were seeking a comparative experience for the visitors to the garden. Visitors were attracted to the introductory sign for the Climate Change Garden and tended to read it and take a brochure. While we anticipated that visitors would view the garden comparatively, not all visitors actively did so unless prompted by staff or intern. The garden layout was unstructured in terms of its sequencing, and some visitors visited the high tunnel while not visiting plants

Bed Number	Best Description	Bed Species
Bed 1	Plants in this bed have adapted to grow in warmer regions and should grow well inside the high tunnel but not so well outside of the high tunnel.	okra, peanuts, cotton, Malibar spinach, cowpea (long bean)
Bed 2	Plants in this bed are adapted to grow in this region, but as the climate in this region continues to warm, these plants may no longer grow well here.	Lettuce, Spinach, Radish, Calendula, Torenia
Bed 3	Plants in this bed grow well here in the warmer months, but cannot survive in winter. Some plants may survive the winter inside the high tunnel.	Canna, Eucomis, Musa, Fig, Gladiola, Acidantera, Agapanthus
Bed 4	These are popular landscape plants used in urban and residential settings. These plants have been specifically selected to see which will grow well in the high tunnel.	Lagerstroemia, Camellia, American Holly, Hydrangia, Phygelius, Abelia
Bed 5	Plants in this bed are found in native plant communities Upstate New York. Plants have been selected to see which will grow well in the high tunnel.	Ilex glabra (Inkberry), Symphorocarpus spp (Snowberry), Monarda fistulosa (wild bergamot), Ilex verticillata (deciduous holly), Veronicastrum spp. (Culver's root),
Bed 6	This bed has a variety of pepper plants known to have a longer growing season similar to conditions in the high tunnel. Some vegetable crops may grow better here as the growing season gets longer in this region.	long season peppers

Table 1. Bed descriptions and species lists for the six beds included both inside and outside of the tunnel in the 2014 installation. (J. Cera)

	Air temperature, °F		Soil temperature at 4 in.	
	Outside	Inside	Outside	Inside
Day	72.6	76.0	67.7	69.2
Night	59.6	59.6	67.3	68.5
Overall	65.2	66.7	67.5	68.8

Table 2. High tunnel air and soil temperatures between June 26 and Oct. 7, 2014. (Rodekohr, 2014)

growing under ambient conditions, or viewed them in ways that made them difficult to compare. When they did walk through the garden, many appeared hesitant to enter the high tunnel without explicit instruction or permission to do so. Once invited by staff or the intern, visitors would enter. We speculated whether the unstructured, free-roaming nature of the garden made it challenging for visitors to learn key information, make observations, and interpret them in a way that would be most meaningful to them. Visitor feedback told us that a basic choreography of experience would be more helpful.

There were also interpretive lessons learned from a planting design standpoint. When visitors did view the garden comparatively, sometimes the phenological differences between the plants were subtle to the untrained eye. This was partly due to the fact that we intentionally limited the environmental variation between the gardens inside and outside the high tunnel to a moderate increase in average temperature (rather than temperature or precipitation extremes for example). However even with modest temperature interventions (slightly warmer inside the high tunnel than out) visitors were able to detect differences between the plants inside and outside the tunnel. When asked to rate the overall condition of the plants, visitors and survey respondents generally provided higher ratings to the overall condition of the plants inside rather than outside the tunnel.

We had over thirty species and cultivars of plants in the installation, and while we hoped that grouping them in theme-based beds would assist in organizing observable changes for viewers, processing all of the plant effects over that many species was likely too daunting for the typical visitor. Also some of the species used were perhaps not typically familiar to visitors and may have caused some visitors to focus on plants they were interested in for their own gardens, or just for the plants' interesting qualities. Many visitors for example gravitated toward Bed #3 which displayed tropical plants.

One of the methods by which we had hoped to have this garden be an interactive experience was for visitors to use the provided survey to rate the plants and provide comments about their performance. Over the course of the season (May – September) we distributed 100 brochures in a box attached to the introductory sign. Of those, 9 surveys were returned. We hypothesize that the layout of the garden contributed to the lack of returned surveys (it is likely that visitors did not exit the garden the same way they entered thereby bypassing the survey return box) and that the survey itself inhibited completion and submission. One objective of the survey was to provide an interactive way for visitors to observe the plants inside and outside the tunnel, and as stated earlier making the observations may have been difficult and therefore visitors may not have felt able to provide ratings. The open-ended nature of many of the questions, while seemingly a good way to gather baseline, objective feedback from visitors may also have inhibited completion. Finally, having the survey attached to a take-home brochure may have influenced the return rate in that visitors simply took the brochure home not realizing there was a survey. For the surveys that were returned, the rating questions were answered by all respondents, 1 respondent answered all the open-ended questions and 3 others provided answers to the observation open-ended questions. Only one respondent gave feedback on what they would like to know about climate change.

Lessons Learned

Based on our experiences in this initial materials and methods investigation we see the following opportunities to improve the interpretive experience and impact of the climate change garden.

Simplify plant diversity and variation

There are opportunities to focus the way that information is shared in the garden so that it is more apparent to visitors. Climate change can have varying and diverse impacts on plant vigor, and differences in phenologic expression may not be immediately obvious to observers. Conversely, diverse responses that are unorganized visually can also be difficult to interpret for the typical viewer. This can be addressed by reducing the number of species (and their corresponding response diversity) used in an installation. This legibility could be further improved by arranging individuals of the same species together in groups, such that plant phenological effects will be more visually significant in the garden landscape.

From a project development standpoint, we benefitted greatly from observing variation in phenological expression for a diversity of plant species and types in the first year, and the conclusions we've drawn from these observations will be very useful for choosing new plant palettes moving forward. By reducing the number of species and their corresponding response diversity moving forward, we should be able to make effects on plant phenology more interpretable to the user. Using plants that may be familiar and readily identifiable to the visitor may also improve interpretability.

Choose plants by their message

Many visitors will be observing the possible effects of climate change for the first time when visiting the garden. The plants chosen and their phenologic expression have a profound effect on the message sent by the entire garden. Some plants respond more significantly to climate change-associated environmental effects than others, and exhibit pronounced phenological effects. Plants are your

messengers- their relative susceptibility or resilience to environmental effects and how they exhibit phenologic effects (e.g. accelerated growth, senescence, altered bloom time, stress-related disease) will directly impact what a visitor takes away from the installation. For our case, as we continue to run trials in the garden we may also find that certain plants demonstrate phenologic responses to climate change factors in ways that are more evident to the viewer. Rather than exaggerating the impacts of climate change on plant response, these effects should be readily evident and visible, preferably throughout the growing season. Therefore choosing the right plants is critical. Over time we anticipate tuning the plants in the installation to optimize for plant phenologic expression, survivability, and productivity and their corresponding interpretive messages.

Amplify the impact of the installation

For our first season, we limited the environmental variables in the tunnel to better understand how the tunnel would perform, and how plants would respond. While the phenologic effects were evident for many species, the absence of environmental extremes associated with climate change may have had a relatively muted effect on plant response. This made the effects on plants subtle and sometimes difficult to discern for viewers. Beginning next year we will be adding extremes in temperature and precipitation (e.g. periods of excess irrigation, drought and/or heat waves) and may also increase the average daytime temperature in the high tunnel, which we hypothesize will have more pronounced effect on plant phenologic expression, survivability, and productivity.

Strengthen visibility of cause and effect

The climate change garden is a dynamic and ever-changing system, and environmental conditions and their effects are changing constantly. We feel 'current events' in the garden could be more easily shared to enhance the impact and interactivity of the installation. Strategically positioned bulletin boards, white boards or other similar devices could post environmental effects underway like heat waves or excessive irrigation, and highlight any readily observable impacts on plants. This could be further reinforced by placing highlighted "tags" near plants that are currently expressing responses to such effects. These improvements would improve visibility by enhancing the cause-and-effect linkages between changing environmental variables and their impacts on plant phenology and/or survival. It would also improve the dynamic nature of the garden, so that visitors visiting the garden repeatedly during the season can readily observe new phenomena.

Choreograph the user experience

While most people have heard of climate change, its effects on regional climate may not be known to visitors, and its impacts on plants are even less so. Therefore, to begin an interpretive climate change garden installation must be fundamentally educational. When comparative interpretation and feedback is also sought from visitors, sequencing the visitor experience may help communicate the intent of the garden and improve the quality of visitor experiences in the garden.

Improve the feedback loop

Providing opportunities for visitors to make overall and specific observations about the garden and plants and asking them to share those with staff will give visitors the chance to be an active participant rather than a passive observer in the garden. Through the use of bulletin boards and highlighted "tags" along with opportunities for visitors to leave their own observations on the bulletin boards, we hypothesize that such interactivity may help reinforce the messages being shared. We will also benefit from this feedback by learning how visitors interpret and respond to conditions in the garden. Providing a survey, separate from a take-home brochure, with more directed questions and answer choices, and a survey depository at the end of the garden sequence may provide for increased completion and submission of the survey.

Redesigning the garden

Based on our observations this year, we plan to redesign the project for greater impact. While the basic layout of the beds and high tunnel will not change, the redesign will overhaul the climate-associated environmental effects displayed in the garden, plant selection and composition, visitor interpretive experience, and visitor survey data collection.

Environmental controls

With the high tunnel in place and average baseline temperatures established from the 2014 season, we propose to use the high tunnel to more closely demonstrate the cumulative effects of climate change by adding significant variation in temperature and precipitation extremes associated with climate change. For example we will simulate discrete periods of high temperature, drought and/or flood by not venting the greenhouse and withholding water or over-irrigating to demonstrate impacts of such effects on the plants. We may also increase the average daytime temperature in the high tunnel to approach the mid-range of the increased average annual temperature increase predicted for the area in the 2050's, +4.4 to +6.3°F (Horton et al, 2014).

Plant selection and composition

To increase the accessibility and visibility of the climate change message, in 2015 we will install just two overall plant categories instead of six for the beds inside and outside the tunnel. Three beds will contain food crop plantings, each with a limited selection of vegetable and grain varieties that are likely to demonstrate changes in growth, development, productivity, and survival based on temperature and precipitation patterns. We intend to use the grain varieties to help us interpret possible impacts of climate change on our staple foods, many of which are derived from grains; commonly grown garden vegetables that visitors may find in their own gardens will be used to help visitors recognize the possible local impacts of climate change. The remaining three beds inside and outside the tunnel will contain nectar resource plants. These plants, many of them native, will be grouped into three different typical bloom times- early, middle, and late season. The intent of this part of the installation is to demonstrate how climate change-associated variables may bring about differences in bloom time, resource abundance or other phenological expression. Plants for both bed types will be selected so that visitors returning to the garden will be able to observe different conditions and effects throughout the course of the growing season.

Visitor interpretive experience

The current layout of the high tunnel and the associated outdoor beds will remain in place; however the visitor's experience of the garden will be enriched and improved by a new pattern of circulation that coordinates movement through the site with an unfolding interpretive message. See Figure 4 and Figure 5. Five stations will be set up throughout the garden, each with interpretive signage and an opportunity for visitors to dial a phone number on their mobile phone to learn more:

1. *Introduction* - We will provide a clear point of entry for the garden. At this entry point there will a new set of stairs and entryway installed to provide access to the entrance of the garden. There will be a sign introducing the garden, with information describing the science of climate change, the goals of the garden, a map, and instructions for interacting with the installation.

2. *Garden of Today* – This station will introduce the two main groups of plants (food crops and nectar resource plants), why they were chosen, and plant characteristics of interest to observe in the garden beds outside the tunnel.

3. *Wayfinding and Transition*- This stop will provide a place for staff to highlight particular plants of interest, for visitors to record their observations, and to direct visitors to the next station.

4. *Garden of the Future* – This stop will remind visitors of the predicted effects of climate change, identify current climate conditions inside the high tunnel (higher average temperatures than the "Garden of Today" as well as acute temperature and irrigation events), and specific plant characteristics to observe inside the tunnel.

5. *Conclusions and Additional Resources*– After visitors exit the high tunnel they will approach a final interpretive stop where themes will be reinforced, and visitors will have a chance to share their observations, thoughts and conclusions. We anticipate collecting visitor's observations with a white board on the kiosk at the final stop with specific questions and prompts for visitors to share. An improved visitor survey will be provided at the garden's entrance with clear instruction for completing it during the visit, revised questions for ease of answering, and a clear place to return the survey at the end of the visit. Resources for additional learning will be shared including a webpage dedicated to the garden that users may visit to learn about the current goings-on at the garden for their next visit. Opportunities for visitors to both reduce their carbon footprint and adapt to climate change will also be shared.

Finally within both the outside and inside garden beds project staff will use eye-catching focused information tags to draw visitor attention to particular plant characteristics, impacts of note, and to convey additional interpretive messages. The tags will be moved periodically as project staff observe events worth sharing with visitors to help amplify the intended interpretive experience in the garden.

Visitor survey data collection

To improve the onsite survey we will begin by conducting an online pre-survey with a wider audience and hold several focus groups to help us understand people's knowledge of climate change, its impact on plants, and how the climate change garden might help them understand these topics better and be compelled to action. We will use the data from the pre-survey and focus group sessions and consult with climate change communications experts at Cornell to craft a better onsite survey. In addition to the onsite survey we will provide several opportunities for visitors to leave their observations directly in the garden on white boards and on focused information tags that staff and visitors can write on. At the final interpretive stop another white board will give visitors a final chance to share their feedback. The surveys and observations made by visitors on the white boards and the focused information tags will be recorded by staff as visitor response data.

