EDITED BY
ULYSSES SEAN VANCE III

BEYOND HEALTH CAPACITY

Spatial Practices in Inclusive Design

ROUTLEDGE

BEYOND HEALTH CAPACITY

Beyond Health Capacity: Spatial Practices in Inclusive Design sheds light on the systemic challenges communities with limited access to medical support and health maintenance have endured. It emphasizes how approaching medical interventions through non-traditional health facilities can positively impact health's social and environmental impact. Health capacity is an emerging consideration for optimizing a building design to meet health criteria based on physical, virtual, historical, or social space. These emerging practices can be focused on by interrogating the role of planning, construction, and urban design in addressing public health needs, alongside considering access and social justice as an agency in design. This book reflects on past and present efforts interrogating the practical application of inclusive design practices in resolving the spatial challenges of health reform.

By focusing on examples experienced during the pandemic and after, each chapter offers an overview documenting these experiences as approaches to these new competencies, reimagining urbanism around health, and proposing new criteria for the future of healthcare.

This book is essential for students and practitioners working in architecture, community planning, urban design, landscape architecture, and public health.

Ulysses Sean Vance III is an Associate Professor of Architecture in the Tyler School of Art and Architecture, Temple University. He is a licensed architect, educator, and design researcher focused on inclusive design practices.

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Routledge
Taylor & Francis Group
NEW YORK AND LONDON

Designed cover image: Shutterstock

First published 2025
by Routledge
605 Third Avenue, New York, NY 10158

and by Routledge
4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

Funding for the Open Access version of this book was provided by Temple University through the Office of the Vice President for Research, Humanities and Arts Research Program (HARP) and the Temple University Tyler School of Art and Architecture Dean's Grant Fund.

ISBN: 9781032879956 (hbk)
ISBN: 9781032879949 (pbk)
ISBN: 9781003535768 (ebk)

DOI: 10.4324/9781003535768

Typeset in Optima
by codeMantra

This book is dedicated to Lilu and Ziui, who have waited ten years for me to finish it.

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Vance is a recipient of the inaugural American Institute of Architects Academy of Architecture for Health HBCU Fellowship, a fellowship developed to foster collaboration among healthcare stakeholders to address health inequities.

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ACKNOWLEDGMENTS

As an architectural professor, I am motivated by my study of how people interact with their environment—working extensively to expand the role of physical equity and inclusion in design. In developing a discourse around interaction and healthful inclusivity, I have worked with many organizations, institutions, and phenomenal people who have informed my work and helped support its pursuit. As such, I would like to acknowledge the North Carolina State University Center for Universal Design and the North Carolina Division of Vocational Rehabilitation, who supported my earliest investigations of housing and the need to address the narrative of disparities resulting from negligent institutions. These early investigations of universal design concepts for human occupancy and occupational work zones completed with Dr. Sharon Joines at NC State University were paramount in defining my interest in promoting an ergonomic approach to spatial practices.

My work has evolved as a result of the opportunities to collaborate. As this book narrates, I have found that the vocabulary of different disciplines involved in a participatory process increases the spectrum design can serve. The broadening of my perspective, particularly regarding health spaces, is directly attributable to my transition to the University of Michigan's Taubman College of Architecture and Urban Planning. My research, service, and creative practice have benefited significantly from my time at this research university. I have studied the context of adolescent patient care and thereby offer designs for improving the physical space of patients and their families during hazardous medical procedures. I have studied emergency response systems and the relatedness between the equipment, the shelter, and the people they serve. My work has also advanced the capability of educational environments to deliver a total wellness experience by considering the extent to

which students are limited to sedentary activities, which may result in a range of health issues, instead of healthy curricular activities throughout the school day. The opportunity to meet with professionals across many health and healthcare disciplines and discuss the critical connections in our research has contributed to exploring new territories not previously aligned in my teaching of architecture. All of which I am grateful to Monica Ponce de Leon and the support of programs she initiated, such as the Research Through Making seed funding grant that supported many of the ongoing research projects discussed in this book.

The research opportunity to work with colleagues from the University of Michigan Medical Innovation Center afforded me a more practical approach to controlling the place of occupational work-zone interactions by investigating the effect of space on the recovery and wellness of the patient, visiting family, and caregiver. Together with a team of engineers and entrepreneurs, we regularly discussed the challenges of different medical environments and, as a result, developed a mobile understanding of the patient room, which led to the Cancer Care Unit Isolation Cart (ISO-CART). The design was a result of collaborative work that would go on to be published by the American Pediatric Surgery Association (2012) and to win the Sheikh Zayed Award for Pediatric Surgery (2012). More importantly, my partnership with Dr. Gregory Yanick and Dr. Sabina M. Sadiqqui led to many research conversations and collaborative learning opportunities that empowered my scholarship and teaching.

I would also like to acknowledge the support of the University of Michigan MCubed funding initiative that created the partnership with the School of Kinesiology, School of Public Health, Momentum Center, School of Education, and Project Healthy Schools initiative, and, in particular, Dr. Rebecca Hasson, a devoted leader in improving well-being in elementary schools. The joint efforts with Dr. Hasson as the InPACT and Active ClassSpace Projects are the best examples of working collaboratively through discussions on physical equity in a confined environment. The work has resulted in multiple coauthored articles published in academic and professional journals such as the *Translational Journal of the American College of Sports Medicine*.

In transitioning to Temple University, I would like to acknowledge the Office of the Vice President for Research and the Tyler School of Art and Architecture for the gap funding to develop and advance the consolidation of ideas presented in this book. I would also like to acknowledge the AIA Philadelphia Design Philadelphia Festival for hosting the Informal Health Symposium. Temple University, Tyler School of Art and Architecture has supported my continued interrogation of inclusive design and the application of its concepts in urban environments. I am incredibly thankful to my current research partners, Sally Harrison and the faculty of the Urban Workshop Group, as we continue to advance the need to address social impact issues through collaborations that engage underserved communities.

INTRODUCTION

Ulysses Sean Vance

Health has quickly become a key focus in architecture as a design practice, offering multiple instances for deeper integration and clarity within architectural inquiry.[1] Architectural inquiry, or production as commonly practiced, refers to the different types and phases associated with designing and implementing facilities suitable for hosting specified activities.[2] In healthcare, this involves building hospitals primarily to provide access to healthcare, seconded by the building of health centers providing support to a central medical facility, and lastly, the ability to maintain care through continued visitation. Beyond the hospital, health capacity takes on a new meaning in these contexts: access, support, and maintenance of health, redefining healthcare. Additionally, in the context of design beyond the hospital, the architecture of health emerges as an operative measure where perception shapes, occupation defines, and materiality grounds the relationship between extended medical space and non-medical territories.[3]

It is important to recognize that health, while widely discussed in architectural design practice, is not immediately comprehensible in architectural terms. Qualities of life and space that contribute to the expectations for wellness were attributed to personal health as matters of hygiene and disease transmission until there is an event when persons at higher risk for disease transmission become an isolated vector. Still, their admonishment in social settings and toward public health avoided association in architectural practice until the events of the recent pandemic. As a result, research metrics have begun associating atmospheres derived from the shape and quality of disease transmission in spaces as measurably impacting individual and community health improvement.[4] While postulation from the earliest derivatives of modernism asserted that architecture and architectural interventions could

DOI: 10.4324/9781003535768-1

affect your health, rarely was the impact of such associations comprehensible as architectural associations of land, volume, and the fluid choreography of atmospheres as bodies in motion.[5]

In architecture, the common disposition has been to address preventing illness and disease through isolation.[6] The default creates issues based on the capacity to provide support and maintain the enclosure in quantifying the amount of communicable disease and illness contained within. This is partly due to the premise that the role of architecture is to shelter by enclosure and containment, and until recently, the large data sets and the ability to parse through the data were initially too daunting for the scale of computing alone.[7] Entering the 21st century, the development of dynamic geometry software evolved to assess the presence of volume as a physical entity. This advancement allowed for the evaluation of instinctual responses based on measurable outcomes, linking health-related metrics to capacity building in computational design. This connection has led to compelling discussions about how volume and atmosphere relate to medical practices and their broader implications for health outcomes. As this area is still emerging, very little is known, and even fewer are the transferable measures for positioning health capacity as a theoretical basis for research in architecture.[8] An inquiry into capacity, in architectural terms, assesses factors such as volume, area, heat, occupancy, durability, and load, all primarily related to material properties. The fundamental objective is to determine the amount of force from a source that can be contained or mitigated. .[9] The cognitive interpretation of capacity in architecture is the discussion of capacity as shifted to engagement, adaptability, legibility, safety, and comfort. The link between physical and cognitive assessments forms the basis for actionable intentions in implementing inclusive design, which enhances how individuals act and interact within spaces as a method of architectural inquiry.[10]

As with most architects, working toward a solution is related to the building as a manifestation of assigned space enclosed by roofs and walls. To expand the role of this process in making a building explored in such a manner as to amplify the role of inclusive design in defining its elements is the creation of equitable conditions for architecture on the whole. The use of inclusive design to study constituent parts that are interrogated to carry a more significant sense of worth performatively combines many issues, from aesthetics to resilience and cultural heritage. In isolation, these performative measures may carry specific intentionality to their exploration, which in the context of health is as varied as the particular elements themselves and how they might perform relative to a definition of intention in medical care. Therefore, in the context of this book, the intent of discussing architectural production as connecting these resonant parts while also connecting different phases to a process from conceptualization through fulfillment is one of many viable ways of working through a segment of an inclusive design process reframed

as architectural inquiry. Pivoting to architectural inquiry involves focusing on the subprocess in a project's architectural phasing, specifically on space planning and programming.

