Modest contemplations in the public sphere of walking and eating

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Abstract

The street is one of the key spaces of public and private life. For its central role in making of modern life and contributing to the quality of social and personal life, it is a space worth probing in its multiple spheres of being and usage. We explore a nexus of human experience – where walking, eating, pleasure, social interaction, and more converge. In this particular case, we examine eating and walking and speculate on ***social facilitation***: effect of social interaction on shift of state from ***noneater*** to ***eater*** while walking in the street. We take parameters from a survey and execute an agent-based model. In the survey, participants had scored ten theoretical factors as instigators of eating while walking in the street. In the current paper, we compare results with an earlier design which employed means of factors to define center of distribution for random-normal assignment of factor scores. In the current iteration, we use multiple regression to estimate a center, reasoning that factors tend to work in consonance with one another. Our model suggests chance of social facilitation. Any aspect of human behavior in the city that is known or understood facilitates programming the context in which the behavior happens. Those who design or manage urban settings either ground or supplement their versatility through encounter with a broad range of insights which inform urban space. Modelling provides one such consequential pathway to apprehension. Using the computer as a modelling tool facilitates managing the problem of anticipation of social action in space.

Introduction

> *"I'm a great one for eating while I'm walking."* (Anecdote 1)
>
> *"You'll see people...buy breakfast...already eating it on the way home."* (Anecdote 2)
>
> *"Eating a sandwich...on my way to the office. I had to walk along a busy street and cross a few intersections....It's an intimate journey."* (Anecdote 3)

In experimental science, a time-tested pathway for fostering understanding of a phenomenon is through directed attention at its effects within a defined context – with the insight that variation of the value represented by the phenomenon-as-variable would precipitate a concomitant change in the environment of the problem. Exposition learns from experimental manipulation. Ensuing solutions to contingent problems can then be crafted to fit the as-described experimental problem unilaterally or are crafted in such a way that their ranges and tolerances are aimed at accommodating appropriate parameters of the problem, thereby accounting for real-life variances.

So, imagine the case of pedestrians walking on a city street – more particularly, a sidewalk. The sidewalk must be able to move pedestrians along effectively as a primary function. The problem, however, is more complicated than that. The sidewalk must also accommodate people roaming while sightseeing, maundering on an idle stroll, stopping to talk, window-shopping, searching for a trash receptacle, pausing to watch a street entertainer, exploring objects and their use, testing limits of engagement with objects and events [e.g. sitting on steps], and performing a host of other actions. The upshot for a designer is necessity to learn to anticipate this new layer of intricacy within the problem space, as it is possible that estimates of critical parameters might shift. Examples of those parameters are sidewalk width, pavement surface design (e.g. to minimize risk effects prompted by distraction), walking speed, and physical and managerial constraints to curiosity about objects in space.

The pre-eminent logic of the type of scientific exploration described above is ***cause --> effect***. In this paper, we explore the potential that, in a social context such as the street, pedestrians might influence one another in/about a particular behavior in public space. For the purpose of that exploration, we have taken up the diversionary act of eating while walking. We frame our exploration of ***cause --> effect*** around the context of inducement of ***non-eaters*** to eat, following influence by ***eaters***. We ask the question: Given a few people eating in the street, and given social interaction, could the number of eaters increase?

We will enquire into the prospect that, in a social context such as the street, repeated encounter with those who are already eating, in concord with other conditions which might affect the possibility of eating on the street (see below), might gradually stimulate some people who were originally non-eaters, in the instance, to consider eating while walking. The critical mediating construct is expressed as ***social facilitation*** (Stroebele & De Castro 2004). To the extent that social facilitation might increase number of eaters, the designer should aspire to recognize the possibility of ***organic*** changes in the parameters that shape and ultimately define the sidewalk.

Food in the Street

According to the Food and Agriculture Organization of the United Nations in a 2001 report, an estimated 2.5 billion people world-wide consume street food (FAO 2001). As might be expected, some of these foods are eaten at point of purchase, but it is to be expected that some are also eaten on-the-go, while the eater is walking (or riding, driving). Our population frame is larger, as it includes those eating foods purchased on the street as well as those who have either purchased food in a setting such as a restaurant and taken it out into the street or have brought the food along from home. Eating while walking adds new layers to the dynamic dialogue of ambulation and space: slower pace of movement, translocation of waste (from point where eating is initiated to where it ends), sidewalk surface management (level changes, trip obstacles [since attention is divided], slip resistance), and so on. There are, however, also more deep-seated layers of the phenomenon: personal agency, social relationship, composite awareness-shaping (in the process of tasting while moving across landscape), and so on.