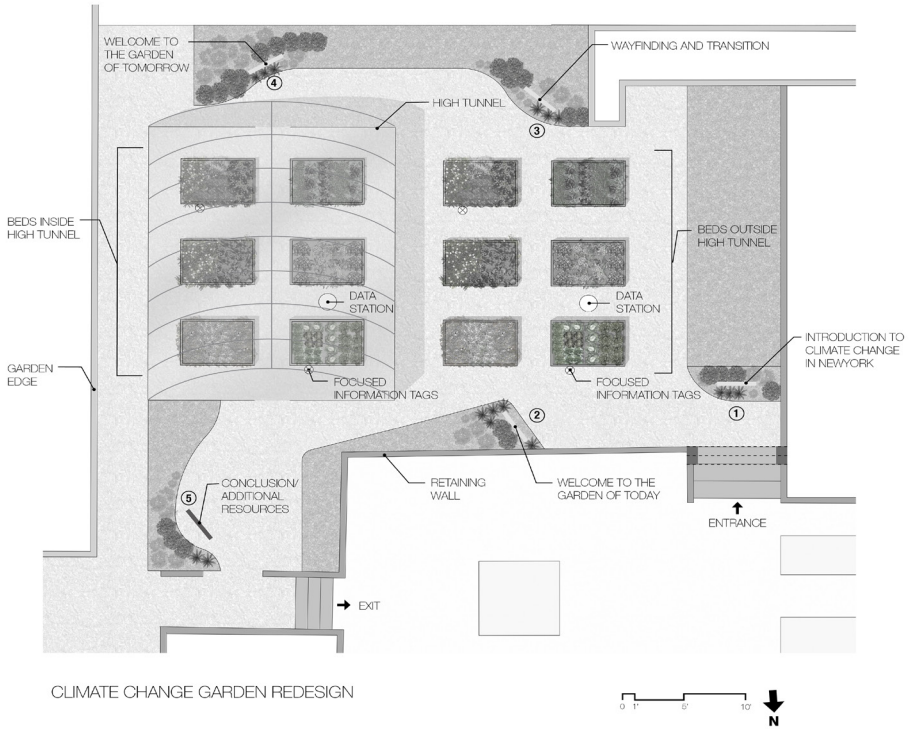

Figure 4. Plan of the proposed climate change garden redesign. (Morouj Akbar, MLA '15)

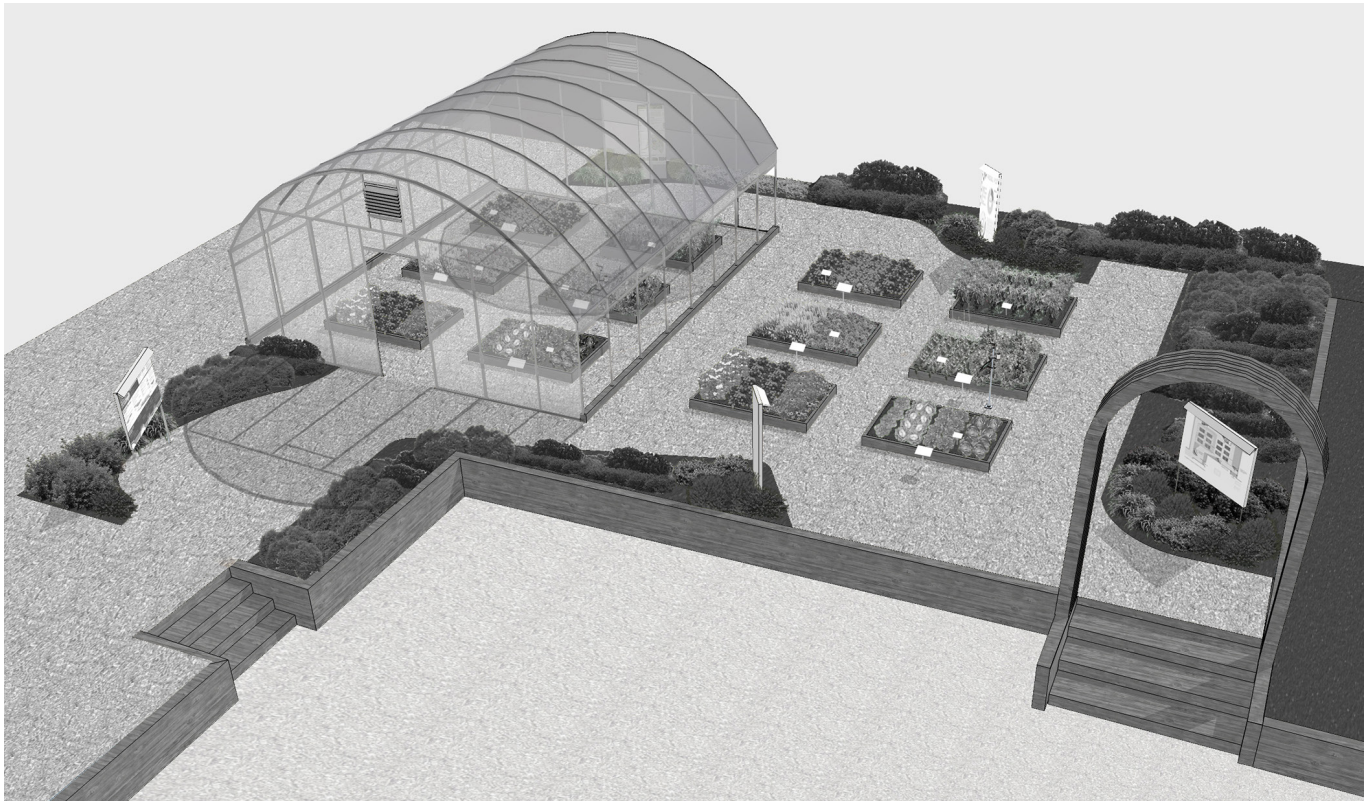

Figure 5. Perspective rendering of the proposed climate change garden redesign. (Morouj Akbar, MLA '15)

Conclusion

It became evident during the course of the project that the Climate Change Garden would become a dynamic and ongoing exercise- a sequenced exploration of research questions, site design and evaluation, followed again by subsequent series of questions, project redesigns, and refined conclusions. Due to the relatively unexplored nature of key linkages between equipment performance, plant phenologic response, and visitor experience, we see our foray into the emerging climate change garden genre as a kind of design research by which the project can be tuned and enhanced over time through a series of iterative redesign exercises. As something of a 'designed experiment' (Felson and Pickett, 2005, and Felson and Pollack, 2010), the design and installation itself are an experimental research exercise, one that will be observed, measured, and evaluated to determine how to better refine it moving forward. This upcoming season we will redesign the project and make key adjustments to climate-associated environmental variables, plant selection and composition, interpretive layout and visitor experience, and visitor survey data collection. In future years, we see the benefit of adding additional equipment to the high tunnel in order to improve precision and automation. As we develop this work, we hope it may inform how other botanical gardens and similar organizations and agencies might develop their own climate change gardens. Ultimately this work could also inform other, more scientific future research investigating resilient planting selection and design (Hunter, 2011).

Climate change is coming to every city, town, and street corner. Behind the work of defining and tuning the climate change garden remains our original intent- that of providing a portal for visitors to experience, understand, and ultimately anticipate climate change and its potential future effects on plants and the region. We seek to open a dialogue with visitors about climate change and its possible impacts, one that may ultimately lead to greater receptivity and understanding of local, regional, and global efforts to mitigate for and adapt to a changing climate.

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Edible Sacramento: Soil Born Farms as a community-based approach to expanding urban agriculture

David de la Peña, Ph.D.

keywords Urban agriculture, community engagement, alternative food networks, community gardens, permaculture

Abstract

Urban agriculture (UA) has taken root in Sacramento and its relatively quick rise owes much to the efforts of the nonprofit Soil Born Farms. The organization's transition from farming vacant land to becoming a nonprofit and regional UA advocate highlights the potential of grassroots organizations to create spaces of engagement and resistance. This paper focuses on calls for UA's expansion and the appropriate roles for government, nonprofits, and designers. In particular, it addresses efforts to expand UA through top-down design and policy initiatives, and it responds to critiques that UA may be misused to further the neoliberal project. As this study shows, Soil Born's ability to mobilize UA networks has exceeded the city's capacity to bring about systemic change. With a focus on incrementalism, relationship-building, and food systems education, Soil Born has helped establish networks that have mobilized citizens, urban farmers, gardeners and gleaners to remake Sacramento as an edible city. This paper concludes that institutionalizing the existing, dynamic grassroots networks and practices would significantly diminish their impact, and that top-down design approaches and critiques of grassroots efforts may be misplaced. Furthermore, landscape architects can play an important role in designing UA at multiple scales, but they must be grounded in a familiarity with local actors and practices in order to be relevant.

Introduction

On a cool autumn morning, Judith Yisrael is standing at a metal folding table, chopping collard greens and onions in her backyard farm in Oak Park, Sacramento. Surrounded by camera-wielding family members, dozens of neighbors and a handful of urban farming activists, she demonstrates how to prepare an Ethiopian dish of spicy greens on an electric skillet, and when she offers samples she is rushed by children, who leave only turmeric stains on their fingers and plates (Figure 1). Beyond the crowd, volunteers at the farm are showing guests around the garden beds, the bee boxes, and an orchard full of chickens (Figure 2). Meanwhile, Judith's partner Chanowk is admiring the new vegetable plots that Randy, of the nonprofit Soil Born Farms, helped prepare with 30 volunteers from the National Guard. I'm chatting with Chris, who like Chanowk is a student enrolled in a permaculture design course that Soil Born Farms is hosting. Chris and his wife Ruth are starting their own urban farmstead several blocks away, with help from classmates and other community-based organizations. This scene is increasingly common in Sacramento and is a sign that urban agriculture is thriving; yet it is doing so without much direct support from city and county officials, and with little involvement by landscape architects.

Despite its lack of direct support for urban farmers, the City of Sacramento did proclaim itself "America's Farm-to-Fork Capital" in 2012 and its visitor's bureau is promoting its local farms and culinary scene, as activists push urban agriculture (UA) ordinances through the city and the county with little resistance. This local UA movement parallels a broader fascination with food systems that was initially driven by chefs and writers like Alice Waters, Jamie Oliver, Michael Pollan, and Eric Schlosser (Nestle, 2006; Pollan, 2009; Schlosser, 2001). Over the past several years, UA has also permeated academic discourses in landscape architecture, community development, health, urban planning, and sustainable agriculture. In both academic and popular venues, writers have critiqued large-scale industrial farming while upholding grassroots food production—urban farming in particular—as an environmentally, socially,

Figure 1. Preparing greens with Judith Yisrael (de la Peña)

Figure 2. Open House at the Yisrael Family Farm (de la Peña)

and aesthetically preferred alternative to the conventional food system (see for example Rich, 2012).

The successes of the pioneering UA projects in cities like San Francisco, Seattle, Milwaukie, and Baltimore have prompted many within and outside of the movement to call for more expansive approaches that would extend the benefits of UA to more people (Nasr, MacRae, & Kuhns, 2010; SPUR, 2012). Some of these calls for scaling up UA, however, indirectly devalue the community-based nature of existing UA projects by proposing more consolidated, top-down approaches; grassroots efforts are lauded but simultaneously deemed too limited to effect substantial change (Viljoen, Bohn, & Howe, 2005). Some social geographers have also critiqued food activists and community gardeners for ignoring the structural causes of food injustice. According to these critics, local food system actors inadvertently play into a neoliberal trap by assuming general welfare responsibilities, and thus enabling the state to retreat from its obligations to health and sustainability (Goodman, DuPuis, & Goodman, 2012; Guthman, 2008; Staeheli, 2008).

This paper focuses on the current calls for UA's expansion and the roles of government, community-based organizations (CBOs) and designers. It examines the allure and the critiques of small-scale urban food production and provides examples of how designers have proposed extending UA's reach. Next, it describes how local food system actors—the nonprofit Soil Born Farms in particular—have nurtured community networks that support UA within the city of Sacramento. Using evidence from participant observation, interviews, and textual analysis, the paper describes how Soil Born grew from a small experiment in vacant lot farming to become a regional leader in urban agriculture, youth education, technical training, food access, and community engagement. Its experience illustrates the ability of local actors to scale up UA through community-based networks, as well as the potential challenges of a grassroots approach, which include an uneven distribution of resources, burdens of maintaining social programs, and the dependency on grant funding.

Secondarily, the paper explores the theme of design and the role of landscape architects, who have not been visible actors in Sacramento's UA movement. This study finds that many local UA actors believe that professional designers are primarily driven by aesthetic considerations at the expense of physical and social ecologies. In place of professionals, UA networks are more likely to eschew design altogether, or turn to "permaculture designers," whose values are perceived to be more aligned with their own. This study of Soil Born Farms and Sacramento's UA movement gives support to the notion that community-based approaches to creating and designing alternative urban food networks are viable and preferable to top-down approaches. It argues that landscape architects should engage in the discourse of how to expand UA, not through the ungrounded and unrealizable designs of urban and exurban agricultural infrastructures but through a familiarity with the local actors and places that have already demonstrated that farming the city is a valuable and necessary endeavor.

The Allure and Critique of Small-Scale Urban Agriculture

In their book Agricultural Urbanism, Janine de la Salle and Mark Holland characterize the rising awareness of food systems as "waking from the coma" (De La Salle & Holland, 2010). During the 20th century, they argue, urbanization and the commodification of food divorced people from farms and the systems that bring food to market; as a result, cities are places where citizens don't know where their food comes from, how it got there, or what it contains. This point of view is popular and convincing, and the exposure of America's dysfunctional "industrial food complex" by de la Salle, Pollan and others, has been a launching point for food activism and food system reform (De La Salle, Holland, & Lanarc, 2010; Nestle, 2006; Pollan, 2009). When large scale grocery stores, industrial processing plants, multinational corporations and agribusiness are identified as the poison, as they have been by many critics, local markets, artisan production, CBOs, and small farms become the antidote (Cockrall-King, 2012; Weber, 2009).