The space planning and programming of architectural components involve measuring the magnitude of an architectural intervention, which is explored more directly later in this book. The steps in this background research and development process include assessment, capacity building, analysis, implementation, evaluation, and feedback in a repetitive loop called an iterative process. During these iterations, new ideas are reasoned by comparison with the previous concepts to modify the current idea in the next iteration of the ideation process.[11] Critical inquiry at this stage benefits from research into how each step in the space planning process is informed by an inclusive design approach that incorporates communal empathy based on collaborative exercises to define, develop, and prototype implementations from participatory processes.

Unique to the emerging conditions of contemporary architectural design for health is the involvement of medical personnel, who actively serve patients as a source of feedback to the medical process. Additionally, these participatory processes involve community members who are not actively patients but whose input is related to the facility's ability to deliver healthcare to persons near the proposed intervention. The collective agency of these participants is redefining what constitutes a client, as the previously hierarchical hegemonies of hospital administration were questioned for their inability to fulfill the needs of one or more of these new participants. As a primer on what involvement personnel, patients, and community have throughout the newly expanding participatory design process, this book looks to inform a larger audience of interest and clarify strategies to examine the success and sometimes failure of addressing health through the physical design of space and buildings.

As a field of thought, the conceptualization of working on health beyond the prevention of illness as a component of building design is emerging, and the framing of this work as health capacity is not to limit the output to predictive measures. Instead, going beyond health capacity is capturing interests from parallel disciplines, assessing constraints and clarifying strategies best resolved through imaginative storytelling. As an emerging field of inquiry, health capacity is broad, and these discussions are selected to frame a fragment of architecture's viable role in articulating the structure of collaboration and, consequently, partnerships with medical disciplines for care beyond procedure.

What Is Health?

Health is superficial and profound, fundamental, and yet glamorous. Health is recognizing bodies, space, and the opportune moments of life experienced together and apart. Health is being critical of personal concerns, giving

credence to signs of advancing stages of disease or dilemma.[12] Health is reflexive, and in shared situations, the totality of health is beyond comprehension. The perspective of health is framed by the experience in that space, with the encounter of the enclosure framing the perspective of space as an embodiment of the perception of health for that space. Encounters such as these affect the memory of a healthful encounter. They may serve as a reminder of concern, amplified by our engagement in confined spaces or synthesized into the distances between persons when encountering health as a construct of the built environment.[13]

The illusions of health as a utopian safety, as presented by Dubos in *Mirage of Health*, primarily associate the social patterns of health with illness and disease, which continue to shape the spaces that frame social engagement.[14] Even now, in a new space age, the unfamiliarity in reaching outwardly from the bounds of the earth's thin surface to that which was once the heavens is limited by the perceptions of health in that space and harkens back to the ancient bereavement of fragility against the more fantastic unknown. In many ways, the most extreme fragilities of life have unjustly affected the common perception of health. Even more so with emerging technologies contributing to a greater understanding of what makes the human body vulnerable, the prevalence of diseases, from leprosy to tuberculosis, and today, with SARS and COVID, the negative impacts of perception on health far too quickly confuse comprehension as there are so many misconceptions about what it means to mind individual health in the context of rapid urbanization.[15]

Among health's earliest definitions, history commonly refers to health in a functional sense to help clarify the misunderstanding. Incorporating the attitude that health results from the reality of existence and that parallel instances of health, even for a global event, put forth similar reasonings for health as determined by context.[16] So common was the reverence for projecting a negative characterization that even a bill of health, contingent on one's condition, could free a debtor from prison, as in formerly Scots Law.[17] The most extremes are those perceptions attributable to war, as war truly challenges the sense of health and wellness and, with the act of surgery, the chance for survival. Given the magnitude of peril oft associated with war, the parallel between changes in the definition of health and the timing of wars validates the consideration that the human capacity for understanding what ails the body, mind, or spirit can only honestly present itself with clarity when under demise. The realization that health is so frequently portrayed by illness, or absence thereof, as opposed to wellness brings about the first consideration of this book, by which the spatial sensibilities of health will be framed. First, in the ability to perceive health, then as a state of being, an act and territory of said acts, through to finally, a conceptualization of health as a capacity. From this perspective, this book will reason going beyond health capacity as a matter of spatial practices in inclusive design.

Health as Perception

Health, with its many interpretations, is primarily a matter of perception. Over the centuries, it teetered between a matter for mystics and then the medically astute, treating both health and the ability to perceive health as immediate to the well-trained. The clarity of that training offered the ability to declare "a clean bill of health" or whether a patient was "at death's door." While many of these euphemisms are not a direct correlation, examining the common societal perceptions of "a picture of health" is one way to determine the social ramifications of its influence on culture. What is intriguing is the pervasiveness of these perceptions and their influence on the cultural definition of human health, as euphemisms have become more mainstream in defining culture and experience. Terms such as "feeling blue" or even "breaking out in a cold sweat" are ingrained in the presence of arts, entertainment, and culture, as if "death warmed up" or at least accepted the prevalence of health in the context of culture. The application of these expressions, the narrative meaning of health, begins to migrate into other contexts, and the primary objective of this text is to discuss its prevalence in architecture and its relevance in defining the built environment. From issues of rapid urbanization due to increasing populations to the depletion of resources and the overcrowding of cities, health and its compatriot wellness are now more readily part of the discussion regarding the progressive definition of architecture. Whether tangible or intangible, the idealism of architecture is its willingness to account for the creation of a better-built environment. Many of the questions architects have regarding health policies and procedures rely on the equitable advancement of understanding how architecture protects vulnerable populations, and within these contexts, this book will interrogate the plausible priorities in resolving what health is in the context of emerging architectural practices.

At the turn of the last century, the aspirations for emerging technologies to redefine health globally, created by increased access to information, communication, and medical resources, challenged the readied approach to delivering healthcare and, correspondingly, obtaining wellness and well-being.[18] Mediums, such as telecommunication or telehealth, are readily advancing the bounds by which medical care can be rendered, creating new challenges to policy, as in the changes to Title II of the Americans with Disabilities Act to meet the accessibility needs in these networks with the increased capacity. New media in imaging and diagnostics will continue to change and challenge the interrogative capacity of even the most remote applications in medical issues, and the introduction of quantum processing and comparative computational reasoning will give medical capabilities to each device.