Factors associated with consumption of food.

People eat in the street or in a public space for a variety of reasons. Satisfying hunger is a direct reason (homeostatic regulation [Kringelbach 2004]). There are other motivations, however. One street eater speculated on the following: “tempting street vendor;” “happen to have a fruit or snack with me;” “just purchased from vending machine;” “I have someone with me and the food is [one] he/she likes;” “when I see delicious food;” “warm you up in...winter;” “celebrate a relationship;” “crush’s favorite;” “[your] stomach is already full, [but] for some reason, when a friend or relative asks for your company to eat...you accept their offer;” habit; curiosity;

availability (De Leon 2011).
Beyond anecdotes, there are theoretical factors that have been linked to consumption of food.

Hunger.
Two systems are known to drive human consumption of food. First, food is a function of the homeostatic mechanism, the system which works to serve nutritional needs (Alonso-Alonso et al. 2015; Stroebe, Papies & Aarts 2008). In the second system, homeostatic needs do not primarily drive consumption. As Lowe and Butryn (2007) have stated, an increasing proportion of food consumption by humans seems to be driven, not by a homeostatic need, but by pleasure. They termed that drive hedonic hunger.

Happiness and positive emotions.
Happiness before consumption has been shown by Appleton (2006) to correlate positively with daily energy intake. Evers et al. (2013) explored the role of positive emotions as trigger for food intake. They reported on three studies which they conducted that "the results pointed towards the essential role of positive emotions in food indulgence" (p. 5).

Availability and presence of food.
In a study described by Stroebele and De Castro (2004), participants indicated a greater desire to eat after food was exposed to them. Provokingly, fourteen percent (14%) of participants who had indicated no appetite for pizza actually ate a slice by the end of the described experiment, during which pizza was exposed to them.
Proliferation of vending machines and convenience stores have been discussed as issues when considering eating behaviours among youth. In some societies, these sources of food are ubiquitous, accounting for multiple billion dollars of youth expenditure annually (Story, Neumark-Sztainer & French 2002). Convenience is a factor of interest in Western society, noted Stroebele and De Castro (2004). Research indicates, they wrote, that "accessibility and availability increase food intake" (p. 825). Food that is made easier to access might be chosen to be consumed.

Other people and other people eating.
Socio-environmental factors which affect food intake include social interaction. Meals and snacks consumed in social contexts last longer (Gemming et al. 2015). People also eat more when in the presence of other people who are eating, according to Stroebele and De Castro (2004). These latter authors observed that "presence of other people during food consumption can have profound effect on intake" (p. 822). They termed the effect, social facilitation. Social facilitation is powerful enough that it takes place "regardless of time of day [or] place" (p. 822).

Physical space.
Stimuli associated with physical surroundings have an influence on food consumption. Stroebele and De Castro (2004) recognized the role of properties of location such as odour, temperature, lighting and colour. Other peculiar things about physical setting might influence food choice or intake. Physically-constrained locations (e.g. office desk, car), for instance, are associated with higher likelihood of selection of snacks (Stroebele and De Castro 2004). In our case, we

speculated on a particularity of place: familiarity. We included the construct in our set of questions to see how familiarity with a space might affect choice to eat.

Variety.

Food intake "increases when participants are offered multiple foods with different sensory characteristics." Wilkinson et al. (2013) termed it the "variety effect" (p. 175). Rolls et al. (1981) have also argued that variety of food might enhance intake during a meal. We see a signal which increases intake as also possibly one which might act as a spur to consume.

Freshness.

Food freshness is defined as "the level of closeness of a food product to its original state, in terms of distance, time and processing" (Gvili et al. 2015, p. 352). In a general sense, freshness plays a role in perception and assessment of food quality and thus has impact on food choice. Indeed, Gvili et al. indicated that food freshness has been shown by studies to be the leading cause of food choice. They also noted that food appeal and taste are mediated by freshness. In our study, we have conceptualized freshness as closeness-in- time to moment of purchase of food that is being prepared and sold on the street.