For decades, discourses around UA were limited to community gardens, which were subject to a kind of romanticization and granted self-evident value with little empirical evidence. In recent years, scholars have added considerable weight to the intuitive notion of UA's multiple contributions (see Surls et al., 2014, for a compendium of UA research). UA as a whole has been difficult to evaluate, but documented benefits include increased property values (Been & Voicu, 2006), generation of fungible income (Nairn & Vitiello, 2010), reduced crime (Glover, 2004), carbon capture (Kulak, Graves, & Chatterton, 2013), food access (Cockrall-King, 2012; Lawson, 2007), public health (Twiss et al., 2003) and social capital and conviviality (Agustina & Beilin, 2012; Hou, Johnson, & Lawson, 2009; Rich, 2012). Within the design fields, recent literature tends to promote UA by appealing to an aesthetic of community-built informality. The popularity of books such as Urban Farms (Rich, 2012), Greening Cities, Growing Communities (Hou et al., 2009), Designing Urban Agriculture (Philips, 2013) speaks to a growing acceptance of landscapes that highlight intimate connections between people and place, that demonstrate local control, and that display an aesthetic of messy vitality. Sarah Rich's exquisitely photographed book, Urban Farm, is exemplary in this regard, replete with vivid images of hand-made signs, multi-colored bee boxes, improvised trellises, and unkempt compost heaps (Rich, 2012).

The appeal of local, grassroots food activism, however, is not without its critics, including those who favor structural solutions over piecemeal approaches. Some argue that the benefits of UA are not inherent by virtue of their local or small-scale qualities. Born and Purcell (2007) warn that the aura of the local is a trap, and that the scale or location of a farm does not predict its contributions to sustainability or health. Others expand upon this claim, adding that UA and food activism reinforce neoliberalism by "responsibilisizing" citizens with the oversight and management of their own food systems and economic welfare, while the state retreats from providing a safety net in the form of food stamps or medical services (Biltekoff, 2013; Goodman et al., 2012; Guthman, 2008). Still others have pointed out that reliance on grassroots actors can make cities vulnerable to an uneven distribution of resources, as charitable services and community activism tend to concentrate in certain neighborhoods but not others (Galt, Gray, & Hurley, 2014; Ghose & Pettygrove, 2014; McClintock, 2014;

Pudup, 2008). Despite this caveat, McClintock and others still argue that UA offers enough benefits to outweigh its shortcomings. For McClintock, "radical" and "reformist" activism must also be accompanied by "broader, multiscalar discussions of political economic structure, redistributive equity, or just sustainability" (McClintock, 2014). My observations in Sacramento support the claim that grassroots actors like Soil Born operate amidst and with some awareness of the contradictions of their work, tactically operating within cracks left by a retreating state and creating spaces of resistance and of engagement. The UA networks fostered by Soil Born do not simply assume former responsibilities of the city; they also prod government officials to engage in broad policy discussions that would promote UA through relaxed zoning standards, tax incentives, and the creation of a regional food policy plan.

Scaling Up Urban Agriculture

Calls for greater governmental management of food systems is amplified by UA supporters who find that small-scale practices do not produce substantial change. April Philips, in Designing Urban Agriculture (2013), argues for example that UA must be scaled up "to make a more significant impact." She proposes designing agricultural landscapes at the scale of the city. "Current urban design and planning," she writes, "is focused on the fragments rather than a cohesive whole (2013, p. 5). Philips calls for a national policy framework for UA as well as city and regional planning processes, within which she still views the grassroots actors as essential stakeholders. Other design scholars, however, have been less convinced of the social benefit claims of local food system activists. In Andre Viljoen's edited book CPULs: Continuous Productive Urban Landscapes (2005), Susannah Hagan evinces some frustration with bottom-up practices:

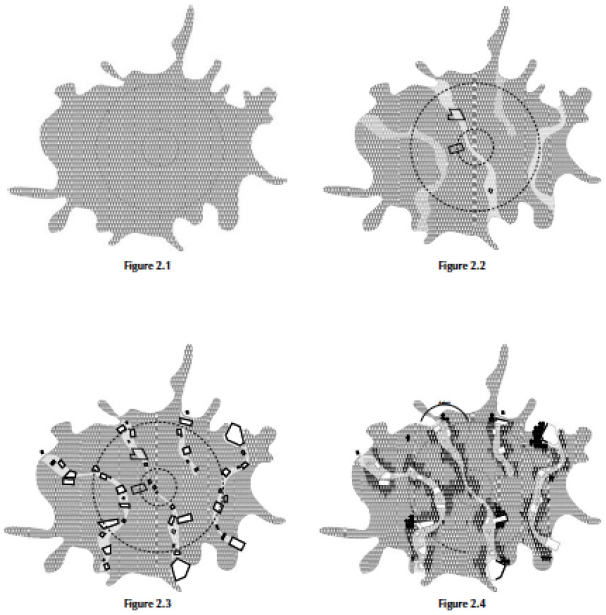
> Urban agriculture tends to define itself as a bottom-up, grass roots movement with no time for the top-down elitism of designers. This is misguided. Environmentalism, in whatever guise, demands both top-down and bottom up initiatives. Freeing up or reclassifying land for UA requires more than a desire to hold hands and plant vegetables. It requires top-down intervention by planners and local authorities. (Viljoen et al., 2005, p. 55).

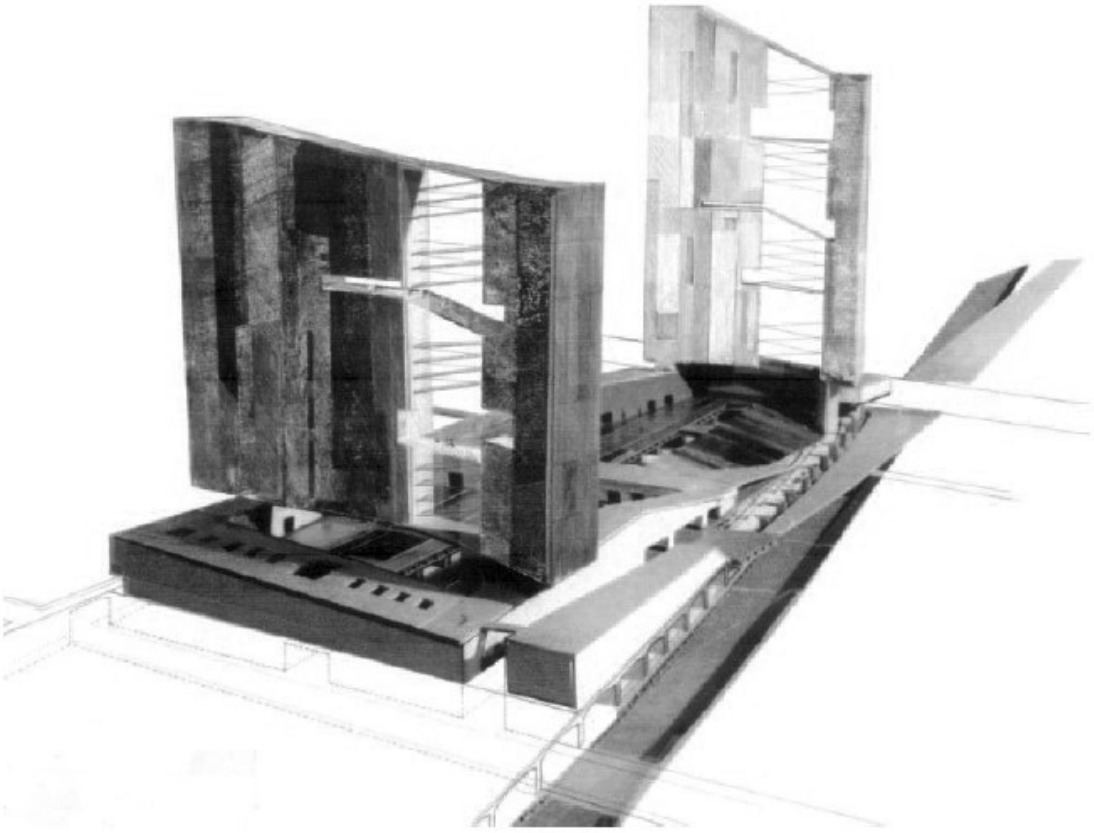
One might agree with Hagan that both top-down and bottom-up processes are necessary, but most of the essays in CPULs focus on top-down processes, making the case for a new city order that could only be realized by means of strong hierarchical control. The continuous productive landscapes, as represented in the image below (Figure 3) theoretically make use of unused urban land, but in most cities the vast scale of this proposal presents complications.

Bohn and Viljoen's interest in UA is admittedly buoyed by an aesthetic goal: "urban agriculture in particular," they write, "can be read as a deeply understood form of ornament within the city. Through urban agriculture it is possible to experience urban ornament" (Viljoen et al., 2005, p. 249). The ornament shown throughout the book depicts the productive landscape as patterned bands of color extending horizontally across the landscape and vertically onto building surfaces (Figure 4). This ornament includes "city-traversing open spaces running continuously through the built environment," yet the political and economic mechanisms by which this might be accomplished are again not clearly described (Viljoen et al., 2005, p. 11).

The futuristic visions found in the Viljoen text should remind readers of earlier urban design utopias. which Viljoen in fact references, including Ebenezer Howard's Garden City, Le Corbusier's City of To-morrow, and Frank Lloyd Wright's Broadacre City (Viljoen et al., 2005). Each of these designs integrates gardens and farming into a suburban or exurban context, and each would have required consolidated power to materialize. Wright was aware of this fact, and accordingly proposed replacing the county government with a county architect. But Viljoen's book is not alone in following the lead of these influential designers. The editors of Carrot City (Gorgolewski, Komisar, & Nasr, 2011), similarly call upon Howard and Wright in their "re-visioning" of the contemporary city. In their book, agriculture is imagined as integral to "farming subdivisions" and what one

Figure 3. Diagram of the city developing into a Continuous Productive Urban Landscape (Viljoen, 2005)





Urban Nature Towers:
A proposal for a high density CPUL accommodating 450 persons per hectare. Vertical landscaping, created by attaching a framework to the building's façade, supports trained soft fruit plants and fruit trees. The vertical landscape supplements horizontal urban agriculture fields.

Plate 15

Figure 4. Depiction of the urban and ornamental potential of CPULs (Viljoen, 2005)

designer calls "Agriburbia" (Gorgolewski et al., 2011, p. 21). In another essay by landscape urbanist Charles Waldheim, Wright's Broadacre City, Hilbersheimer's New Regional Pattern, and Andrea Brazi's Agronia are all given as precedents for a new agricultural urbanism, and they are all low-density plans that extend urbanity indefinitely across the landscape (Waldheim, 2010).

Whether or not one finds inspiration in Howard's diagrams or in the fantastical renderings of Corbu, Wright, Hilbersheimer or Branzi, the implications of these visions should give the reader pause. In their illustrations, productive landscapes are represented as simplified, abstract spaces or swaths of color and texture. The messy vitality and the evidence of communal human care celebrated in Rich's Urban Farm are absent. Without understanding how and why urban agriculture comes into existence, and what social, physical and economic resources it needs to thrive, the utopian visions in CPULs and Carrot City cannot be viable.

An Argument for Community-based Urban Agriculture

The critiques of community-based UA presented in this paper point to similar conclusions—that grassroots UA is idealized and ineffective, or worse, contributing to social inequity; and that UA should be scaled up through controlled and coordinated efforts by the city, or by other governing agencies. In some ways the pendulum continues to swing, from a critique of large-scale, impersonal farming to a celebration of artisanal, local practices, and back to calls for increasing the scale of UA through highly-controlled systems. Not all critics, however, discount the potential of small-scale actors to make systemic structural changes. For example, April Philips acknowledges the successes of grassroots efforts like City Slicker Farms in Oakland, California; she also offers guidelines for small-scale producers on creating a business plan (Philips, 2013). De la Salle and Holland emphasize the importance of action at the regional scale, but also call for incentivizing local artisanal food production and for creating guidelines for integrating agriculture into communities (De La Salle & Holland, 2010). With respect to neoliberalism, geographers Nathan McClintock and Ryan Galt acknowledge that alternative food networks do in fact operate amidst contradictions, but they assert that action is preferable to paralysis (Galt et al., 2014; McClintock, 2014).

In Sacramento, the aesthetic appeal of small-scale, community-driven agriculture has helped put the spotlight on local minority farmers like Chanowk Yisrael, or the vacant lot guerrilla farmer Ron Rutherford. Other young activists have also been highlighted by the media and by politicians to promote the city's Farm-to-Fork movement: Scott Thomson, whose project ReSoil provides nitrogen-rich food scraps to urban farms; Todd McPherson, who works with youth at local school gardens; and Dominic Allamano, who leads Soil Born Farm's fruit gleaning project. These individuals and many others are jointly creating an alternative food network along with what Ryan Galt refers to as "subversive and interstitial food spaces" (Galt et al., 2014). Their activist efforts are framed as alternatives or resistances to the "capitalist rationalities" of conventional food systems.

For landscape architects, finding their appropriate role in designing UA both at a local and a regional level presents many challenges. In smaller-scale contexts like community gardens, designing a prescribed landscape can work against community self-empowerment, especially if the designers are not embedded as members of the community (Hou et al., 2009). On the other hand, appreciating local expertise need not be accompanied by a denial of one's own expertise, as Randolph Hester and other community designers point out (Hester, 2005). At the scale of the city, landscape architecture approaches often take one of two directions: one, toward a focus on new development at the city's edge; and two, with grand gestures that are neither economically viable nor socially constructive. Such has been the experience of landscape urbanism, and such is the tone of CPULs, Carrot City, and even Agricultural Urbanism.