Even with all the advancing technological wonderment, many are still far from receiving the basic needs of primary care. The push toward emergent technologies in medical practices has created new disparities in many ways. Still, some old disparities founded on persistent matters of bias and the

perception of healthcare related to the core premise of primary care as an institutionalized act challenge the availability and acceptability of healthcare as distributed within any given societal construct. As with many infectious diseases, the fear of illness and disease, and even of deformity or the hypertrophic and keloid scarring associated with healing, causes biased reactions when encountered in different spaces, and these perceptions translate into physical and social distancing, which was even formalized during the recent pandemic.[19]

Health's Post-State Status

Health and wellness are finicky subjects for architects to discuss at the scale of infrastructure. Health, commonly known across multiple definitions, started almost precisely where it exists today as an act of personal awareness determined by environmental concerns. Hippocrates, in or around 400 BCE, established the qualities of the environment as a recognition of the importance of ecological conditions, matters "On Airs, Waters, and Places" and their influence on human health. While seemingly passive, this first text also astonishingly invokes the importance of natural resources and their impact on sanitary control in maintaining agriculture and living conditions appropriate to the amassing of people and building on centuries of knowledge and understanding, advancing health as a state, a perception, and even a representation of humanity.[20]

These ancient comprehensions of sanitation continued into and across the next century's influence on urban planning and disease prevention as the "*humours* in the circulation of the body" became more influential over the perceived impact of a metaphysical presence attributed to the weather and the position of bodies greater than that of individual health.[21] Yet, the understanding of sanitation and, conversely, the stagnation of resources inform the concept of health as a spatial practice by referring to these foundational narratives from Hippocrates and others. Similarly, current practices describe the spatial impact of health conditions and relate the environment to the health and wellness of any territory, whether for the impact on agriculture and the ability to produce food or in the convenience of planning a day's activity based on weather that recognized the environmental influence on health.[22] The dynamic nature of a changing environment and the conditional fragility that renders vulnerable any population, no matter the preparedness, speaks to the criticality of a resilient ecology in discussing the changing comprehension of health. In this sense, the significance of weather and the environment is relative to the context and the redundancy in capacity needed to recover from a cataclysmic event. In ancient times, these were ordinary weather changes related to the fragility of agricultural practices. However, in the current context, with climate issues from flooding to drought and extreme happenings at

the continental scale, the impact is felt across once-distant communities and people who now are collectively impacted by increased transportation and the ability of diseases to travel more quickly over considerable distances.[23] The increased connectivity impacts the ability to remain resilient against diseases by building immunity over time.

These more significant changes and challenges rewrite and remap the definition of health. The 18th and 19th centuries brought both industrialization and war, creating vast new cities from the gathering of people in the making of things.[24] These new cities also brought about poor living and working conditions and, subsequently, more concerns about the betterment of people in these conditions and, correspondingly, their health.[25] A common reference on this matter that is often discussed in the teaching of architecture as it relates to health and well-being is Edwin Chadwick's *Report on the Sanitary Condition of the Laboring Population of Great Britain*, which in context are observations culminating 20-plus years of observations across the middle of the 1800s. Chadwick's position that poor sanitation was correlatingly tied to the increased presence of disease in cities called for the proper removal of sewage in cities and the need for clean water, rekindling the cornerstone expressions of Hippocrates in the context of modern 1800s cities such as London and the unsanitary conditions of the working class across Great Britain.[26]

Chadwick's positional report would later be reinforced by John Snow's definitive establishment linking cholera to contaminated drinking water. Through the mapping of deaths from cholera, Snow's work fundamentally founded urban design on forensics through the evaluation of conflict resolution as his assessment. He was able to locate the generation of the disease through the interrogation of water samples to determine from forensic science the source of the contamination, defeating the previously popular beliefs on the genesis of cholera as a matter of "bad airs." The success of these findings strengthened the association between sanitation and health as a pillar of scholarly discourse. It established the territoriality of health for the next 100 years by mapping cities to track disease removal.[27] Analytical mapping of disease would last well into the 20th century, taking another significant war and industrial leap with the advent of the X-ray, followed by that of the personal computer to modify perception and, subsequently, state of affairs defining health.[28]

Between 1945 and 1948, multiple countries from around the world worked to agree to organize around the conceptualization of health improvement.[29] In 1948, they formed the World Health Organization as part of the newly formed United Nations.[30] In establishing the World Health Organization, they defined the parameters they could collectively work to improve. These discussions were foundational in the development of modern health, leading to the conceptualization of formal public health. Far beyond the ecological wastelands of 19th-century London, health in the 20th century developed as

matters of perception, representation, policy, and even agency, underscoring the need to transition from sanitary acts to disease prevention and advance a new conceptualization of health promotion.[31]

The World Health Organization defines health as a state. However, health is often exhibited as an act through behavior and the promotion of priorities, both literally and metaphorically. As a state, health can be understood as a figurative description of a condition or situation. The use of "a state" in this manner is interpreted, at least in the context of this writing, as a comparative with "society." In addressing the social aspects of health, it is helpful to interrogate "health is a state" as determined by its limitations in dynamically adapting to a social context as a spatial construct. Pursuing health for its complexity beyond a person's individual biology and relating it to something more broadly contextual establish health in the public sense with something familiar at this more considerable reading of scale in terms of health and our relationships with one another.[32] Likewise, in his discourse on society, Edward T. Hall argues that health, or at least its perception, is a living, evolving entity shaped by the interactions and experiences of its members. Societies can be small, and rural communities can be large. Both are urban metropolises shaping the spaces of health. Within them, societies also can be dynamically adaptive, whether hierarchical or egalitarian, as they can be open or closed to outsiders. Societies, in gathering, define their existence through space. From the perspective of existing in groups, society can be described as a structured community of individuals who share common norms, values, and behaviors. These shared elements create a sense of belonging, identity, and mutual obligation that, within the context of a mutual commitment, exist beyond the individual state of health.[33]

Health Is Territorial

In 2015, the United Nations convened to establish the Millennium Development Goals, and of the eight goals that range from eradicating extreme hunger to ensuring environmental sustainability, six are dedicated in some form or fashion to addressing Public Health. As a blueprint for improvement, the document in review reflects the challenges still prevalent some 70 years later. The six distinctions also express the global challenge in addressing health. Beyond the civic, the medical, and the institutional depictions of health, there are even more specialties and levels of care.[34] In determining a practical approach to addressing directives, the UN MDG in action and the role of architecture working at capacities addressing global issues invites the plausibility of scale and reduction of size to interventions associated with procedural practices in healthcare that also are capable of being networked solutions. These reasonings of scale benefit from the previously mentioned new technologies whose integration has a recognizable impact, increasing the connection between medical professionals and patients in remote instances.

The first factor in retooling the scale of public health goals to actionable intervention involves translating from an institutional theatre considering healthcare as an industrialized device to that of a domestic scale working at and helping define community. These redefinitions began before the pandemic. However, the pandemic increased the speed of deploying certain elements, such as telemedicine and virtual healthcare. The benefits of early deployment can be seen through the inclusiveness of medical support away from the hospital through community hubs connected to health centers and integrated into a health network, allowing many to operate well after the closing of emergency support related to the pandemic. The instrumentation of care that the hospital once defined as a larger institution has become more domestically oriented, fostering a different landscape of institutional care in domestic spaces. Introducing new challenges where existing infrastructure is not yet ready to support medical activities in domestic space or part of public infrastructure. In particular, those services were traversing new connections between patients and the increasing autonomy of healthcare delivery operating via emerging technologies.

Health as a Capacity

Currently, discussions of technology are moving outward from medical procedures made possible through devices to interventions at scale across cities and regional connections across countries. In restructuring the sanitation city concept from Chadwick and Snow, there is a need to address the growing global waste challenges, particularly those associated with medical waste. In 2020, the pandemic highlighted the inability to predict and respond to emergency health events. Amidst the public concern for access to healthcare was the burden of a domestic response at the scale of civic infrastructure, particularly the inability to maintain municipal services like sanitation. The general public typically associates wellness, well-being, and recovery from illness with hospitalization, and the hospital is the primary resource for personal health in urban areas. As the reliance on centralized services moves to individual health practices, medical wastes are transitioning from institutional support to domestic infrastructure, which is unprepared for the increase of biomedical waste.[35] Likewise, when these systems falter, personnel are expected to continue to facilitate the burden of services even when overcapacity occurs. As with most decisions post-pandemic, the capacity of public health services, particularly those of sanitation workers, came under heavy scrutiny.

Health is a place and, therefore, has a capacity. The modern interpretation of health as a mutual obligation of wellness but also to infrastructure impacts the corresponding reimagination of health space as an architectural problem. It reinforces the growing importance of social gatherings in determining health space. If health is a transition beyond a state, it is dynamic

and, therefore, spatial, so it is surmised that redefining health has capacity. These factors are crucial in determining a society's capacity to support these new conceptualizations, which parallels its ability to achieve health as a primary goal and objective. Posing this theorization in the field or discipline of architecture warrants investigation into how to represent health and, correspondingly, health capacity. Post-pandemic, people continue to attend to their health concerns independently, in domestic spaces more than institutional spaces, with a doctor of their choosing.[36] For people who are more often than not subjected to regulatory exclusion and prone to dealing with illness by shutting themselves inside their home until the condition subsides, a doctor who meets them on their equal ground represents a stark change from the institutional system that typically requires patients to navigate their way into the sterilized conditions of a healthcare facility. The crowds expressed no impatience even when waiting in the rain, with no provider guidelines. Oddly enough, there was something quite comforting about this pandemic-born shift to healthcare delivery in new environments, where hymnals and air hugs might be more expected than healthcare. Even the magnitude of the situation, a single event upending the hegemony of medical institutions, was almost unfathomable until it happened.[37] When it did, questions roiled every dimension of life. Still, healthcare being the prime effort to fight the virus's impact made it seem as if the pandemic had finally made public health relevant after years of policy and procedures dominated by proprietary concerns.