Movement.

Gvili et al. (2015) proffered arguments linking movement to food choice. Living animals move. Healthy ones display more motion than the diseased or infected. Thus, at both an intellectual and visible level, motion becomes associated with freshness. Growing edible plants also move in the wind as opposed to plants and fruits that have been plucked and have begun a post-harvest decay process. So, the same kind of intellectual and visible connection between movement and freshness could be applied to plants. The perception (and reality) extends to inanimate things (e.g. running water is fresher, has less bacterial proliferation, reduces build-up of chemical contamination) and food supplied by humans (e.g. items just brought in by the hunter or farmer are "fresher"). Items judged recently moving are considered fresher than those that have been in storage. As already indicated above, freshness encourages food choice – and desirableness might be linked to consumption.

In our study, we went out a bit further and speculated on the role of movement as transferred to the consumer – particularly since walking while eating involves movement of the agent. We included it as an item on our questionnaire for respondents to see what association their own movements might have with choice to eat.

Methods

We have explored a model of the influence of social facilitation on eating in the street (Stephen, in press). Based on our parameters, we found a significant effect of social facilitation on [likelihood of] eating while walking in the street as expressed in increase in the number of eaters. We began by carrying out a survey of factors that might influence participants' likelihood of eating in a street. Ten theoretical factors were contained, including factors described above as part of the conceptual framework of the current paper. Participants (n = 103; convenience sample) scored each factor as an instigator of eating while walking in the street. Each item was scored on an 11-point scale, zero representing no influence and ten representing absolute act of eating as a result of the factor.

Using results of the survey, we structured an agent-based model in Netlogo (Netlogo, n.d.; also see Railsback & Grimm, 2012). Agents walked along a one-mile stretch of street. (See figure 1.) One agent parameter was walking speed, which was random-normally distributed

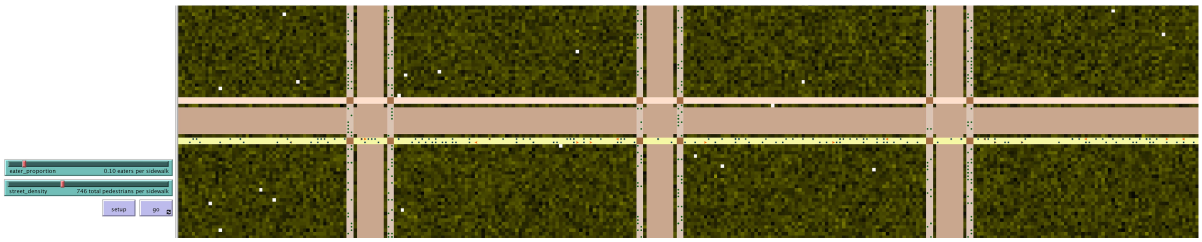

Fig. 1. Pedestrians on street: Portion of model world

(***eaters*** on a slower distribution than ***noneaters***) based on a survey of the literature (see Bosina & Weidmann, 2017; Johansson & Kretz, 2012; Sharbafi & Seyfarth, 2017; Wagnild & Wall-Scheffler, 2013). Pedestrian density was derived by combining data from three United States cities (Chicago, 2008; Minneapolis, 2009; Tempe, 2015).

Another set of agent parameters was a score on each theoretical factor. Scores on factors taken from the survey were aggregated into an indicator and each agent acquired own scores-on-factors as state variables assigned within a random-normal distribution around the indicator (parameters: mean, standard deviation). If an agent's composite score (likelihood-to-eat score) generated by these factors exceeded a threshold, then the agent became an ***eater***. If the threshold was not exceeded, the agent maintained a ***noneater*** status and continued on its way.

In order to derive the threshold, we first conducted a one-mile visual observational field run on a business/commercial urban street and recorded proportion of eaters against noneaters. Then, taking likelihood-to-eat scores from survey data, the threshold was derived as the point which split survey respondents into the same proportion of eaters and noneaters as the field-obtained proportion.