Sacramento's thirteen community gardens are all laid out by one city staff member in consistent fashion, and many residents and activists admit to finding the resulting rigid and rectilinear aesthetic anathema to their organic notions of community gardening. Other actors, like Soil Born Farms, have turned to the field of permaculture for their preferred source of design expertise. Permaculture is a design approach that emphasizes regenerative and productive landscapes in which human and non-human ecologies are mutually supporting (Hemenway, 2009; Mollison & Holmgren, 1978). Because of its holistic approach and emphasis on productive landscapes, permaculture has been embraced by most of Sacramento's UA community. While permaculture may more effectively address the overlapping ecological and social systems found in small scale farming, I contend that the skills that landscape architects offer could expand the impact and meaning of permaculture gardens.

Soil Born Farms offers an example from which one might consider the roles of government, nonprofits, and designers. It demonstrates that government could be more enabling to UA but is not likely to be more catalytic than the grassroots actors and networks they foster. This is not to say that government should simply "get out of the way," as one activist expressed, but rather that government might be most effective to create opportunities and to reduce risks for grassroots actors to continue to innovate with ways to produce food within cities. The resulting transformation may extend well beyond creating a sustainable food system, as Soil Born's Allamano makes clear:

> When we're so fragmented, everybody's depressed and lonely. Most people are irrelevant to each other. We've lost a lot of things that are essential to our innate well-being. By reconnecting that narrative, it lets us start to look at how we inhabit our places, our neighborhoods, the village, the ecosystem, habitat. How do we reconnect to each other, to the seasons and cycles, become producers, not just consumers? Contribute to the well-being of the land that contributes to our well-being? How do we midwife the reemergence of a beneficial human population? (Personal communication, 2014)

Allamano's vision of a connected populace and food system would be structured and designed quite differently than the utopias highlighted in CPULs, Carrot City, or

Waldheim's essay. In the following section, Soil Born's history and vision show how UA can be expanded in ways that maintain its scale and its regenerative and connective potential.

Setting the Stage for Farm-to-Fork

Soil Born Farms was conceived as an idea between Shawn Harrison and Marco Franciosa, two UC Santa Cruz students of agroecology, who were steeping themselves in the teachings of master gardener Alan Chadwick and Waldorf educator Rudolf Steiner. Harrison was inspired by the innovative and socially conscious urban farms at The Food Project in Lincoln, Massachusetts and Fairview Gardens, surrounded by suburban Santa Barbara, where he apprenticed. Around 1997, the pair began searching for vacant land upon which to begin a profitable small farm of their own. Their goal, according to Franciosa, was "to bring the food right to the people and get them involved in the farm" (quoted in Laskowski, 2004). In 2000, they set their sights on Harrison's hometown of Sacramento, convinced that the city's potential for UA was enormous yet untapped, and they began to traverse the city's broad arterials looking for opportunity (S. Harrison, personal communication, 12/2014).

Sacramento is a city of roughly 450,000 residents in a region of 3.5 million, 75 miles northeast of San Francisco in the midst of the fertile farmland of the Central Valley. In 2012, mayor Kevin Johnson officially proclaimed Sacramento "America's Farm-to-Fork Capital" (Lillis, 2013)(Figures 5,6)[1]. This was a marketing ploy, backed by the city's Convention and Visitor's Bureau, but it was also hard to deny: the city is surrounded by what is among the most productive and diverse agricultural lands in the country. Seventy percent of the land in the six-county region is farmed, producing 3.4 million tons of food per year (SCVB, 2013). With 2.5 million residents annually consuming only 2.2 million tons of food, Shawn Harrison is correct to say that the city has the potential to feed itself with locally produced food. However, this bounty does not usually end up on local forks; most leaves Sacramento for other markets. Rice production, for example, comprises 93% of the region's grain crops and 98% of that is exported, mostly to Asia and the Middle East (Agriculture in Metropolitan Regions, Vision, & Education, 2008). The mass exporting of food crops has been the norm since the city's founding in 1848. From the start, farming around the Sacramento region was conducted at a massive scale and by large farms and cooperatives [2]. As Harrison puts it, "Agriculture grew up before the people were here" (Personal communication, 2014). The combination of low population and high farm output left food producers looking for markets for their foods, and innovating methods for preserving, processing, packaging, and marketing food for export (Walker, 2004). It was in Sacramento and the Central Valley that the industrial food system was born. Sacramento's early farming history, then, is hardly something to be nostalgic for but rather already contained the blueprint for today's food system that the visitor's bureau, the mayor's office, and grassroots activists are now attempting to redefine.

When Harrison and Franciosa arrived in Sacramento in 2000, they found very little in the way of urban farming or UA activism. There were a few key exceptions. At UC Davis, Harrison had recently completed a summer apprenticeship at the student farm, whose principles of sustainable agriculture, experiential learning and student leadership would complement Soil Born's vision. In Sacramento, the Mandella Garden was another exception: a successful and beloved community garden established in 1971, but embroiled in what would be a losing battle against infill development. And at the Rudolf Steiner College in nearby Fair Oaks, Harald Hoven's Raphael Garden had been operating as an urban farm since 1987 and running a CSA (Community-supported agriculture) since 1993.

Farming Hurley Way and the American River Ranch

In late 2000, Harrison and Franciosa found the piece of land they were looking for, a vacant 1.5 acre parcel with good soil on suburban Hurley Way, surrounded by houses, apartments and a middle school (Figure 7). The two dropped a hand-written note in the owner's mailbox that read: "We'll give you free food if you let us farm your property." The next day, the owner agreed to a lease of "$1 plus free vegetables every year" (Laskowski, 2004). Soil Born grew quickly, adding partner Janet Zeller of the Sacramento Natural Foods Co-op in 2002 and making a profit selling certified organic food to local restaurants and at farmers markets. One clear advantage they had was in being able to develop close relationships with restaurateurs. "We can give them whatever they need," said Franciosa in 2004. "If they need 15 pounds of squash for their evening special, we can get it to them in five minutes. They love us" (Laskowski, 2004). This was the start of building a network around urban food systems.

In 2003, Soil Born partners invited the public to help then envision ways to expand the reach of their programs, and soon after transformed itself into the nonprofit Soil Born Farms: Urban Agriculture & Education Project, which allowed them to teach ecological horticulture through school programs, start an apprenticeship program, and conduct outreach to disadvantaged communities. They had begun to undertake these projects on Hurley Way, working on a pilot program with teachers to create a program called

Figure 5. Mayor Kevin Johnson proclaims Sacramento as Farm-to-Fork Capital (Downtown Sacramento Grid)

Figure 6. Annual Farm-to-Fork Gala Dinner on the Tower Bridge (Merced Sun Star)

"Food, Health, and the Environment," modeled after Alice Waters' Edible Schoolyard project in Berkeley. Soil Born's educational program was a clear response to the withdrawal of government support, as Harrison noted in 2005: "Schools are cutting after-school programs, and this school is a low-income school, so about 70% of the kids are on free lunch programs, which are horrible" (in Hess & Winner, 2005, p. 57). Soil Born also began an apprenticeship program to "provide training for aspiring farmers by teaching the basic concepts and practical applications of organic food production" (SBF, 2014b). To address food access issues, they started a project called "Food, Education, Equity, and Diversity (FEED), to do outreach and education for residents in the low income Del Paso Heights community. The program worked with recent immigrants and community gardeners to encourage the use of organic techniques and to augment the limited supply of fresh produce in local markets (Hess & Winner, 2005). All of these projects needed more space in order to expand.

The Rancho de Los Americanos was a 35,521-acre Mexican land grant (Figure 8) made in 1844 to William Leidesdorff, a Jewish-Danish entrepreneur and one of the first black millionaires in the US (Palgon, 2005). Of the original land grant, one remaining 55-acre farm tract was preserved for farming and leased to various for-profit farms (Figure 9). In 2006, building upon its successes on Hurley Way, Soil Born began collaborating with the county to restore the ranch and the riparian habitat along the river; in 2007 they farmed 5 acres of the ranch; in 2008 they were granted a lease for 25 acres, and today they manage the full 55 acres. From their two farms, and with a staff of 8 employees and 8 apprentices, Soil Born now undertakes a broad array of programs: market farming; farm stands, a CSA, a school garden initiative; at-risk youth training; adult education; summer camps; and a neighborhood gleaning project.

Soil Born's programs boast impressive numbers that speak to their quick expansion. Throughout 2014, the market farm grew 45 crops and tended 690 fruit trees. They operated farm stands weekly and prepared 5,000 CSA boxes for subscribers. They employed and trained seven apprentices. Through "Growing Together: A School Garden Initiative," 10 school gardens were supported, over 100 teachers were trained, and over 2,500 students gained hands-on learning through integrated school garden, health and environmental curriculum. They operated summer day camps for kids, and over 150 home gardeners took classes and workshops on gardening, rainwater collection, and medicinal herbs. In addition, Soil Born hosted a Permaculture Design Course. Their annual "Day at the Farm" event drew over 2,500 attendees, and over the year they coordinated 1,000 volunteers. Their most ambitious program is what Harrison calls "The Edible City Initiative," or "Harvest Sacramento." Harvest Sacramento conceives of the city itself as a diffuse site of food production, starting by gleaning existing fruit trees in private yards. Last year they harvested about 50,000 pounds of fruit and donated it to the Sacramento Food Bank and Family Services (SBF, 2014a).

To support all of the activities that Soil Born Farms undertakes requires a robust management support structure and more funding than farm sales alone could ever provide. Across the country, similar nonprofit farms operate successfully and serve as a model for urban agriculture, but unappreciated by most is the fact that they are heavily dependent on subsidies. As the New York Times noted in an article entitled "Don't Let Your Children Grow Up to Be Farmers," Milwaukee's celebrated urban farm, Growing Power, received $6.8 million in grant support over the past five years (Smith, 2014),. Soil Born's budget is fast approaching that mark. Executive director Shawn Harrison now spends more time managing grants, contracts, volunteers, educational programs, and advocating than he does farming. Says Allamano, "we can't be a profitable farm and fund social programs and community programs and educational programs; we work with low income communities that cant afford to pay the true cost of a lot of the educational programs, so you wind up in this situation where you're running on the nonprofit industrial complex hamster wheel just to survive" (Personal communication, 2014). To Harrison, Soil Born provides a service for emerging urban farmers, but not a model. He still believes that small-scale urban farming is financially viable, but also that Soil Born is not a model for profitable market farms:

> We're definitely advocates for market farms, and farming as a secondary activity … [We're] losing money every year ... but we're teaching young farmers. It's a socially based enterprise.

Figure 7. Annual Equinox Dinner at Hurley Way Farm (Valley Community Newspapers)

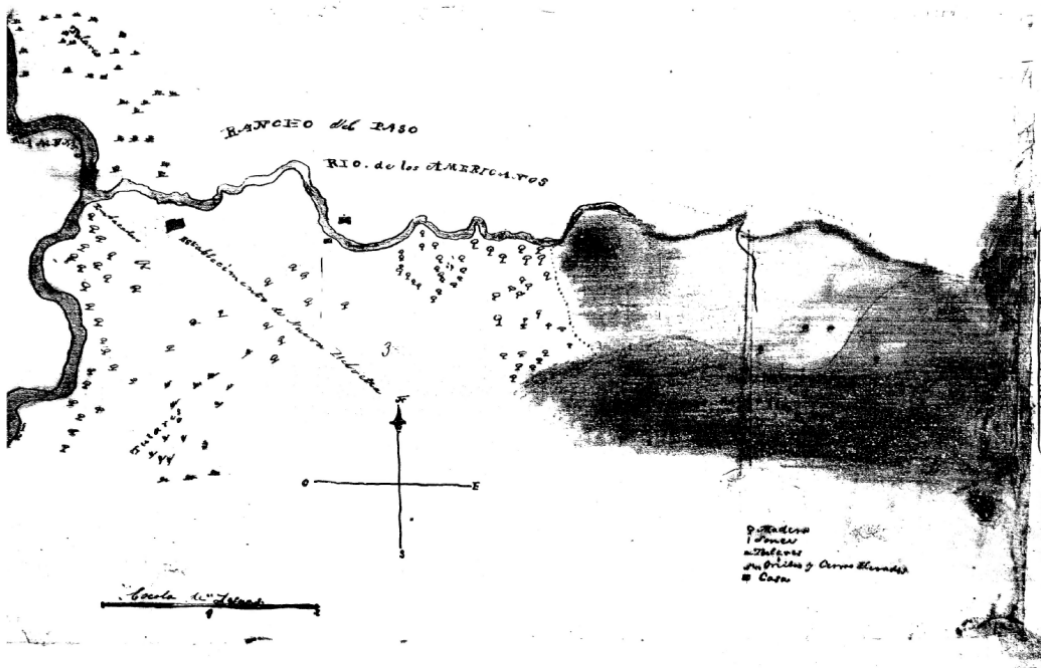


Figure 8. Rancho de los Americanos ca. 1855 (California Archive)

Figure 9. American River Ranch ca 2014 (Google Earth)

We rely on donations and events and grants, to provide services to the community. Our goal is to teach and train more young farmers, get more people growing food themselves, in front and backyards, getting people eating better. (Personal communication, 2014)

Landscape design, for Soil Born's founders, has played a negligible role in the advancement of their UA project. The farm on Hurley Way is hardly noticeable to passersby and maintains a utilitarian aesthetic, surrounded by low-density suburban buildings with little pretense. The American River Ranch, on the other hand, is endowed with broad vistas of the river. Design projects have been

undertaken here to accommodate expanding programs: a fenced-in youth garden is designed to be educational and also beautiful, with a large chicken coop that sacrifices the functionality of mobility with a more visually striking and permanent design element. The nearby community kitchen has added an attractive outdoor seating area with a brick oven, and a classroom building has been renovated. In 2012, the Sacramento Metro Chamber donated design and construction services to create an "outdoor classroom," an amphitheater with stepped seating and native grasses, designed by a local architect (Figure 10).