In an era of constant information, data, opportunity, and conflict, the definition of public health agreements is pertinent to establishing any sensibility to be made for the betterment of society, determining the capacity to develop defensibility against disease in the same space as enjoyment of people together without usurping the tenacity of community born from all that has transpired. And, while as logically mindful as these reasonings of contemporary society may seem regarding the importance of public health and infrastructure, the measuring of capacity creates yet another redefinition of architecture to understand the contributions of each part of health as a state, an act, and a capacity of beings as much as it is the setting for the whole.

Health as a Spatial Practice

The study of health capacity involves the planning and programming of these various systems, each by their respective disciplines, working separately toward a common whole. In creating an intersection of economies capable of achieving a diversity of scales for engaging health, each discipline will need to be dynamically adaptable to the enablement of new infrastructure and the disruption of perceived autonomy, which, in the discussion of wellness across a city, a region, or continent still depends on institutional resources predominantly defined by time to location. In this capacity, health

and wellness are an embodiment of the territorial boundaries to health, which is an intriguing realization of architectural systems operating at any scale as the critical avenues that bring about a wider field of view on the distribution of healthcare across populations is still reliant on assurances resources can be made available. The complex task of relating capacity to access, support, and maintenance of health involves as many metrics related to services and systems as the constant evaluation of infrastructure associated with the logistical placement of said resources and the fluctuating definition of global territories.

As a spatial practice, some interesting connections can be drawn between the territories of access, support, and maintenance that are not explicitly reliant on need while playing a significant role in fulfilling the aspiration of providing means for transitioning away from traumatic events. The capacity of an architectural intervention to render access and support the ability of individuals or groups to obtain health services and resources and seek help from trained persons in facilitating care depends quite heavily on the ability of a system, municipality, or society to maintain infrastructure that can withstand disruptions. Understanding and applying a framework of assessments that define, determine, and interrogate the systems through a participatory process is one way to establish the crucial connections for ensuring the measures provide resilient and reparative responses to conditional challenges unique even for neighboring communities.

Overall, this book is a call to action from a body of voices actively working through some aspect in extending the role of one or more constituent parts of health capacity as space for inclusion in the face of meeting these challenges. This book interrogates the viability of practical applications of inclusive design in resolving the spatial challenges unique to expanding health at scale and in practice. The voices contributing to these developments come from various disciplines, each committed to informing narratives and reimagining the relationship between health, healthcare, and the built environment.

Notes

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1

INCLUSIVE DESIGN

Ulysses Sean Vance

As with any endeavor, research or otherwise, it is good to begin by clarifying intent and defining terms and terminology, as language has a subtle yet powerful way of shaping the concepts it conveys. In examining Inclusive Design closely, there are nuanced distinctions between its distinction as noun, adjective, verb, and adverb that deepen an understanding of its applications in the context of the state and action of topics like health, as discussed in the Introduction. The term "inclusive" exemplifies this phenomenon, where the common root "include" gives rise to a meaning shared with its etymological equivalent yet diverges in purpose. "Include," a verb, refers to containing something within a group or set, signifying an addition to an already existing entity.[1] For example, when a hotel mentions that "the price includes breakfast," it simply states that breakfast is part of the offered service. "Inclusive" transforms this idea into an adjective with a broader, more socially meaningful implication. The term "inclusive" describes an environment that actively encompasses all individuals, striving to involve everyone and create a sense of belonging where all are valued and respected. An "inclusive workplace," for instance, does not merely allow entry to people from diverse backgrounds; it cultivates a setting where every individual is encouraged to contribute fully, free from barriers related to identity or difference. Thus, while "include" and "inclusive" originate from a shared linguistic root, their meanings underscore distinct approaches—one adding, the other welcoming. Recognizing these differences is essential, particularly when fostering environments prioritizing equity and belonging.

The word "design" shares a linguistic heritage with "designate" that reveals an intrinsic connection between the concepts they represent in the context of inclusive Design. Both terms stem from the Latin root "designare," which translates to "to mark out, point out, or designate." Despite their shared

DOI: 10.4324/9781003535768-2

origin, these words diverge in application and scope. "Design" encompasses the broader act of envisioning and planning the creation of an object, process, or system.[2] It involves shaping the form and function of something with intention and foresight, as one might in crafting a building's layout, structure, and purpose.[3] Conversely, "designate" refers to specifying or appointing something or someone for a particular purpose, thus selecting and assigning a defined role within a broader context.[4] While "design" is about establishing the overall purpose, "designate" focuses on selecting specific elements to fulfill that purpose. Both terms underscore a relationship between vision and choice, revealing how focused actions—designing—operate within the grander framework of Inclusive Design.

The term "Inclusive Design" merges the principles of inclusion with the creative and intentional practice of design, forming a concept essential to contemporary architecture. Inclusive Design extends beyond merely accommodating individuals; it seeks to create environments that actively support and empower diversity, ensuring that all feel welcome, valued, and able to engage fully with the space. While "design" involves envisioning and planning elements of form, function, and purpose, "inclusive" emphasizes an open, equitable approach that integrates varied needs and perspectives. Together, "inclusive design" reflects a commitment to designing spaces beyond accessibility to foster a sense of belonging and respect. This approach is especially significant in architectural practice, where built environments can impact people's experiences, emotions, and well-being. Exploring Inclusive Design in architecture invites a broader discourse on how spaces can be thoughtfully crafted to accommodate and celebrate diversity, promoting functionality and a more profound sense of community and equity.

What Is Inclusive Design?

Inclusive Design in architecture, particularly its application in architectural inquiry, is a way to interrogate concepts during architectural production addressing various interactions.[5] It will often have a specific application, such as in health for underserved populations, allowing the focus to define the parameters and criteria for applying various methodologies. In establishing a spatiotemporal narrative from Inclusive Design, incorporating parameters like universal design principles or applications, such as those provided by the Facility Guidelines Institute, act as the foundation for variables serving broader needs. Inclusive Design as a framework prioritizes criteria from the broadest comprehension of community for a project when designing everything from objects to buildings, even interface with its expanding sense of reality through digital content and virtual devices. In Elizabeth Burton and Lynne Mitchell's book *Inclusive Urban Design: Streets for Life*, they outline six such criteria while working with inclusive Design (safety,

comfort, distinctiveness, legibility, familiarity, and accessibility), which they see as reinforcing their social model for incorporating an extended spectrum of life in consideration of designing urban space.[6] Similarly, this research addresses these six criteria. Recognizing these as a potential base, it expands the narrative by incorporating digital design approaches, adding engagement and adaptability to discussions of occupational use associated with medical personnel and patients.[7]

The primary concepts of inclusive design Burton and Mitchell outline give agency to the shared conceptualization of space, place, and time between subjects as noted about perception in *The Hidden Dimension* by Edward Hall. Applying these theoretical models of spatiotemporal perception, such as informality, openness, and justice, to physical and material challenges of building social infrastructure, the conceptualization of inclusive design is an intermediary of measured difference and cultural expectation. As Burton and Mitchell point out, the applications contribute to urban issues while framing social solutions by being mindful of their cultural impact. Advancing inclusive design concepts that focus on providing health facilities in communities with incredibly diverse urban populations as the sub-focus for this book includes validating a cultural understanding as part of discussing health and the human factors associated with being healthful. The earlier introduction of these concepts helps improve communication across a participatory process. While the similarities between healthy and healthful are apparent, subtle differences in the heritage of language associated with these terminologies for different communities can create confusion when considering animate versus inanimate objectivity in sorting data from a community design process into digital production, which could then translate to the wrong outcomes for personal wellness. The initial premise of this chapter is to expand on the understanding of Inclusive Design to help clarify the terminology when working in architectural production, examining spatial logistics in a manner sensitive to the participatory process. The value of the clarification is in its application for interrogating concepts like the anthropological understanding of community demographics and connecting these measurements of people's behaviors across cultural solutions that impact space design. Considering architecture, in a similar fashion, as it relates to a digitalized understanding of health space, separate from inclusive Design for health culture at first, at least in the context of this chapter, and then recombining them later in this book through specific topics of environment and architectural bodies and working toward a collaborative agency using these mediums for participatory design processes.