An emergent condition was built around ***social facilitation***. Encounter with an eater and repeated encounters with eaters gradually increased the noneater's likelihood-to-eat score. Some of these agents finally crossed the threshold after as many as nearly three-dozen encounters which were either distinct, continuous by virtue of consistent proximity over time or both distinct and continuous. Even with so many encounters, many an agent continued to remain a non-eater, as its likelihood-to-eat score never crossed the critical threshold.

In the current paper, we wish to compare results, using a different method of agent parameter estimation. In the previous analysis, means of factors were used to define center of the distribution for random-normal assignment of scores-on-factors. In the current study, we are using multiple regression to estimate the center. The reasoning is encapsulated in the argument that factors tend to work in consonance with one another. A regression equation distributes factor weights based on consideration of factors involved. The reader should be aware that we are not using multiple regression here to generate a prediction model. We are using it as a rational means for articulating a more networked, wholistic expression of the phenomenon.

As mentioned above, we took beta coefficients and used them as proxy values for the center of distribution on each factor. We then estimated standard deviation based on that center.
These values of center and variability became parameters for the current version of the model.
As we hoped, there was gradual increase in number of eaters as a consequence of gradual conversion of some noneaters into eaters. Figure 2 shows a generalized change in number from noneater definition to eater definition ("slow" green line near bottom of plot).

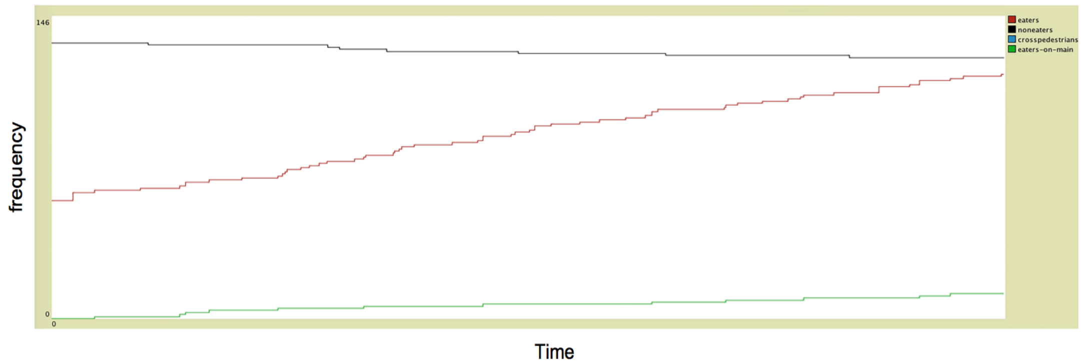

Fig. 2. Typical increase in eaters. Bottom green line is critical line.

Figures 3a and 3b depict more micro-focussed views of gradual increase in likelihood-to-eat scores of selected agents.

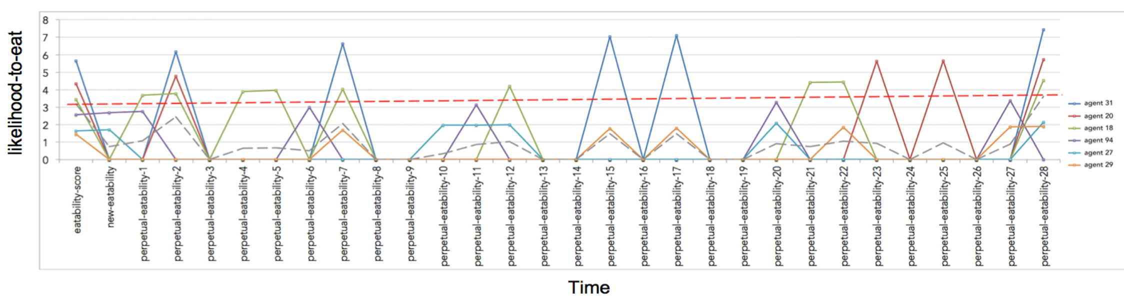

Fig. 3a. Increase in likelihood-to-eat score. Six selected agents. Dashed red line shows gradual increase.