Despite the site's natural beauty and added design features, the founders and the public that supports Soil Born still returns each year to the less formal Hurley Farm for its annual Equinox Dinner, the organization's biggest fund-raiser. As founder Janet Zeller reasons, "people love the intimate feel" of the original farm (Dienst, 2012). The dismissal of professional design presents a challenge for landscape architects, whose reputation is not entirely favorable among urban farming activists. Randy Stannard, a food access coordinator with Soil Born, says that small-scale farms can't afford the luxury of professional design.

> I think of landscape architecture as creating really impressive things but it usually costs a lot of money. One, just to pay somebody to get the design, but then to implement what was done. Well, this isn't a low budget, grassroots, let's-minimize-cost type of thing. (Personal communication, 2014)

Creating a design process that includes users is a skill that not all designers have, and even typical community design processes, such as design charrettes, can be off-putting: "We're going to do a design charrette?" asks Stannard mockingly, "What the hell is that?" (ibid.). It isn't that design is unimportant to Stannard, who notes that people are attracted to good design and it makes them want to be a part of the successful project. Landscape architects have a long way to go in demonstrating their added value to community-based UA projects.

Soil Born Farms and Sacramento's Urban Agriculture Network

Soil Born Farms has incited changes to Sacramento's food system. By acting as an example, by providing educational programs, and by demonstrating the unrealized potential of harvesting the city, it have given thousands of residents useful insight into their relationship with food. Soil Born director Shawn Harrison believes that the city should play a role in food policy, literacy and production. However, he refuses to draw hard lines around what the city is, preferring to define "city" as "we as human dwellers" (Personal communication, 2014). Just as he and other members of CBOs participate in regional food policy discussions, some agency staff and representatives also participate within UA networks as members and volunteers. It is impossible, then, to isolate informal from formal networks. That being said, Harrison does believe that governing agencies have historically neglected to put food on their radar:

> Their job is to build houses and to maintain streets and infrastructure and things of that nature. The food system is beyond the streets that they built and maintain. They're not players in that. But that's beginning to shift. Their role is mostly policy and regulation, but they can be a hindrance or they can be a positive force by playing an active or inactive role. (ibid.)

In contrast, UA, says Harrison, is "mostly borne of local control, where a lot can happen" (ibid.).

The network of UA that exists in Sacramento today is expanding quickly and is made up of government agencies, commercial interests, non-governmental agencies, and activist citizens. The figures below depict how "the city" with all of its actors has established networks around UA. The two diagrams illustrate firstly the inconsistent connections between agencies and CBOs (Figure 11), and secondly the broader set of connections that Soil Born has been able to manifest (Figure 12).

These diagrams show how the networks have coalesced around various themes: commerce, food production, social and environmental advocacy, education, health, and housing. Soil Born, it should be noted, is not the only organization that plays a central role. The California Endowment, a statewide nonprofit devoted to health, supports the UA network through a 10-year multi-million dollar "Building Healthy Communities" (BHC) grant in South Sacramento [3]. The Food Systems Collaborative, led by the non-profit Valley Vision, has also brought together various leaders of CBOs and is currently planning a more extensive food systems policy initiative that will connect local UA actors with the Sacramento Area Coalition of Governments (SACOG).

Whichever of the three most prominent non-profits one wishes to focus upon, it is useful to note that non-profits connect well with a full range of UA actors, while governments often act in fragmentary and uncoordinated ways. This observation challenges the notion that government is the most effective means of coordinating food systems. In fact, the goals of creating sustainable food systems may be better met through the leadership of nonprofits rather than government. It should be noted that in other cities, such as Seattle, Baltimore or Toronto, government has taken leadership roles in expanding

Figure 10. Architect's rendering of new outdoor classroom (Sacramento Press)

UA. These cases have been successful, however, because they have built upon local UA networks and provided resources that help them thrive.

Governing agencies, for their part, can enable but cannot replace community-based networks; they are incapable of being the grassroots, no matter how they may attempt to emulate or appropriate grassroots practices. As an example of this limitation, Sacramento Vice Mayor's Chief of Staff, Joe Devlin, spoke about the potential of UA on a key city-owned property, but only if a broad coalition of actors could make it work. "Between the school district, the Food Bank, Farm-to-Fork, and others," he said, "there could be a tremendous community benefit here. We just don't have the expertise or the bandwidth to figure it out" (J. Devlin, field notes, 12/15/14). Lacking bandwidth may be a reflection of reduced budgets for government, but the lack of expertise and limited connections is actually the key to why grassroots actors are the locus of knowledge. Their immediate, face-to-face experiences with organizations, individuals, and the soil give them both technical and immersive knowledge about the urban food systems and the social systems they seek to improve.

Soil Born's activities in South Sacramento highlight its ability to manifest long-term change through connecting people to each other and to food systems. Working with support from the California Endowment, Soil Born supports a vast area of over a dozen neighborhoods where the majority of residents live in food deserts. Dominic Allamano, who coordinates Soil Born's efforts here, aims to create what he calls "precursors" to a stronger society:

> [The residents] haven't been active participants for a while. Their health is probably not there. Their time is probably limited. Their yard is maybe a tree or two, maybe a fruit tree, which is awesome, and Bermuda grass. The soil is compacted, the norms, the rhythms are upset. We're starting almost from scratch. We're like an alien species that's landed here on this planet and doesn't know how to live here. (Personal communication, 2014)

Soil Born Farms has assumed the role of managing food access for the California Endowment's BHC area, working with other groups to foster more engaged gardeners, install home-based food production, build and support school gardens, distribute food to food insecure residents, introduce healthy snacks into corner stores, and manage the gleaning project Harvest Sacramento. "The idea," says Shawn Harrison, "is that these things build upon one another to change the fabric of the built environment in those neighborhoods, built around community engagement. So it's like our mini-edible city … by the time we're done with that 10 year initiative, we'll have layered and interjected a whole range of activities into each one of those neighborhoods and hopefully they'll start to have a little life of their own" (Personal communication, 2014).

Nathan McClintock (2014) argues that reliance upon nonprofits can result in the uneven distribution of resources, and this has been the case in Sacramento without question. The 10-year focus on the BHC has shifted Soil Born's focus away from its previous work in the Del Paso Heights neighborhood; with other organizations facing the same commitment to the BHC, the epicenter of UA in the city has shifted south. UA actors are cognizant of this unevenness but

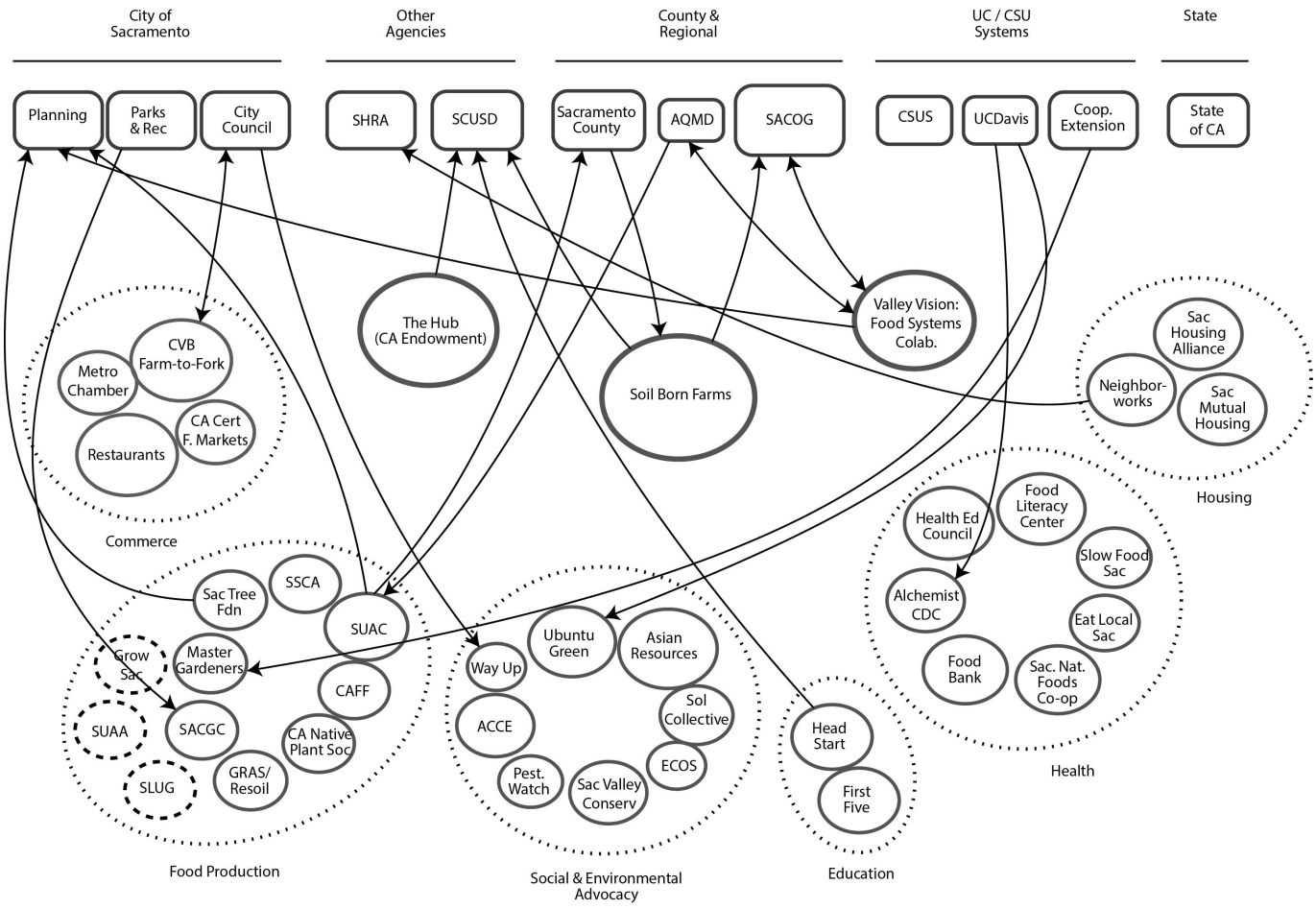


Figure 11. Relationships between government and UA actors (Alex Cole-Weiss)

hope that the model being developed in South Sacramento will ultimately be replicated throughout the city and beyond. Allamano thinks of the multi-layered work in South Sacramento as an experiment in applying "acupressure points" to the city, with the hope that a healthier food system might emerge throughout the city:

> It's a planned emergence. We can't do this; we can't make it happen; we can't drive an outcome. We try to improve system conditions; we try to build more connections; we try to change the narrative; we try to create the precursors to the things we want to see. (Personal communication, 2014)

Allamano's approach to bringing about change to the physical city starts with connecting people to each other. The programs of Soil Born Farms, including the work in South Sacramento, the offering of permaculture courses, and the training of young farmers, help create connectivity and support networks that further UA goals.

Conclusions

Without question, UA has taken root in Sacramento and its relatively quick rise in scale and effectiveness owes much to the efforts of Soil Born Farms. The organization's transition from small for-profit farm to become the regional advocacy leader and a model for food systems education highlights the potential of grassroots organizations to create spaces of engagement and resistance. This potential has exceeded the city's capacity to bring about systemic change from the

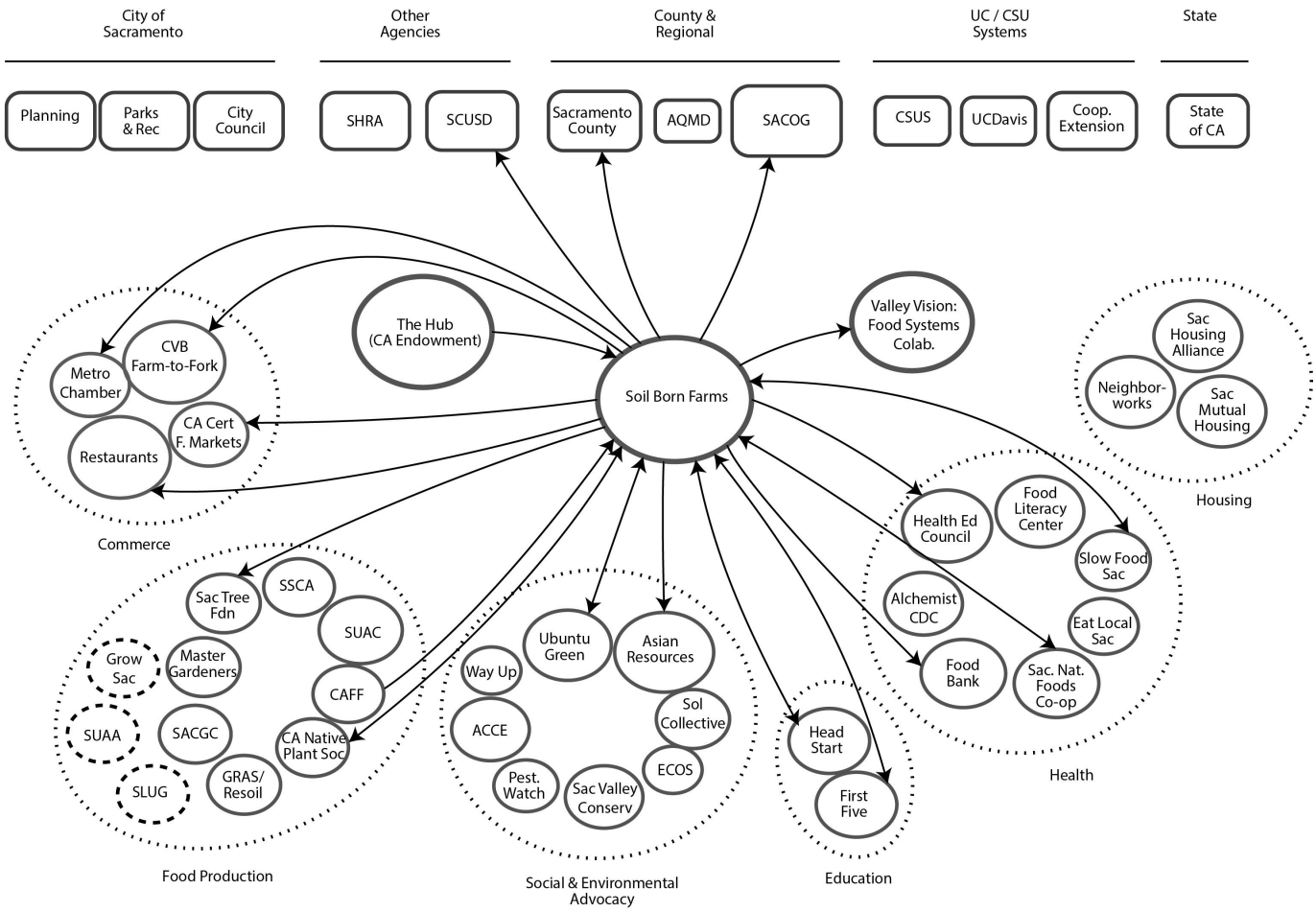


Figure 12. Relationships fostered by Soil Born Farms (Alex Cole-Weiss)