Why Inclusive Design?

In working with inclusive Design, there is a common misconception that applying accessibility criteria equates to an inclusive design process and

practice. It is important to note that while inclusive Design includes criteria from accessibility guidelines and even incorporates accessible parameters in exploring solutions, each has a different intent. Inclusive Design intends to improve inclusivity when working within an exclusive context, such as the design process and accessibility guidelines, which are about compliance. Compliance, by definition, can be understood as cooperative adherence, whether to law or a construct since a designer defines intent with a client. As such, accessible compliance is the interpretation of the intended rules that mostly satisfy equal provisions for persons with limited ability or a disability rather than strictly following guidelines.[8] The understanding of compliance is essential in establishing the role of accessibility in this research, as it inconsequentially defines equity of space rather than indemnifying responsibility. In *Inclusive Design Guidelines for HCI*, Nicole and Abascal point out that decisions that equalize our social and physical differences are based on the civic interpretation of rules governed by the code and are considered equal to protecting life. At the same time, the elevation of spatial experience through emerging human-computer interactions in architectural inquiry tends to be less specific as a means for increasing the spectrum of ideas included in space planning and, as such, keeping the focus on inclusion; it is about utilizing mediums such as virtual reality and digital design in providing a medium for more solutions and less about the formality of a solution.

In advancing inclusive design through digital means, especially in a participatory process, understanding the broadest means of fulfilling a particular task is important to understand the varied situations of the human form during the work of relative occupational inquiry.[9] The utilization of engineering standards for quantifying space attributable to mass production and, in particular, the visualization techniques employed in the ergonomic studies of heavy industry and military equipment of the mid-1900s have significantly influenced the rationale for formulating a scientific approach to architectural metrics.[10] These techniques represent the visual characteristics of space and serve as the basis for promoting efficiency in appropriations for the range of motion (motility, mobility, and exertion) commonly applied throughout this study. Comparatively, the singular nature by which compliance defines environments in relationship to the human form, more commonly defined by contemporary codes, reduces to exact measurements and ignores the human body's experience during performance and natural complexity.[11] This is similar to a reduction of intonation in order to simplify a language, where, in doing so, it reduces the emotional connection to what is being articulated, leaving minimal flexibility for interpretation.

The multi-axial metric (three-axis, X-Y-Z, and time) used in the preliminary study "Acts of Spatializing Healthy" (Vance et al., 2016, 309) and contributed to this research for quantifying displacement during the interrogation of physical activities was developed from these utilitarian ideals. Various

associative standards for studying individual space were used in quantifying activity zones, buffers, and topological studies.[12] Many of the studies focused on how space constraints are impacted by rapid population growth for the class size, particularly when these limitations restrict the movement of individuals within a room.[13] Previous applications of these research studies of parameters addressed adolescent exercise activity in a classroom, where furniture adjustments were the foundation for emphasizing adaptable practices for measuring modifications to the corresponding physical activity zones to create a compendium of activities.[14] The primary application, shown later in this chapter, defines the difference in spatial syntax for a specific activity and the modification of elements in a confined space based on references from biomechanical studies (Wiktorin, 1986) for particular physiological body types.[15] The results demonstrate a means for varying the applicability of differing stages of activity in a single space based on solitary, parallel, associative, and cooperative participation (Parten, 1932, 243–269) as subcategories in clarifying the means of *engagement* criterion this work uses when interrogating inclusive design concepts.[16]

In critically examining the tenets of an inclusive design approach defined by Burton and Mitchell's initial six criteria of *safety*, *comfort*, *distinctiveness*, *legibility*, *familiarity*, *and accessibility*, this research proposes expanding the list to include **adaptability** and **engagement** as a means for developing a direct correlation between inclusive Design, Universal Design, and their compounding application in architecture. The outline of the subcategories gives credence to the exploratory exercises of architectural inquiry associated with space planning practices. These practices may not always include drawing as the critical investigative medium. Instead, the practice may rely on sharing experiences that will lead to physical making resulting from a collaborative effort. The lexicon of terms helps to organize the effort to do everything possible to solve a problem:

Engagement (solitary, parallel, associative, and cooperative)
Adaptability (flexibility to need, occupational use, range of motility, mobility, exertion)
Comfort (static engagement, respite, shelter, waiting)
Acceptability (interactive motility, mobility, exertion)
Safety (clearance, advance precaution, transparency, privacy of information)
Legibility (perceptible information, language, medium)
Distinctiveness (unique, part to whole)

Advancing inclusive design concepts that focus on providing affordable healthcare solutions, including understanding the human factors issues that significantly impact vulnerable populations, relies on clarity of terminology when exploring actions and garnering a response. For example, while the

similarities between health, healthy, and healthful are apparent, subtle differences in the **legibility** of such terminology can shift support, whether by definition, translation, or comprehension of application. While architecture has a rich history of articulating needs, as found in the 18th- and 19th-century writings on human experience, there remains a notable absence of a comprehensive approach in a post-digital era responding to the significant data recorded and what the data means for what creates and exacerbates vulnerabilities within the built environment. Acknowledging the gap between the information and solutions is vital in determining vulnerability in the context of need, and the four key considerations that shaped an understanding of the perceived role of architecture up to and through the 20th century are inseparable from the discussion of Inclusive Design.[17]

First is the role of access in the lexicon of design terminology addressing human factors. In particular, Jean-Frederic Levesque's "conceptual framework for healthcare access" work introduces strategies for expanding spatial inquiry in providing informal interventions as a material practice for health services. Levesque introduces five comprehensive perspectives on health access that are directly relatable to the planning and programming of medical spaces, which contribute to the question of the feasibility of particular spaces for the population to access healthcare.[18] In response to this framework, the research interventions on informal spaces introduce three-dimensional modeling as one of three primary drivers (drawing, modeling, and timing) in producing prototypes testing the validity of Levesque's claims. Within their definition of the Levesque framework is a taxonomy of terms: approachability, acceptability, availability and accommodation, affordability, and appropriateness. These terms fit neatly alongside the associations of inclusive design practices. The value in working on them as drawing, modeling, and the tracking of time for an activity exists in transiting the investigations away from simpler parallels between Levesque and inclusive Design toward more concrete concepts on what of this work has already been adopted and how to expand upon in spatializing the material response to specific clinical goals determined by the presence of components from clinical practice operating independently within and interdependent with various architectural elements.

Inspired by these insights, the functional aspects of human need, as articulated by John Zeisel, invite the broader architectural and urban planning audience to consider the role of behavior in defining and shaping community. Zeisel's concepts test the overarching application of neuroscience as an inquiry into advancement at the expense of expressive and communal values, highlighting how the focus on efficiency and progress can obscure the fundamental needs of the human experience. In this context, architecture risks becoming a mere tool of function rather than a medium for nurturing community and safeguarding against vulnerability by observing environmental behavior.[19] Zeisel is also critical of planning without corresponding

data, particularly in analyzing progression in space, which emphasizes the importance of human-scale environments that promote social interaction and well-being. He argues that the study of physical surroundings is better studied through analytical mapping as opposed to verbal description, as the mental picture conveyed in drawn documentation references more content.

These realizations parallel the social and cultural factors from drawing rooted in the first Enlightenment period, emphasizing reason and progress, often manifesting through the rational and functional use of geometry in design.[20] While the focus on reason for a drawing advanced architectural development, it overlooked the social and emotional dimensions crucial to human well-being. The second Enlightenment or modernist period sought the elevation of logic and order through drawing as more than a means for establishing fabrication. It may have provided a framework for a narrow interpretation of human needs, neglecting the vulnerabilities that arise when these needs are not holistically addressed in a society.

As a critical point, the rise of industrialization and mass productivity in the 20th century brought with it a new set of challenges in conveying relative concepts within architectural inquiry. While these advances made goods and services more accessible, they also introduced disparities in wealth and access to safe working conditions, as evidenced by the civil rights struggles for fair wages and labor protection. The potential for industry to manipulate and exploit workers, highlighted in *The Principles of Scientific Management* by Frederick Taylor, reflects how architectural and industrial progress can create new forms of vulnerability, particularly when economic interests overshadow the rights and well-being of individuals.[21]

These considerations underscore the importance of establishing architecture's role in creating and mitigating vulnerabilities, as would develop from Nuefert's understanding of occupational work zones. By recognizing the similarities in arguments from functionalism, the impacts of industrialization, and the missing social and cultural relevance, this discussion of the gaps between these earlier discourses on need and progress connects the current establishment of a more resilient and inclusive approach to design, refining a discourse into the manner of relevance for vulnerability in architecture while reflecting on the conceptualization of spatial vulnerability—where architecture's promise to provide shelter is tested by its ability to adapt to and protect the most vulnerable.