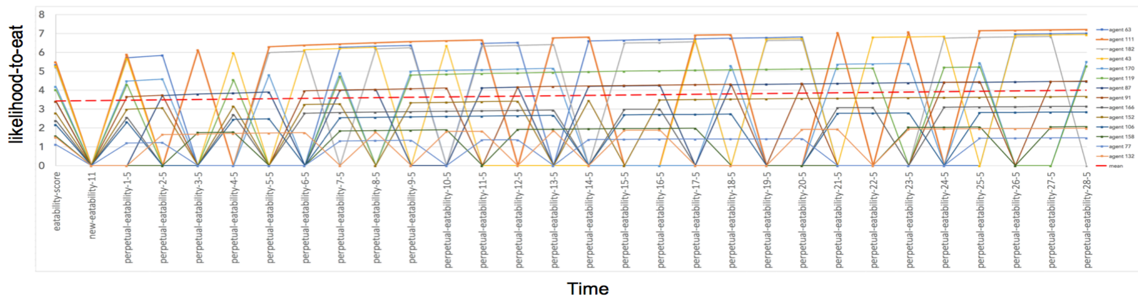

Fig. 3b. Increase in likelihood-to-eat score. Fourteen selected agents. Dashed red line shows gradual increase.

Results

Below, we present observed changes in eater-noneater counts as generated by the models. We conducted fifteen runs per condition. In order to test increase among eaters, we employed a Wilcoxon matched-pairs signed-rank test (including an alpha correction). We conceptualized each model world state as a variable with two observations: a before and an after. Each procedure (pre-, social facilitation, post-) was a unit/case. Table 1 presents some summarized data analysis from the earlier study.

Condition	Beginning eater count (15 runs each condition)	Ending eater count: Mean	Ending eater count: Median	Difference/ increase in eaters
S(0.15/0.5)+P(1492)+E(0.05)	9	31.47	30*	22.47
S(0.15/0.5)+P(1492)+E(0.10)	19	41.73	42*	22.73
S(0.15/0.5)+P(1492)+E(0.30)	57	76.80	76*	19.80
S(1.52/5)+P(1492)+E(0.05)	9	69.93	70*	60.93
S(1.52/5)+P(1492)+E(0.10)	19	77.07	78*	58.07
S(1.52/5)+P(1492)+E(0.30)	57	107.40	106*	50.40
S(3.35/11)+P(1492)+E(0.05)	9	32.60	32*	23.60
S(3.35/11)+P(1492)+E(0.10)	19	40.40	41*	21.40
S(3.35/11)+P(1492)+E(0.30)	57	74.13	74*	17.13

S (m/ft) = max. proximity of an eater in order to have effect (Multiply by 4.5 to get distance.)
P = street density (# of ppl. on street). NOTE: 1/4 P was used due to burden on model.
E = existing (starting) proportion of eaters on street
* = significant at .05. Test: Wilcoxon matched-pairs signed-rank test

Table 1. Results of earlier study. Mean used as parameter

We ran the same test for the same conditions during the current iteration. Results are presented in Table 2 below. All conditions showed a significant increase of eaters. None of the 95% confidence intervals per condition contained zero.

While increase in eaters is recorded in both cases, it is notable that increases in the beta-weighted conditions are more modest than those of the mean-weighted conditions. The former

are also more stable, more consistent about the increases.
Overall, we expected to see a systematic increase in number of eaters created as one moved from lower to higher S conditions (i.e. As allowable distance of effect of an eater on a noneater is liberalized, one expects a greater number of noneaters to be impacted). The pattern of increase observed was mixed – ranging across increase, slight increase, flat to slight reversal.

Condition	Beginning eater count (15 runs each condition)	Ending eater count: Mean	Ending eater count: Median	Difference/ increase in eaters
S(0.15/0.5)+P(1492)+E(0.05)	9	20.40	19*	11.40
S(0.15/0.5)+P(1492)+E(0.10)	19	32.07	32*	13.07
S(0.15/0.5)+P(1492)+E(0.30	57	67.60	68*	10.60
S(1.52/5)+P(1492)+E(0.05)	9	24.80	25*	15.80
S(1.52/5)+P(1492)+E(0.10)	19	32.27	32*	13.27
S(1.52/5)+P(1492)+E(0.30)	57	67.60	67*	10.60
S(3.35/11)+P(1492)+E(0.05)	9	24.60	25*	15.60
S(3.35/11)+P(1492)+E(0.10)	19	33.27	33*	14.27
S(3.35/11)+P(1492)+E(0.30)	57	68.40	69*	11.40