top down. Through a focus on incremental change, relationship building, food literacy, and ecological stewardship, Soil Born has succeeded in mobilizing citizens to support their mission and urban farmers, gardeners and gleaners who are beginning to create the edible city. As more grassroots actors engage with UA, the movement broadens into broader, regional discussions about food systems policy, including lobbying efforts aimed at both the city and the county to pass UA ordinances and advocacy efforts to Valley Vision and the regional council of governments to initiate a Food Systems Action Plan.

Soil Born's nonprofit model, however, is not without challenges or contradictions. The multiple social benefits that accompany their endeavor depend heavily upon charitable donations of money and labor, a fact that undercuts Soil Born's value as a model for profitable urban farming. Furthermore, the roles they have assumed for education, and the injections of energy and materials that have accompanied projects for school gardens, tours and camps, expose and also enable the inexcusable failure of the state to fund health education in public schools. For landscape architects, the UA networks that have been created offer opportunities for engagement, both at the community and the regional planning scale. It is this author's opinion that regional policies and large-scale UA designs will be irrelevant unless they are informed by actual practices and local experiences. Landscape architects have important skills to contribute to both small and large-scale UA projects, and also much to learn from the urban farmers, activists and backyard gardeners who know UA best.

Notes

1. Because of its early association with agriculture and food processing, Sacramento became known as "cow town," or more lightheartedly "Sacratomato." It was an image that locals were eager to lose, and one that city boosters fought until the mayor's proclamation (Darnell, 2012).

2. Despite popular nostalgia for small farms, Sacramento's story, and California's for that matter, was never about local farms. In fact, statewide, the average size of farms has steadily declined over the past century (Walker, 2004).

3. The California Endowment is a nonprofit focused on broad issues related to health. As a "conversion foundation," created in 1996 out of the privatization of the nonprofit Blue Cross, they are themselves a product of neoliberal forces that have capitalized public welfare.

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SURFING the YouTube: How social media is changing landscape research

Benjamin Shirtcliff, Ph.D.

keywords YouTube; Adolescent Behavior; Skateboarding; Unstructured Play Activity; Public Place; Urban Design; Social Media; Descriptive Research Methods

Abstract

Accessing insights from underrepresented populations, such as adolescents, remains a persistent challenge in the research and design process. The paper will investigate the utility of online videos of user-posted materials as an innovative research tool. Unlike traditional in situ approaches to studying human behavior and public space, online videos permit access to multiple sites based upon the population or activity of interest. The approach is similar to studies of behavior using unobtrusive observation—where participation or interviews might interrupt the activity under observation or where access to the setting of the activity would otherwise remain inaccessible to the researcher.

Methods. The use of YouTube remains largely untapped in urban design research, yet it is well situated amongst a discipline well versed in using visual research methods to understand the relationship between behavior and design. The following paper describes how anonymously posted online videos of adolescents skateboarding in 17 public, open spaces in New Orleans, LA were collected and coded for further analysis. Collectively, this culminated with 104 unique videos that contained 278 individual scenes gathered from online video search engines such as YouTube.

Findings. Videos were reliably coded (k>.75) for prosocial behavior and risk-taking behavior across locations which varied in terms of physical features, social groups, and urban context, showing that YouTube content could, indeed, provide useful data. Overall, the findings have important implications for research into the use of public space by underrepresented populations, alternative activities, or spontaneous events. The innovative strategy could incite positive changes in research methods in landscape architecture and urban design by employing strategies that access relevant streams of human behavior through online sources.

Introduction

A research method that permits access into how positive social encounters are encouraged amongst frequently misunderstood populations or activities would provide insight into inclusive urban design. Landscape architecture maintains an underlying assumption that designed environments influence human behavior. Architects, landscape architects, urban planners and designers continue to believe that the places they design promote "good" social encounters (Dobbins, 2009). Whyte's observational research, for example, on public urban places—which used direct observation gathered from strategically placed video cameras recording human behavior—identified that the biggest, single deterrent, as to why there are not more "good" places is because of 'undesirables' (Whyte, 1980). Whyte's research went on to identify that poor urban design decisions were often made out of an unsubstantiated fear of 'undesirable' individuals who challenged normal, spatial practice. Similarly, adolescent skateboarders are identified in the literature as undesirable in public space. Emerging concepts of "inclusive design" have the potential to challenge exclusionary urban design practices to better account for the diversity of human behavior (Burton et al., 2006; Carp, 2008; Zabielskis, 2008).

Urban design research should advance how built environments afford positive social encounters for everyone. The physical environment, as Gibson argues, affords experience (Clark et al., 2002; Gibson, 1979). Affordance, a term created by the ecological psychologist James Gibson, (1979) suggests that experience is dependent upon or limited to the actively perceived environment. But how and for whom remains a strong point of contention for strategies to create more inclusive urban environments for everyone (Turner, 2002), including adolescents (Collins et al., 2001; Mugan et al., 2009; White, 1993; Woolley et al., 1999) or for alternative activities, like skateboarding (Freeman et al., 2002; Nemeth, 2004, 2006; Stratford, 2002; Woolley et al., 2001).

The following paper addresses how YouTube can be used as a research tool to better understand how unsupervised adolescents, who are difficult to study, use and manipulate the urban environment. Adolescent skateboarders were

selected because they are active users of public space and notoriously difficult to observe, suggesting the need for an alternative approach. Observation and the use of secondary description—the use of sources that are found—are key descriptive strategies in landscape architecture research (Deming et al., 2011, p. 71-72). Following Deming's suggestion, the following paper is based on a study that employed multiple methods—direct observation, site inventory, and secondary description—to overcome known limitations of relying on any single source to support contextual validity. Published results validated the use of YouTube to describe how physical and social settings support adolescent skateboarders (Shirtcliff, 2015). The present paper's primary focus is on the use of online videos as an innovative research tool for gaining insights into covert populations (i.e. adolescents, ages 10 – 19+) and activities (i.e. skateboarding).

Background

The following literature review identifies that adolescents are an underrepresented population in the design and planning of cities. Skateboarding is engaged in by more than adolescents, however the activity is confounded further because of their age. As a population that is difficult to research, for ethical reasons, the literature review frames the need for alternative research strategies to access how adolescent skateboarders engage the city.

No Right to the City

Adolescents are shown in the literature to be intentionally marginalized, oversimplified as a group instead of being a part of many subcultures, possessing limited access to decision making regarding their environments, found to use the environment differently than adults, and to be dependent on public services more so than adults (Freeman et al., 2002). Adolescents have been found to be commonly referred to as delinquents and face confrontations with adults (Collins et al., 2001) and peers (Valentine, 1996; Woolley et al., 1999) in public space. Adolescents are unable to congregate or use public spaces because they are viewed as a negative element (Kato, 2009; Owens, 1997, 2002). Youth transgressions of spatial limitations (Janssen, 2009) maintain normalizing notions of youth resistance, subversive meanings of place, and the ongoing reconstruction of space (Robinson, 2000). Such transgressions, however, may have less to do with adolescents than the limited design intent of the place.

No Place of Their Own

Studies in geography, landscape architecture, and urban design reference how the social and physical makeup of the space generally factors into adolescent behavior. Travlou found that "the environments of teenagers are not just appendages of the adult world, but are special places created by teenagers themselves and invested with their own values" (Travlou, 2004, p. 2). Multiple studies have further shown how space perforated by adolescent skateboarding is used to generalize all youth as unruly, their appropriated space as the site of resistance, and the deployment of exclusionary tactics to continue to marginalize all youth so as to encode a normalized spatial identity (Flusty, 2000; Fusco, 2007; Howell, 2005; Kelly, 2003; Nemeth, 2004, 2006; Robinson, 2000; Stratford, 2002; Vivoni, 2009; Woolley et al., 2001). Instead of playing in programmed facilities, adolescent skateboarders prefer to appropriate their own spaces in public space (see Nemeth 2004, p. 75–76, citing Valentine, 1996 and Woolley and Johns, 2001). Such appropriation, however, frequently leads to confrontations (Flusty, 2000) because their behavior is judged to be in conflict with the proper use of "neutral" public space (Rallings, 2014). The appropriation of public space by adolescent skateboarders is observable, contested, and further research may lend insight into how to create better places for this underrepresented population.

Staking their Claim

Teens use props, like skateboards, and will occasionally manipulate the design of urban places by waxing edges, installing steel edges, or building their own concrete ramps. Through the creation of such situations for play, the city becomes a playground (Flusty, 2000, p. 154). According to Eric Fredericksen, the urban environment is open to creative interpretation and adolescent skateboarders resist containerization in the physical environment (2002, p. 46-50). Fredericksen found that skaters "creatively use the environment around them" because they have so few spaces to skate (2002, p. 46). As Iain Borden describes, objects in the city transform human experience in relation to the skateboard (Borden, 2001, p. 191). Accordingly, the unstructured, non-programmed settings where adolescents are found in the city offer important insights for urban design research to better understand how public place supports their social and cultural interactions.

Limitations

Research on young people's participation in environments designed to support play has several drawbacks. Insights are restricted to those adolescents who can access and would choose to use these places. The primary mechanisms for conducting research on adolescents' active use of public space are identified in Table 1. No studies known to the author have conducted behavioral research on adolescent skateboarding and appropriation of public space using YouTube.

Significance

While secondary data collected via online video streams is novel to design research, the use of video recording to understand human behavior has an important history in public space research for landscape architecture. Whyte

(1980) incorporated strategically placed surveillance cameras to study behavior in public space. His findings had important implications for the design of public space in cities. Similarly, YouTube videos are recorded by ubiquitous cameras carried by anonymous users. YouTube videos differ from Whyte's methodology, however, in that cameras are held by active observers in public space and are publically accessible documents.

Research Methods

YouTube as a Research Tool

YouTube videos and the publically available, anonymous lens of the public eye is novel to research in the design fields, but is becoming a more common data source in social and behavioral research (Giglietto et al., 2012; Konijn et al., 2013). Giglietto and colleagues (2012) comprehensively reviewed the use of social media in current social and behavioral research. YouTube, they found, had 800 million users monthly and 60 hours of video uploaded every minute. Statistical approaches across studies focused less on the video and examined the "traces of social behavior" embedded within the video as a window into the community responsible for it (Giglietto et al., 2012, p. 151). The approach has the potential to lend insight into otherwise inaccessible settings of human activity.

Reliability

Giglietto and colleagues (2012) identified that a major challenge for the use of YouTube is that it opens the door to big data which necessitates the use of complex statistical analyses. One of the foremost concerns is maintaining internal consistency in coding multiple variables. As with other observational methods, inter-rater reliability of the coder ensures that codes are representative of video content and observed behaviors. Such reliability can be achieved by maintaining internal consistency amongst two or more trained raters (Haidet et al., 2009). The use of Cohen's kappa (following Hulley et al., 2007) is an appropriate reliability statistic because it requires precisely parallel scores, rather than general associations as calculated with bivariate correlation coefficients or percentages. The purpose of the reliability coefficient Kappa and maintaining inter-rater reliability, especially when working with "big data", is to ensure that what is being coded reflects a complete picture of what can be collected from the video. Haidet and colleagues (2009, p. 466) identifies that "video recordings are an excellent source of data that can be used to assess relationships between behaviors" and "provide a high degree of reproducibility when measuring observations." The research approach offers multiple benefits which must be balanced with an instrument that can be used to reliably code behaviors.

Table 1. Research Methods on Adolescent Activity in Public Space.