Defining Capacity Theory

In contrast to the lexicon of human factors commonly associated with accessibility criteria and Universal Design, capacity theory based on Inclusive Design in architecture is more than just a measure of physical dimensions; it is the canvas upon which human experience is inscribed. The concept of

space having a capacity is important in measuring the execution of architectural inquiry. These measures extend beyond mere geometry, working to establish the social and cultural capacity beyond geometry alone while embracing the relationships between objects, the movement of people, the interaction of light and shadow, and the flow of air, water, and energy. Spatial capacity shapes the navigation of built environments, shaping perception, engagement, and interaction between people, places, and things, as the atmosphere it defines is the essence of the experience of life commonly referred to as place. Through the manipulation of place, architecture exerts its most profound influence, guiding the movement of people, goods, and services, framing views, and shaping the emotional character of places in response to the built environment.

Capacity theory in architecture involves deliberately organizing elements to create a cohesive, functional, and adaptable utility for organizing spatial capacity across a concept. The organization, which is not only arbitrary but also not limited to geometry principles in architectural theory of proportion, scale, and rhythm commonly associated with form, all of which have historically contributed to a comprehension of defining space, but without social and cultural reasonings, lacks the reference to engage capacity fully.[22] The premise of a capacity theory in design involves maintaining concern for human behavior and perception relative to built elements and how their arrangement can evoke feelings of comfort or unease, intimacy, vastness, security, or, for a case in point, vulnerability. In this sense, spatiality is not just the air between but rather how the Smithsons framed it as a charged void actively participating in the human experience, shaping and being shaped by its inhabitants.[23]

In connecting the concept of spatial vulnerability to that of spatial capacity and, subsequently, capacity theories framing health, it is crucial to recognize that architecture is not a neutral participant in the making of public space and, subsequently, public health, as interpretations of modernist architectural theory might suggest. As evident in the failings of 20th-century affordable housing, architecture can undermine the well-being of occupants as a result of the design as well as the maintenance and upkeep.[24] The capacity of a particular configuration to offer refuge and comfort to some can become a source of risk and exposure for others, creating a duality that persists as spatial vulnerability.[25] Health as a narrative informs capacity as a critical theory, recognizing that while space can be designed to protect, poorly designed spaces can create new forms of vulnerability, particularly for those at risk.

In the context of this writing, capacity theory is a combination of the Bowen theory of human behavior and embodied cognition in architecture and urban planning.[26] It refers to the susceptibility of spaces—whether buildings, neighborhoods, or entire cities—to negatively impact the health and well-being of their inhabitants, particularly those belonging to vulnerable populations. As a premise, it is intrinsically linked to the quality of the built environment and

the capacity of architectural design to either mitigate or exacerbate health risks. As an exponential reading of Bowen's theory, urbanization accelerates social interactions globally, and understanding how disparities and vulnerabilities manifest in different contexts, the increased population of rapid urbanization periods becomes increasingly critical to the functional capacity of a city and its infrastructure. Capacity theory thus provides a framework to engage with health narratives as an aspect of architecture criticality, offering criteria to evaluate outcomes associated with specific spatial types.

The first criterion, **functional constraints**, focuses on limitations in spatial, environmental, social, or economic functionality, determining a system's maximum output or capacity. These not only are best exhibited in articulating physical comprehension of mobility, motility, and exertion but also relate to the sensing of materials and the impact of space on the complexity of impairments (Bowe, 2000).[27] Next, **dynamic adaptability** addresses how systems respond to changing inputs or demands, including shifts in population density, resource availability, and evolving user needs, influencing sustainable operations. Derived from the *Principles of Universal Design* established through the NCSU College of Design, Center for Universal Design, dynamic adaptability simplifies all seven principles into one goal.[28] **Interdependence** and **engagement** follow, examining the interconnectedness of elements within the space and their impact on different populations ranging from staff to facilitators and patients, emphasizing the psychological and physical capacities necessary for an effective interaction within these environments.[29] **Resilience**, **reparation**, **and redundancy** in tandem explore the system's ability to absorb shocks, manage surges in demand, and offer mental and physical recovery spaces. In contrast, redundancy also acts as a safeguard against system failure. As criteria, it is a recognition that events can create disparities and vulnerabilities for any population at any point, and the reconciliation of access to resources should be equitable.[30] Finally, **capacity utilization** provides a three-part assessment of *efficiency*, *thresholds*, *and system tipping points*, analyzing the balance between optimal occupancy, error tolerance, and recovery time, linking back to resilience, reparation, and redundancy, and how to focus a specific resolution toward a goal.[31] These criteria establish a framework for insights that are the foundation of architectural performative assessments and underpin capacity theory as a tool for bridging architectural discussions with parallel disciplines. In working with medical practices, particularly those transitioning to health and wellness, the framework ultimately connects to broader social determinants of health concepts in the built environment.

The foundation for architectural exploration related to capacity theory can be argued as prevalent in architectural explorations of representative space for proper healthcare, with Florence Nightingale's *Notes on Hospitals* (1859) profoundly exploring the link between space and health. In the context of hospital design, it was the first to connect spatial organization to patient

outcomes.[32] Nightingale argued that hospitals should be structured to support hygiene, proper ventilation, and access to natural light—all critical factors in patient recovery. She identified the capacity of hospital space along four key dimensions: ensuring patient comfort and privacy, separating functional areas to prevent cross-contamination, strategically allocating air and light, and maintaining high standards of cleanliness. Her insights exposed the spatial vulnerabilities of poorly designed hospitals, illustrating the inequalities that left the poor in overcrowded, unsanitary conditions, thereby increasing their susceptibility to disease and reinforcing social marginalization. These early observations on spatial inequality and environmental conditions have become foundational to capacity theory in healthcare, emphasizing how evidence-based Design can mitigate health disparities and support equitable, healing-centered spaces. Addressing spatial organization, environmental constraints, and social determinants laid the groundwork for understanding health as a dynamic component of the built environment's ecology. This foundation highlights the critical role of capacity theory in shaping equitable and functional healthcare spaces.

Expanding Capacities

Conversely, the contemporary challenges of capacity addressing inclusive Design become very specific when applied in post-digital practices, especially in conditions that exceed a defined capacity associated with a vulnerable population. The *INPACT* project (Hasson and Vance, 2014) is one example of how a contemporary understanding of vulnerability as overcrowded activity conditions in a confined condition expands capacity's definition as criteria applied to architectural inquiry and interrogation.[33] Appropriate space is needed to properly plan classroom activities and class space environments that incorporate an understanding of the relationship between the human body, its movements, and variability in size and shape when locating objects. This research demonstrates the digital testing of ranges in motion associated with levels of physical activity and the processes of arranging these activities amongst sedentary furnishing arrangements in elementary classrooms. The quantifications garnered from these studies have multiple purposes, the most significant of which is the definition of space to be allocated during each exercise relative to the centroid of the range of motion based on the center of gravity during each exercise. The measurement of displacement in three axes determines the volume rendered as a single-activity zone, therein establishing a basis for determining a metric that, when repeated, informs the amount of space required in providing multiple physical activity zones per classroom based on the number of students in each classroom and class space.

As part of an ongoing study intervening sedentary classroom activities with physical activity, this comparative study of work zone versus activity zone

per child engages in a "tug-of-war" with administrative and building safety policies that influence classroom conditions when facilitating these activities with an increased density of children. Fifty years after the landmark ruling the Supreme Court identified five factors in defining spatial equity in schools: the facilities, the staff, the faculty, extracurricular activities, and transportation. Differences are still there. Moreover, though the colors of the disparity have changed, with segregation only slightly muted by an economic inequality that ranges from all races, an alarming amount of devalued and vulnerable populations still lacks adequate measures to meet the original intentions of the law. While specific components of the law, such as faculty and staff availability, are a dynamic variable, the density of children to personnel intensifies the difficulties associated with declining teacher availability. When coupled with the state of facilities and lack of extracurricular activities, the ability of curricular activities in these schools to address parallel disparities continues to fall. Isolated to operating within the confines of a single classroom, the work utilizes scanning and simulation methodologies to exact the displacement of persons and furniture during transitions between learning activities and a compendium of physical activities, measuring disparities in access and orchestrating the room interventions.