S (m/ft) = max. proximity of an eater in order to have effect (Multiply by 4.5 to get distance.)
P = street density (# of ppl. on street). NOTE: 1/4 P was used due to burden on model.
E = existing (starting) proportion of eaters on street
* = significant at .05. Test: Wilcoxon matched-pairs signed-rank test

Table 2. Results of current study. Beta as parameter

A curious succession, seen earlier in the older study, seems to have been largely mitigated. As one moves from the lowest "starting proportion of eaters" (E) to the higher proportion immediately greater, there is increase in new eaters spawned (visible in the last column of each table) – and that comes as little surprise. As one moves from the middle "starting proportion" to the highest, however, in the earlier set of results, instead of an increase once again in eaters created, there is decrease. In the current iteration, the peculiarity is visible only in the first triplet. We plan further exploration in order to be able to articulate a coherent explanation.

Conclusion

We explored a case of pedestrian behavior in the city street. We looked particularly at the case of pedestrians who might eat while walking. We enquired with regards to the effect of social facilitation on noneaters. Our model results suggested that, overall, the possibility exists. For modelling, we compared means of theoretical factors against regression betas. Both systems showed an overall increase in eater count, but the latter showed more modest gains.
In addition to the overall expectation of increase, we reported two critical observations. In the first, low to high S conditions were expected to yield higher new eater counts along that S condition progression, but current observations are mixed. In the second case, under the E conditions, we expected a higher beginning proportion of eaters to yield higher new eater counts. This happened as expected in transition from the first to second levels of E, but there

was a reversal at least once in each model. Among other things, these two questions suggest enquiries to pursue in further studies.

Implications for design.

The matter of eating while walking in the street is of interest to the designer and other managers of the urban context. A change of behavior holds potential of changing parameters of design and management.

As mentioned earlier, an example of a critical parameter of design that might be affected by pedestrian behavior is walking speed. Multiple factors which affect free walking speed have been identified in past research. They include, body mass, sex, culture, purpose of trip (e.g. going to the fair, as opposed to making a court appointment), circumstances of trip (e.g. casual sightseeing, opposed to a timed scavenger hunt) and air temperature (Chattaraj, Seyfried and Chakroborty, 2009 ; Johansson & Kretz, 2012; Wagnild & Wall-Scheffler, 2013).

In one example involving cultural difference, Chattaraj, Seyfried and Chakroborty (2009) compared free flow in a corridor space using an Indian and a German case. They found that density influenced speed once personal space (which they characterized as cultural) was taken into account. Speed was more dependent on density among participants in the German case than among participants in the Indian case.

Wagnild and Wall-Scheffler (2013) looked at speed choices of persons alone, with friends of the same sex, with friends of the opposite sex and, particularly, with a friend who is a "significant other." They found that, while men's optimal speed is generally faster than women's, when a man walks with a woman, he slows down in order to match the woman's speed. Speed was slowest when the woman was a "romantic partner." Wrote the authors:

> It has been suggested that dyad walking speed is correlated to relationship status....Thus, if male and female couples walk together, they may walk at significantly slower walking speeds than walking alone or with other acquaintances." (paragraph 4)

They added elsewhere that the degree of a man's accommodation to fit the woman's pace "is linked to the relationship status of the male-female pair, such that males will nearly match the females' paces only if they are in a romantic relationship" (paragraph 15).

A notable exception to the above is the case of a woman walking with a female friend, which recorded overall slowest speed:

> Previous work has noted that women report feeling extremely close to their female friends and here we show that women walk more slowly together even than they do with their Partner. (paragraph 15)

How might walking speed, for instance, be influenced by eating? While we do not currently possess extant data, there are logical indications. Barkley and Lepp (2016) explored the impact of cellular phone usage on walking speed. They examined cellular phone use conditions/ behaviours of talking, texting, partial use (i.e. one of the behaviours only over a portion of length of the observation space) and no use. Results indicated that subjects in both the talking and texting conditions "took a significantly ($p < 0.001$) greater amount of time traversing the walkway (i.e., walked more slowly) versus those in the 'no-use' category" (paragraph 11). They found no statistical difference between the talking and texting conditions.

Bosina and Weidmann (2016) recorded walking speed for different trip purposes. Between purposes of business, commuting, shopping and leisure, they found walking speed for leisure (1.10ms-1) to be slowest.