Research Method	Frequency	Reference
Interviews	15	Beal, 1995; Bradley, 2010; Freeman, 2002; Karsten, 2006; Korpela, 2001; Kraftl, 2006, 2008; L'Aoustet, 2004; Nolan, 2003; Owens, 2002; Robinson, 2000; Shannon, 2008; Simpson, 2000; Thomas, 2005
Focus Groups	9	Clark, 2002; De Visscher, 2008; Horton, 2006; Pomerantz, 2004; Robinson, 2009; Travlou, 2004; Veitch, 2007; Wheaton, 2003; Woolley, 2001
Archival Research	9	De Visscher, 2008; de Vos, 2005; Howell, 2008; Johnson, 2009; Nemeth, 2006; Rogers, 2005; Vivoni, 2009; Woolley, 2006; Fusco, 2007
Participant Observation	7	Atkinson, 2009; Beal, 1995; Doane, 2006; Kraftl, 2006; Robinson, 2000; Simpson, 2000; Travlou, 2004
Nonparticipant Observation	6	Beal, 1995; Bradley, 2010; de Vos, 2005; L'Aoustet, 2004; Nolan, 2003; Robinson, 2000
Site Analysis and Site Survey	6	De Vos, 2005; Freeman, 2002; Kraftl, 2008; L'Aoustet, 2004; Simpson, 2000; Travlou, 2004
Surveys and Questionnaires	4	Bradley, 2010; Nolan, 2003; Robinson, 2000; Travlou, 2004

External Validity

Inter-rater reliability can establish internal consistency, but it does not establish external validity—the extent to which coded behaviors can be generalized to other settings—and it is with this critique that the utility of YouTube may be most apparent. One recommended analytical strategy for overcoming the limitation identified by Giglietto and colleagues (2012) is the use of multilevel modeling across multiple settings. Multilevel modeling (MLM) received acclaim amongst social scientists because of its power to identify why students in one classroom in a particular school would perform better on standardized tests than equivocal students in other classrooms in other schools. MLM analysis nests data, like eggs in a basket, and permits parameters to vary at multiple levels, i.e. students (age, race, gender) within classrooms (well-lit, cleanliness, supplies, odors, and noise). Since students are very likely to influence one another, a statistical method was needed that did not violate the assumption of independence of observations. Independence of observations assumes that one observation does not influence the probability of another and is a fundamental assumption of General Linear Models, such as Analysis of Variance (ANOVA) or linear regression. MLM analysis assumes that individuals in a setting are likely to influence one another, making the assumption of independence of cases irrelevant (Tabachnick et al., 2007), and indeed provides a statistic (the intra-class correlation coefficient or ICC) to indicate the magnitude of that inter-dependence.

In sum, YouTube videos, in combination with other methods, provide access to communities and behaviors that might otherwise be overlooked. Online sources of user-posted materials are rich in content for how urban space is used and can be improved. YouTube videos permit unobtrusive observation similar to studies of behavior where participation or interviews might interrupt the activity (Lee, 2000) or where access to the setting of the activity would otherwise remain inaccessible to the researcher (Linkletter et al., 2010). The following describes the steps for landscape architecture research.

Research Setting

Identifying Sites of Adolescent Skateboarding Activity

The recommended use of YouTube as a research method is based upon a study conducted in New Orleans from 2010 to 2011. The study used a nested strategy documenting behaviors across multiple sites that varied in terms of physical features and urban context, see Figure 1. In that study, several neighborhood parks, well-known city parks, popular plazas and squares, abandoned, urban, open space, and accessible, semi-public plazas/ building entrances were the primary focus of research. Descriptive variables from each urban setting were measured in terms of urban context, observed social/ peer context, and the specific physical features found in each location. Adolescents were observed and coded from in-field observations and from online, anonymously posted videos. The primary unit of analysis was the site in which adolescents skateboard in New Orleans. Initial observational research efforts maximized locations and times. Locations (n=17) were added and removed during the study as new information became available or sites were eliminated due to underuse. The research period began in the first week of December 2010 and extended until sufficient observations were completed for statistical analysis. The completed 10-month period is longer than similar studies in the literature, which most commonly range from three to four weeks.

Site Visits

The study also employed unobtrusive observation of the seventeen sites during the research process. Session locations and times varied so that the same observation session was not observed on two consecutive days and that two sessions are never carried out on the same day. This strategy was recommended by Castonguay (2010) to help the observer to remain unnoticed, thus decreasing interaction effects. The study used a sampling grid of known urban, public open spaces in New Orleans, with observation of times and locations based on the greatest likelihood of youth being present—e.g., after school, holidays, and weekends. Observation days and times were set up to best accommodate sporadic site usage. The study completed a total of 173 observation sessions altogether which took approximately 400 hours to complete. Despite this investment, only 6 successful unobtrusive observations were collected for further analysis.

Video Collection

Searching for Videos

The study collected 104 unique videos, which had been watched by that time 254,436 times, from online video search engines such as YouTube and Vimeo. I entered key words such as Skate, Sk8, Skateboard New Orleans, New Orleans Skate, and combinations thereof in internet search engines such as Google and Bing. As the number of videos collected increased, the time period of posting, within the past week or month, became a more reliable means of filtering and identifying videos. Approximately forty hours was spent searching for and downloading videos over the 10-month period from November to August. Videos were downloaded from YouTube in the Mozilla Firefox browser using an extension such as "Easy YouTube Video Downloader Express." Videos ranged in length from 20 minutes to 8 seconds with an average length of 3:30 (SD 3:03).

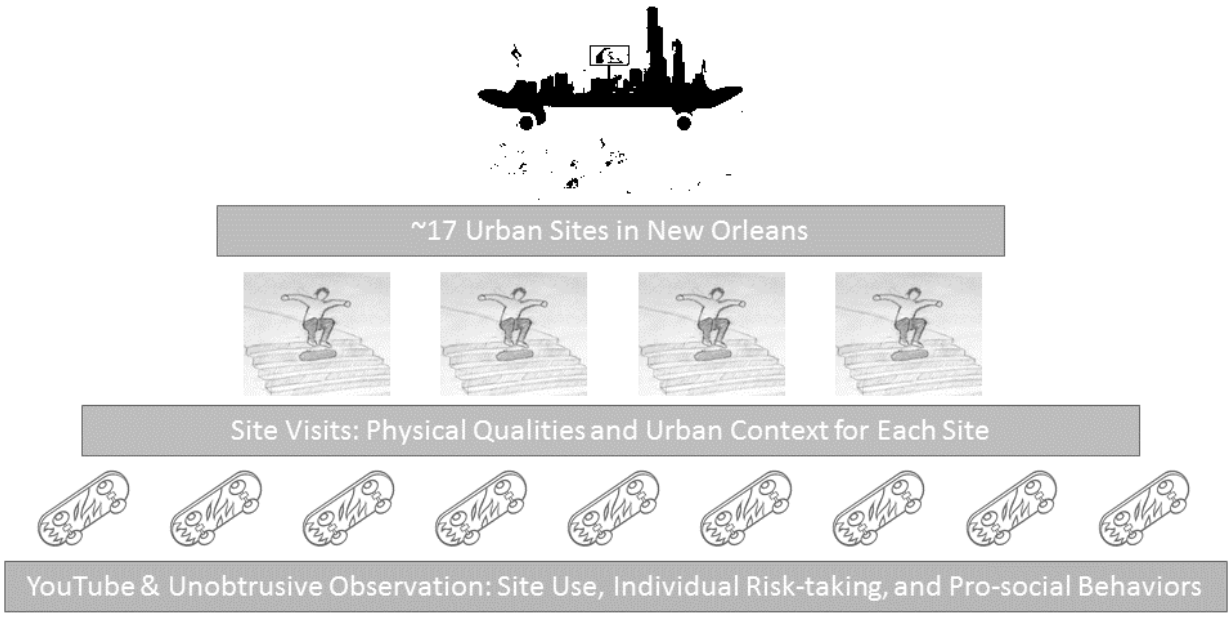

Figure 1. Research Design: a nested strategy, multiple observations, multiple features and contexts, and sites.

Indexing Videos and Building an Archive

From the five and a half hours of video that was scanned for unique content specific to known sites in New Orleans, approximately one hour (54.5 minutes) from 62 videos posted by 22 unique authors was deemed acceptable for coding. An Excel spreadsheet was used to catalogue videos by: numeric id, coded (y/n), time duration, title, author, URL, date posted, date acquired, hits, location, youth (y/n), gender, estimated age, type of space, primary activity, and secondary activity. Once acquired and inventoried, each video was converted into a standard MP4 format for coding. Although well-known behavioral coding software applications exist to make coding more efficient, such as Noldus Observer or StudioCode, budget constraints lead to the use of Adobe Premiere for scanning and trimming scenes from videos in combination with directly entering values into SPSS 19.0 for data entry. I would not recommend this approach as video editing software uses a tremendous amount of processing power and overheating caused the computer to frequently and spontaneously shut down.

Completing Data Collection

Data was verified for accuracy throughout the process. Of studies with multiple sites, published results (Forsyth et al., 2008) have relied on 20 observations per focus area for a sufficient success rate. For this study, the average number of observations was 8 (SD=5) due to the inclusion of low performing sites. Average n's for studies thoroughly observing in situ behavior typically count from as low as 30 to as high as 700 observations, with an average around 250. At the close of data collection, 278 separate observations were successfully identified for coding and further analysis—placing this study well within sample size boundaries established in similar studies (Forsyth et al., 2008; Linkletter et al., 2010).

Selecting Scenes

Skateboarding videos often represent a composition of maneuvers across multiple sites. Consequently each video contains multiple scenes that reveal how different sites were interpreted at the moment. From the videos that involved a known site in New Orleans, 278 scenes were uniquely labeled and extracted for coding of behaviors, context, and physical features. Each scene was treated as an individual case, given a six-digit case number, labeled with the case number in SPSS and in Adobe Premiere, and coded directly in SPSS. Scenes were selected using start and stop points based upon the individual trick—the time before and after the maneuver was decided by the anonymous author who edited and posted the original video. An identical trick recorded from different angles was considered a duplicate. The same individual performing different tricks or multiple attempts of the same trick in the same scene were treated as individual cases because each one shared different information regarding the urban context (slow to change), physical features (vary by type of maneuver), and social context (frequently changes). Videos ranged considerably in how they brought together content. One video may have contained scenes from several different sites and time points, while another video may have focused exclusively on one site with time (minutes, hours, day, month, or

year). Scenes ranged from 1 to 5.5 seconds. Time spent coding each video ranged from 15 minutes to 3 hours, depending on the number of scenes and amount of information contained within each scene.

Coding Scenes

An initial coding scheme that utilized a grounded theory method was developed and updated during video coding (Babbie, 2007). Each scene was observed at least three times for different "levels" of video content: (a) for the site location and presence of youth; (b) for individual and peer behavior; and (c) for the social and physical environment. Depending on the complexity, scenes were viewed repeatedly to ensure accurate video coding of all 18 variables (coding sheet available from the author upon request). All inferential statistics were calculated in SPSS 19.0.

Maintaining Reliability

As described above, inter-rater reliability is an important measure as it indicates the effectiveness of the variable to be consistently coded for further analysis—the researcher really is seeing what is happening in each scene. Inter-coder reliability was supported by having a graduate-level volunteer review 10% of the collected material using a blind review process and making requisite changes until an inter-coder reliability of Cohen's kappa (k>.75) was consistently attained (Haidet et al., 2009). A Kappa of 1.0 represents perfect agreement amongst raters; K=0 indicates random agreement; and, K= -1.0 indicates perfect disagreement amongst raters. Behavioral coding of video in uncontrolled settings is difficult and good agreement amongst observers is traditionally achieved at lower thresholds than in controlled environments (Haidet et al., 2009). Nonetheless, a high threshold of K=.75 was set to best establish the utility of this methodology.

Inter-rater reliability is best maintained through training and continued reassessment of kappas throughout the research process. In this case, training included reviewing the code book, description of variables, and a brief written summary of how each variable was coded. It should be noted that more advanced techniques for coding behavior, such as Ekman's facial recognition research (Ekman et al., 1997), requires years of training to reliably code. For the present study, training took approximately 20 hours and regular follow-up meetings to reassess Cohen's Kappas.

Findings

The study found that several measures can be reliably coded and further analyzed for the relationship between behavior and public space. The success of these measures in accounting for adolescent skateboarders in public spaces in New Orleans are discussed below using the same multi-level process identified for coding above: (a) identification of site location and presence of youth; (b) describing the behavior of the youth and peers present; and (c) describing the site features, social context, and urban context.

A: Site Location and Presence of Youth

The locations of scenes in videos were primarily identified by the familiarity of the researcher with the city, in part due to the commencement of the direct observations of sites. Since similar locations were used in multiple videos from different authors, certain site features or familiar background made locations easily identifiable. For locations that were unknown, contact with locals aided in identification. Another approach was to identify the location by examining the background for landmarks and using aerial maps of the area to identify the location, but this was largely unnecessary.

Individual variables, see Table 2, recorded observed gender (k=1.0), approximate age (k=.78), and ethnic divergence from white as default (k=.72). In terms of age group (mean (μ)=15–16), 27 young adolescents (9–12), 104 mid-adolescents (13–15), 98 late adolescents (16–18), and 54 emerging adults (19+) were coded from observations. Since ethnic variations were heavily skewed to two groups (μ=.63), the variable was dichotomized into white (62%, n=178) and mostly African American (38%, n=105). Gender of individual performing the trick, highly skewed towards males (n=280) over females (n=3), was not included as a variable.

B: Individual and Peer Behavior

Behavior was measured through a risk/reward scale where increased levels of risk-taking were factored with increases in prosocial behavior from peers (see Table 2 and Shirtcliff, 2015). The extreme limits of the factor scale ranged from a destructive/injurious trick with no evidence of peer support to a risky trick with an overwhelming display of peer support (prosocial behavior). The present paper is focused on the reliability of the directly observed behaviors, although it is useful to note the utility of creating a continuous outcome scale from observed categorical or ordinal measures of prosocial behavior and risk-taking behavior. For example, the continuous scale allowed for the risk-taking behavior of each individual to be put in the social context of the degree of peer support present.