As researchers working on the prevalence of obesity in these schools, the participatory process that involved architects, kinesiologists, educators, parents, and students sought to find ways to measure the disparity of services and resources and to find equilibrium when addressing the spatial inequities per child in the classroom. Realizing that the architectural mediums of digital modeling are good at predicting conflicts and measuring policy implementation but not so good at predicting social inequality, the redesign process actively joined with colleagues in the School of Public Health, School of Education, and several regionally significant partners to study the corresponding impact of physical activity in these conditions. It was found that there are apparent disagreements between the practice and policy that guide activities in a given space and that the formal consideration of the teaching plan correlated with the spatial subjectivity of the classroom layout. The cross-disciplinary conversations on where physical activity disrupted the discipline of class space architecture are the discovery of overlapping zones of activity only discoverable by measuring. This was directly attributable to the collaborative interrogation of values and outcomes many had previously imagined would come from a single discipline.

The research also led to an exacting of the differences in the lexicon around proving measurement and the effectiveness of measures, which are confounded when addressing activities in spatially limited situations. The series of studies maintained that physical activity is essential for maintaining a healthy condition and that throughout early adolescent education, there is a need for stressing extracurricular physical activities as a means for managing behavior-related stress in classroom conditions, relating the state of health

in children to their sense of participation in classroom activities. These acts of spatializing health are similar to the goals of the proceeding hypotheses on the model mechanisms of the classroom environment and how issues of crowding in these conditions inhibit the student's ability to self-regulate their behavior as a symptom of the furniture type, orientation, and spacing. Additionally, the research expanded to introduce new furniture models for the room, which, when coupled with a more flexible model of room arrangements based on compressive and decompressive furniture, transition spaces, and recovery space, embraces greater student independence that was internal to the classroom and eventually led to the lexicon of spatial practices defined in later chapters on these spaces as environments and bodies. These conceptual theories contribute to the multidisciplinary question of the single space as a multi-activity speculative apparatus capable of adapting to an individual's or group's health capacity, whether seated or on the move.

The acts of measurement defined by this research do not conclude traditionally as typical of a quantitative body of work. Instead, they form the basis for an expansive third generation of speculative work. Beyond the classroom is the consideration of class space, challenging the normative approach of the actions initiated by studying the range of side movements associated with select physical activities. As the research project and team continue to expand all aspects of the study by advancing the practice in schools across a more significant regional body, the flexibility in data collection will continue to inform the prescriptive measures regarding the implementation of physically active space. The primary proposition of this third research phase is the conceptual acquisition of classroom space by providing a physical activity zone. Establishing that the acquired area in the form of activity zones away from learning zones creates physical activity and redefines a shared space, formatted as an interior and exterior condition of the school in service to the public realm beyond room and building into neighborhood conditions. The exploration of this strategy will continue discussions on the relatedness between policy and exertion, associating conditional changes to a building's interior public space and the corresponding modifications to the systems that shape the curricular activities of a student body. Expanding the work will require actively measuring the development of classroom clusters as shared physical activity space, adjoining classrooms across working hall conditions, and connecting the internal environments to external playscapes in the public realm—expanding the collaborative discussion of this theoretical study to a broader audience of colleagues from disciplines internal and external to Design.

A Case Study for Health Capacity of Non-Medical Spaces

While it seems natural to think of the problem as the desk arrangement in a room, the crowded conditions warranted a comparative analysis of the policy

guidelines and practices against the prevalent furniture types, primarily relying on initial studies mapping the coordinated movements of select exercises to determine the field of motion in defining the space needed to perform the activity. The second study examined these findings' intersection with the territory between assigned desks. The behaviors in this condition required the student to remain at their desk throughout the day without moving from this location unless directed into coordinated activities by the teacher. The second model created a scenario wherein the student has limited control of their seating and can select where to work throughout the day based on an assigned seat location and a separate work zone location. In this model, student participation in the activity breaks would be self-regulated depending on where in the classroom they were located when directed by the teacher to participate. The third model sought to redefine the classroom into separate learning and activity zones, consolidating the activity zones into a shared common space connecting multiple clustered environments. The representational diagramming measured the differences in learning activity space less and was more focused on asserting the activity zone and querying the volatility of curricular control when separating measures for observation and engagement of class space activities.

Some primary questions that evolved from the collaborative consideration of the differences are:

1 *Are square footage designations established by the educational code reinforced in the daily school and classroom practices?*
2 *What is the impact on participation in in-class activity breaks when the population densities of children per classroom in low-socioeconomic schools are higher than the prescribed teacher-to-student ratio, and how does this compare to the participation rates in schools with higher socioeconomic status?*
3 *What furniture orientation and spacing can be modified to elevate the lack of activity spaces by measuring arrangement configurations based on existing furniture or no-cost adaptation to meet the participatory criteria within crowded conditions?*

Aisle Width Minimum

To address these measures, analysis of the class space began by developing the variables that set the rules for transitions between activities, compression and decompression of furniture, and student recovery, identifying critical conditions where the classroom activities resisted maintaining these variables. The drawings were an active record of the differences in the open observation from one activity to the next, recording the fluctuations in aisle width between desks and other furniture. Since the focus was the consolidation of

these aisles into isolated activity zones as transition spaces, it was necessary to articulate the differences in continuity associated with different arrangement patterns, which, in turn, are defined as separate buffer spaces used for activities based on aisle width and activity zone for comparison.

As the classrooms are so different, a base matrix of three classroom sizes was established against three classroom arrangements to determine the occupancy. Evaluation of these configurations focused on transitioning from and back to learning locations of the blackboard and the teacher's ability to identify if (1) the number of desks (amount), (2) the type of desks, and (3) the arrangement of the desks (grouping and direction) affected the performance of the room. The capacity of the space for physical activity breaks was based on two criteria: (1) the performance zone of extreme physical activities and (2) the ability of the configuration to allow students to participate in fixed and mobile activity types as determined by the coordinated compendium of physical activities as distributed by kinesiology.

Space per Occupant

The general assumption is that the area per child is individually defined across the school-age groups, with limits to the number of children per teacher serving as protocol protection against overburdening a single teacher. The policy, which ranges from state to state, considers the number of students assigned to a teacher and the number upon which a teaching aide will be assigned. While not directly attributable to the conditional measurement of square footage per child, it is important to note conditions associated with the teacher's active space later in the study. The comparisons examined two avenues in policy: (1) the square footage per child based on the number of children per classroom and (2) the number of children per classroom based on the square footage per child. The next steps were to graphically map the common arrangements to (1) determine the effectiveness of the arrangement in providing accessible routes for movement during physical activity breaks and (2) compare the findings from the study of activity zones to determine the intensity type of exercises that could be performed in conditions defined by particular arrangements. These outcomes would then be shared with colleagues in the School of Kinesiology and School of Education as best practices for introducing types of activity to the preferred room arrangement of the teachers to support the intervention of physical activity breaks within the classroom.

Crowding and Overcrowding

While classroom-based physical activity breaks have demonstrated success in reducing the sedentary time associated with early childhood obesity, the physical constraints of the classroom, more often than not, proved to be an

inhibitor of active participation by the whole team of collaborators in the initial studies of interrupting prolonged sitting with activity. Upon this realization, our second investigation began to examine the differences in archiving locations of furniture type using traditional hand-recording of two-dimensional space mapping and how shifting to three-dimensional studies led to a different method of studying crowding and overcrowded conditions in schools.

Methodology

Shifting to three-dimensional studies using the Microsoft Kinect's three-camera system, the research shifted to recording and converting simulated activities into measured displacements from a standing starting point. Categorized by the research team into three levels of exertion, these simulations chart the range of movements by converting the visual image of a team subject into one of eight avatars representing the cohort of third, fourth, fifth, and sixth-grade students. By running simulations of the exercises from the compendium of activities, we were able to document various small and large movements associated with specific physical activities. These were categorically profiled as low (stretching to light walking), medium (moderate walking and stationary activities), and high (climbing, jumping, running) and defined as maximum and minimum criteria for aisle length based on the activity type. When coupled with the preliminary findings for a prescribed aisle width, the initial findings articulated a precise prescriptive measure for students moving in a synchronized rhythm while watching a directive video.