In the current study, we considered the case of people eating while walking. We speculated that eating, as other behaviors (such as talking on the phone) which demand some attention, is matched generally with a slower walking speed. We speculated that while there would be a range of walking speeds while eating, it could be as slow as walking pace for leisure, particularly since it is the case that, often, people eating are doing so at leisure.

The point in all this is not to assail eating in favor of more rapid movement of people along the street. The appropriate design response – and here is a critical, significant matter, a worthy lesson, a design realization incumbent on the designer – must consider experience of the city wholistically: i.e. at a grander, richer level of engagement and meaning. While a city is intended to work for commerce, it ought to be recognized also that the city is meant to be a ***wellspring*** and framer of experiences for people – and that includes core human pursuits encapsulated by related ideals such as enjoyment, pleasure, amusement, diversion, recreation and leisure. The perceptive, thoughtful designer recognizes that what needs to be pursued is the kind of probe that can proffer some insight into dynamics, ebbs and flows and mutations of behaviors that city dwellers might exemplify in their pursuit of pleasure and happiness within the city.

Landscape deepening: Contemplations on augmenting value of landscape

Scheuch (in Godbey, 1976) introduced the term, "time deepening" (an analogy of the economic term, capital deepening), to frame an episode of performing multiple tasks simultaneously in order to fulfil a greater number of personal needs or desires and, by that, using time more efficiently. We extend the analogy to landscape and space. We propose that people heighten experience of landscape by performing more actions that go beyond merely looking at it. For instance, we add ***movement through*** landscape and thereby accumulate points of view (and appreciation) of it. We test aspects of landscape by provoking our encounter with them through probes by senses other than visual. We re-mould landscape by co-insertion of self in it conjointly with other people. We re-plot, re-conceptualize or model a cognitive map of landscape by allowing ourself to be seduced by landmarks to which we are drawn. In all these engagements, we ep-aestheticize landscape. We re-mobilize landscape through intensification or magnification of our affective relationship with it. Inertia is decoupled from discovery of landscape. Landscape is "dynamicized." In short, we ***deepen landscape***.

Some of the most deepened experiences of the physical and social landscape have occurred, for us, while eating and walking. Complementarily, experience of food has also been characteristically enjoyable – but in a paradoxically pervading, yet uncentered-on-food or unkeen-about-food way. The experience simply reduces physicalness of food into an aura or an impression of pleasure.

Eating, however, is not the point or the question anymore, as it dissolves into delight of landscape and landscape, in turn, percolates into taste to co-author a new, blended form of emotional substantiality. Aesthetic [or experience] of landscape amalgamates with experience [or aesthetic] of taste. Landscape becomes an indulgence.

Charm of landscape assumes perceptible embodiment in association with delectabilities served by the palate. Landscape is tasted.

Harris (2005) revisited the idea of ***adding value*** to goods and experiences we consume. Value is evinced and assimilated during the process of consumption. Sometimes it is a result of predesign into the good or experiential offering. At other times, value is a fluid, spontaneous outcome. Tschumi (1994) has recounted the idea of experience of urban landscape as one set eminently in the frame of ***movement*** – across space, across events. While walking and eating, value is added to both landscape and food.

There is a space where discourse on ***pleasures*** (Harris, 2005) can be carried out without retreat to externally-defined (and sometimes non-evidentially-robust) behavioral hedges, without the smother or strangulation of thou-shall-nots, a pure space where aesthetics, hand-in-hand with experience, is the lingua franca and where possibilities of genuine experiences can be honestly and authentically explored.

Future directions

There is still work to be done. It was mentioned above, for instance, that pattern of the S conditions (eater proximity) was mixed. More model runs will need to be carried out in order to identify more stable outcomes. Above, we also discussed some curious increase-decrease transitions under the E conditions (eater starting proportions). That is another enquiry which merits further exploration. It will be insightful to be able to conduct more model runs with a higher population density. In the current explorations, we have been compelled to employ only a proportion of desirable population. Running models with larger population densities require considerable computational power. That is a significant challenge. Finally, it will be instructive to collect a range of additional data on walking while eating – for instance, data on the effect of eating on walking speed. In relatively unexplored areas of enquiry, it is often the case that multiple questions and issues arise, but those also open up avenues of research and discovery.

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