Prosocial was defined as the amount of observed peer support generated by the group in each setting. The prosocial variable (μ=1.04, SD 1.22) was reliably coded (k=.75) as an ordinal level variable with increasing levels of observed behavior: 0 (n=120) the default, none, escalated to 1 (n=96) some but barely detectable, 2 (n=14) to detectable but limited to a few observed individuals, 3 (n=35) to more evident more than half of people in setting show support, 4 (n=16) to most evident or the number of individuals showing support greatly outnumber those who did not.

Risk-taking was reliably coded (k=.88) as an ordinal level variable with increasing levels of risky behavior (μ=2.4, SD .73): 0 as cautious required the use of safety equipment (at no point during the study was this observed); 1 (n=188) as restraint required that the speed and skill at which a trick was executed was observed to be within the means of the individual; 2 (n=63) as risky required some additional measure either environmental or personal to escalate the potential for damage to the individual or private property; 3 (n=16) as reckless suggesting that the individual executed a trick without sufficient restraint to avoid damage but somehow managed to not get hurt or break anything; and, 4 (n=5) destructive/injurious was coded when individuals were clearly hurt, either a concussion or excessive bleeding, or a trick impacted another person or property.

C: Tricks, Site Features, Social and Urban Context

Environmental and physical features were continuously updated over the course of the study as new observations made way to new features used by youth, see Table 2. Physical features had great internal consistency (k=.95) and were entered in as rail (n=19) or barriers (n=2), driveway (n=1) or sidewalk (n=15) or street (n=7), street furniture (n=28), gaps (n=44), ramps (n=14), steps (n=80), walls (n=16), planter (n=6), feature or fountain (n=11), landing (n=28) and other, such as playground equipment (n=1).

Appropriation accounts for the observable degree of site modifications to support behavior. Appropriation (μ=1.5, SD .69) was consistently coded (k=1.0) as an ordinal variable with increasing levels of appropriation (similar to Hall's discussion of the use of boundaries in proxemics, c.f. Hall, 1963): 0 (n=171) presence is the default strategy observed when youth used no site modifications to support the activity; 1 (n=81) temporary appropriation describes situations when movable objects were used; and 2 (n=32) permanent appropriation identifies the use of materials that are less easy to remove, such as concrete and glued steel rails.

Social context measures accounted for peers in each setting. Group size (μ=2.1, SD 1.3) was reliably coded (k=.91) as an ordinal level variable describing the size of the group present from small (n=147, 1–5), moderate

Table 2. Reliability of Coded Observations from YouTube

Individual Variables		
Measure	Description (number of cases)	K*
Gender	Gender of Individual (males=280; females=3)	1.0
Age	Age Ranges: 9-12 (27), 13-15 (104), 16-18 (98), and 19+ (54)	0.78
Race	Dichotomized: white (178), and not-white (105)	0.72
Individual and Peer Behavior		
Risk-taking	Individual Risk: cautious (0), restraint (188), risky (63), reckless (16), and destructive (5)	0.88
Prosocial	Peer support: none (120), some (96), detectable (14), majority (35), unanimous (16)	0.75
Tricks, Site Features, Social and Urban Context		
Physical Features	Features used for tricks: rails (19), barriers (2), driveway (1), sidewalk (15), street (7), street furniture (27), gaps (44), ramps (14), steps (80), walls (16), planters (6), features (11), landing (28), other (1)	0.95
Appropriation	Site modifications: Presence (171), Temporary (81), and Permanent (32)	1.0
Group Size	Size of group: small (147), moderate (29), large (29), and very large (81)	0.91
Group Gender	Gender of Group: all males (167), some females (114), all females (2)	0.37
Group Ethnicity	Race of Group: white (50), mostly white (39), even (116), mostly nonwhite (68), and nonwhite (10)	0.86
Tricks	Skate trick performed: Ollie (187), aerial (3), board slides (62)	0.94
Success	Successful landing of trick: yes (187), no (68)	NR*
Police Activity	Observed police activity (5)	NR*
Confrontations	Observed Confrontations (5)	NR*

*Kappa (K) indicates inter-rater reliability, above .75 is considered consistent. NR indicates not rated due to lack of sufficient comparisons or matter of fact nature of event.

(n=29, 6–10), large (n=29, 10–19) and very large (n=81, 20+). The presence of males and/or females (μ=1.4, SD .5) in the group (k=.37) accounted for the variation of sex amongst the peers from all male (n=167), presence of one or more females (n=114), to mostly/all female (n=2). Group ethnicity (μ=2.8, SD 1.0, k=.86) was used to account for variability in terms of divergence of ethnicity from the default (n=50), white, to mostly white (n=39), to relatively even distribution (n=116), to mostly nonwhite (n=68), and finally nonwhite (n=10).

Tricks (μ=1.3, SD 1.3, k=.94) and the completion of tricks (μ=1.6, SD .6) were included as three categories: ollie (n=187), aerial (3), and board slides or grinds (n=62). Tricks were also classified by whether or not (n=69) they were landed successfully (n=187). All forms of observed play were recorded, including skateboarding, roughhousing, parkour or urban acrobatics, socializing or hanging-out, making-out or courting, graffiti, and manipulating or vandalizing the physical environment. Observed police activity (n=5) was entered in as a measure, and observed confrontations (n=5) with police or authority figure was entered in as well. The success of a landed trick, confrontations with police, and observed form or play were not rated to save time and because of the matter of fact nature of the event.

In sum, the measures collected from YouTube were consistently coded (k>.75) with only group gender having a moderate level of agreement amongst raters. The coding instrument was reinforced with numerous site visits throughout the study, which permitted the level of urban activity, predominate land uses, and persistent level of appropriation to be inventoried. The strategy permitted the researcher to enter into each site with a perception guided by previous accounts of site manipulation and activity. By approaching each site in this manner, evidence of use, such as physical traces (Zeisel, 1981), were easier to document and analyze.

Intraclass Correlation of Behaviors within Sites

External validity of the coding strategy to successfully correlate behaviors to site locations was conducted by measuring the intraclass correlation coefficient (ICC) within multilevel modeling. As described above, the statistic is commonly used to evaluate similarities, correlations, for several nested "classes." For the present study, repeated observations within a site were nested within 17 different urban sites in New Orleans. The intraclass correlation coefficient (ICC) was used to assess the degree of correlation of observed behavior within sites or the relative proportion of within and between site variance. In other words, from each scene that was coded, the level of individual risk, amount of prosocial behavior, type of trick, physical feature, urban context, and social context could all be nested within the site in which the trick occurred. If the ICC is high, then there is a high average within site correlation that would remain unaccounted for by an aggregated means model; whereas, if it is low, then within-site variation can be modeled looking for fixed effects of changes between locations. In the larger study, the ICC indicates whether there is sufficient between site correlations to proceed with the recommended statistical strategy of multilevel modeling to explore affordances in further detail (Shirtcliff, 2015). As a measure of external validity, a larger ICC indicates that observations taken at the same site are stable or similar to one another, i.e. are generalizable within the site not unique to the individual, and observed in a correlated manner across different videos. External validity is maintained with a statistically high ICC, suggesting that another video at each respective site would likely be observed in a similar manner.

In an empty mixed model with sites grouped as subjects for random correlated effects; three dependent variables included the ordinal variables prosocial, risk-taking and appropriation. Other coded scores were categorical (yes/no) and not suited for the ICC. For prosocial, the ICC indicated that 38.4% of the variance in prosocial behavior was similarly observed within each site across observations, Z=2.25, p=.024. Similarly, 54.9% of the total variance in risk-taking was similarly observed within a site and this stability was significant, Z=2.59, p<.01. Lastly, the ICC showed than 46.7% of the variance in appropriation was stable within a site, Z=2.63, p<.008, and thus these behaviors were consistently observed within each site. These findings support the approach that YouTube provides access to traces of human behavior in public urban open spaces.

Discussion: Incite Change

Accessing the Inaccessible

The study identified publically accessible, outdoor locations in the City of New Orleans as places where adolescents were known to play, hang-out, and skateboard—at a time when the city has no official skate park. Once sites were identified, two research approaches were engaged over a 10-month period: one, a thorough search for online videos of adolescents playing in the sites; two, each site was visited multiple times to "incidentally" observe youth. Ultimately, YouTube videos were reliably coded to represent the unstructured activity of adolescents across multiple settings. Inter-rater reliability coefficients using Cohen's kappa (k>.75) internally validated multiple measures assessing behavior, individuals, groups, physical features, activities, and urban context. Because the study was about the relationship between sites and behavior, a descriptive statistical method called multilevel modeling (MLM) was used to externally validate that behaviors coded from scenes could be grouped to sites. A sufficiently large

ICC indicates that behaviors in sites could be grouped for further analysis as observations were correlated to the site; this was found for each of the three behaviors (prosocial; risky; and appropriation). Findings support the use of YouTube as a means to access descriptive information on human behavior in public settings.

This paper shows that online videos can offer key insights into accessing the activity of an underrepresented population or difficult to observe activity in public, urban, open space. Further, the innovative approach captured novel information when compared to traditional unobtrusive observation. Since adolescents often have to "move-along", the study used unobtrusive observation to examine 17 sites across New Orleans for evidence of adolescent activity. Even after extensive reconnaissance involving hundreds of hours, the traditional approach did not successfully observe adolescent behavior. Adolescents in "their space" modify their behaviors with the unanticipated arrival of an unknown adult. YouTube videos, on the other hand, offer the researcher of the built environment access to evidence of how urban space is used without researcher interference.

Undesired and unsupervised, adolescents' free movement and covert use of public space presents unique challenges to study how public place can support positive social encounters. Consequently, unobtrusive, observational, behavioral research remains largely absent from the literature. Three primary research strategies were identified from the literature: studies that occur in environments designed to support youth play, such as skate parks; studies that examine specific groups of youth in public space (Rogers and Coaffee, 2005; Doane, 2006; Janssen, 2009); and, those studies that examine urban, public spaces as settings for youth activity (Nolan, 2003; Simpson, 2000; Horton and Kraftl, 2006; Veitch, Salmon, and Ball, 2007; de Vos, 2005; Robinson, 2009). As the literature suggests, adolescents prefer to engage in places where they are able to appropriate settings that support the desired behavior (which is difficult to do if an adult is present). Furthermore, such places may happen to be in programmed environments or popular, public places, but appropriation is likely to be limited by what is anticipated in highly structured places. The use of online videos has been shown to provide access to traces of human behavior in appropriated spaces that would have otherwise likely remained inaccessible.

Implications for Inclusive Design Research and Practice

As landscape architects, architects, and urban designers, our expertise is to understand the benefits and limitations of the physical environment to support urban life by observing human activity. The quality of information gathered from interviews or surveys tends to reflect already known cultural and social values for space and is useful for making collective decisions on materials, objects, or phasing. Participant observation and unobtrusive observation provides access, however constrained, to known populations or acceptable uses of public space. YouTube videos permit access to otherwise inaccessible populations or situations; and, an extensive and correspondingly complex strategy that enables the researcher to further understand the background (site) supporting the activity. The limitation of this approach is the type of information that can be reliably collected and coded for analysis. As the present study shows, quite a bit of data can be reliably collected; however, the approach is best interpreted with complimentary use of inferential and multivariate statistics.

YouTube videos provide insight into how sites are interpreted to support adolescent skateboarders—a difficult population and activity to incorporate in the design process. The use of videos in addition to the opportunity to visit sites repeatedly, even over a short period, is critical to the interpretation of those contextual qualities and aspects unique to each site as it relates to the population or activity of interest. The combination of these observational approaches permits a deep level of interpretation and improves the opportunity for researchers of designed environments to consider the affordances of place to support positive social interactions for everyone. Strategies to create more inclusive environments should incorporate multiple approaches that maximize opportunities to understand the heterogeneous use of public space.

Limitations

While it may be argued that presence of a video camera changes social behavior (Caldwell et al., 2005; Haidet et al., 2009), most research studies on youth suffer from known limitations of researcher intrusion by requiring parental consent and the successful building of a trust relationship. Such prerequisites are known to interfere with natural play behavior. Researchers incorporating video should keep in mind contextual limits when deciding which behaviors to observe and code along with other environmental variables. The method has limitations that must be considered in the design, process, and analysis of any study choosing to use this research tool. Further studies using this strategy would improve our understanding of these limitations and the convergent and discriminant validity of the research tool to address human behavior in public places.

Conclusion

Handheld video cameras, Go-Pro mounted cameras, cell phone cameras, and the affordability of near-professional video recording and processing has made the anonymous lens a ubiquitous element in urban environments. Free,

public access to post and view videos of human behavior has opened up a world of how people use and view space that was previously unavailable or difficult to capture in a moment of activity. YouTube videos and other anonymously posted videos represent an ever-growing amount of data recording human experience in built environments. The videos have fundamental limitations in term of control and scientific value, and contextual limitations should be considered throughout the research process. Regardless, the growing presence of videos on the internet suggests that this has become a stable, social practice in society. These videos are ripe for interpretation of human behavior and benefit by documenting experience removed from the mediating presence of a researcher. Such instances of human behavior in public space capture an important part of the social and cultural life of cities. This new online presence assuages barriers to previously inaccessible information on how underrepresented populations, like youth, behave, or how alternative interpretations of the city, like skateboarding, affect behavior in public space. Further inquiry along these lines may raise important questions testing the efficacy of design to meet claims of social and cultural equity.

The lens has long played a pivotal role in the measure of design success, only now it is anonymous and accounts for both anticipated performance and spontaneous human behavior. As cities continue to increase and diversity, normative theory on 'undesirables' reinforces exclusionary tactics. Landscape architecture should change how it gains insight into how inclusively designed environments can effectively meet the needs of a culturally and socially diverse population. Inciting such a change would push urban design beyond the predicable to support the unanticipated interactions that create culturally rich and vibrant cities.

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