The feedback from teachers expressed their concern with the regimented activities, but surprisingly, participation in the videos was remarkably high. To address these concerns, the research reevaluated the surveys by the School of Kinesiology, electing to provide greater flexibility when transitioning into the activity breaks by reformatting the class space into two zones, allowing teachers to direct student participation and behavior accordingly. Even with these modifications to the approach, concerns of crowding, the proximity of the teacher when resolving conflicts such as patterns of bullying, and low-performance scores due to orientation away from the teacher did arise, and though not previously within the purview of the architectural evaluation work on their resolution is ongoing.

Re-Identification of the Problem

By evaluating the active zones already in the classroom, it was determined that the active buffer surrounding the room when students are arranged in a grid format facing the same direction fell into two categories: (1) teacher observation and (2) unused storage. Consequently, the architectural studies resolved the prioritization of the active spaces toward the student and away

from the teacher based on a novel approach to the teacher's movements. This strategy employed the tracking of the teacher's position by mapping their location based on (1) participation in the activities, (2) non-participatory standing observation, and (3) non-participatory seated observation. Additionally, the research evaluated storage methods employed in the classroom by measured and visual documentation that included (1) photography of the conditions, (2) physical measuring of storage devices, and (3) three-dimensional scanning of storage systems when arrayed with resources pertinent to the class exercises. These efforts noted but purposely excluded measuring built-in systems that were not actively used as storage because these were proposed to be replaced when reconfiguring the class space activities by zones.

Room to Move

In determining the area needed for children to exercise per classroom, the research team from education stumbled upon an undocumented fact that there is no uniform precedent or standard for the number of square feet per child per classroom or the maximum number of children that can be assigned to a classroom or teacher. There are ethical practices, and references abound. However, a legislated number that determines a manageable equilibrium for teachers or prevents overcrowding based on the room size does not exist. Therefore, this research set out to determine a dynamic system of age, population, and attendance that could be managed by the principle, establishing a protocol for measuring capacity relative to activity. The basis is the collaborative reasoning of codes and practices to determine our measure of appropriate size and scale of occupancy in populating a single classroom with the expectation of having adequate room for physical activity breaks.

> In defining the parameters for the principal to follow, it was easier to start with the disparities created by certain room configurations since equity is primarily formed from the resolution of a disparity. As our first inquiries started with a comparative analysis of body size and range of motion, it was important to determine within this new category what our benchmarks for success were. We had a focused application for this material in informing the range of space children need to rectify the area per aisle for children during the activities. However, as a policy, the barrier established by the columns and rows of desks was not consistently removed. Instead, we elected to recognize the goal in context with the desks and find resolute measures for equalizing performance based on introducing adequate space for children to move directly into the activity breaks without using excessive transition time. We even created acronyms to remind the students of the importance of transitioning swiftly to and from the breaks.
>
> *-author, presenting on the benefits of INPACT in Michigan*

Learning from this collaborative process involved teachers in their classrooms, who started as kinesiologists and architects and became more collaborative. It was determined that overcoming the difficulties in getting to a central understanding stemmed from the transition to a participatory process and the ability to collaborate to define the classroom's limitations. Although these inquiries resulted in challenging conversations on performing the task, the collaboration in an inclusive process ranged from selecting activities to documenting how quickly students lost interest in participating, giving the participants ownership of the research in a way that allowed the study to live on past initial funding. The most pertinent of these responsibilities delved into whether the students were more likely to continue being interested when the teacher was able to change up the activity type or use and the teacher's command of the room as a result of the architect's report of options in creating creative social groups for the prolonged activity, pointing out how much of a factor the room's Design, flexibility, and activity space were in providing space to transition to a more dynamic set of movements.

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2

AVAILABLE ENVIRONMENTS

Ulysses Sean Vance

Working on healthcare in categorizing space outside the hospital as a transitional space (de-escalating, decompressive, resilient, and reparative) mediating a patient's transition into medical space for treatment, health access is one of three critical health reform narratives: access, affordability, and accountability, working to improve the experience.[1] The approach to address health access by applying an inclusive design framework as a metric in studying the specifics of making medical space will focus in this chapter on the availability of transition spaces defined by four types of spaces for both urban and building environments of hospitals and their application toward providing spaces to de-escalate anxiety in arriving patients. The four transitional spaces are de-escalating, decompressive, resilient, and reparative. Each space type offers a unique gathering opportunity to address personal and social engagement when entering the medical facility. At the same time, the collective application of transition spaces also offers external consultation space for improving health access. The approach to developing these spaces includes using spatial observation and tracking location based on chronotopic or travel time mapping in evaluating use to enhance the ability to predict challenges and prescribe solutions based on mobility, motility, and exertion as variables associated with building design measured internally and at urban scales. These emerging optimization practices incorporate open-source data from online mapping systems working primarily through digital and computational architecture design and transcend the traditional spreadsheet-driven approach in representing findings.[2] These visual aids are particularly helpful in architecture that relies on visual representation of compliance to accommodate building access.

As emerging practices, travel time maps bridge new specialties in critique through evidence-based design to deliver on the promise of predictability

DOI: 10.4324/9781003535768-3

when determining health capacity. The ability to capture data from public information on smart devices, predict conflicts in data, and represent experience enables ideating interventions across various types at different stages in responding to the challenge of providing health services at an urban scale, allowing the application of a design process informed by the data to address vulnerabilities and disparities, as well as the conditions that challenge wellness and well-being.[3] The work discussed in this chapter interrogates health access challenges when programming urban and building ecologies in architecture to determine why they exist and the possible means to their resolution. The work also references criteria from inclusive design as a framework for integrating outpatient services into spaces beyond available medical environments to mitigate vulnerabilities and promote healthcare as the discourse on measuring spatiotemporal practices by inclusive design.

Environments

Architecture is more than the creation of physical structures; it is also the construction of ideas and tools for shaping associations throughout the built environment. The term "built environment" emerged to frame the relationship between human activities in making settlements in contrast to the found conditions of a natural environment.[4] The primary concern of environmental justice presented in the next chapter is the emphasis on human-made aspects of a surrounding environment and the corresponding interrogation of resources that create vulnerabilities and affect individuals and populations—whether they stem from environmental risks, social inequities, or inadequate infrastructure. Building a foundation for that discussion on travel time mapping to actively track the constraints and position interventions based on capacity is based on using pedestrian activity. The research into available environments reflects the capacity in specific areas to support pedestrian access and determine the magnitude of disconnect for a health network by region, locally or regionally.

Today, interactive travel time maps are provided via websites and application resources to map health resources against various civic amenities. Whether the location of municipal and commercial centers or mapping insurance policy processes that promote health versus medical procedures, the availability of these resources on hand-held devices enhances efforts for determining redundancy in building ecologies that contribute to reparative systems as a means for improving long-term well-being. Connecting the dichotomies in urban and building ecologies amplifies the need for a deliberate approach to criticizing aspects of inclusive design criteria as metrics in spatial practice, a point Malcolm McCullough defines as service ecologies in his book *Digital Ground*. Assessing the functional constraints of service ecologies and the dynamic capacity to read and interpret urban conditions in determining available resources while integrating specific measures into an evolving landscape bridges the urban-to-building design processes.[5]

The active tracking of clusters of activity focuses on capacity, interrogating buildings and urban spaces for what they contribute to each community, their ability to actively maintain resilient services efficiently during an event, and, in the application to healthcare, their connection to a network of health service entities. The opportunity for a model such as the one proposed here to have value in architectural practices today lies in its ability to align real-time mapping and more extensive data set optimization in digital design, connecting the evaluation of functional capacity and environmental adaptability to tipping points prevalent in the data. As a spatial practice embracing new opportunities to improve human health and reduce vulnerabilities, an awareness of active elements gives these production processes a unique dynamic adaptability to assess the built environment.

Embedded within this conceptualization is the possibility of a reparative healthcare network wherein the network's resilience results from redundancy in providing primary and secondary healthcare. The research of Mah and Villoria in *Lifestyled: Health and Places* highlights the intersection of healthcare planning, architecture, and urban design, suggesting a shift toward approaching architecture as a dynamic process that prioritizes optimizing design decisions at scales beyond a single building or space. It involves creating redundancy in the architectural evaluation of spaces, considering various health determinants to define an architectural solution. Developing these model approaches from available analysis tools creates an affordable means to clarify the architectural definition of health into something spatially performative and predictable. Space planning and programming are derived from different design choices impacted by various social, spatial, and health determinants. Exploring these emerging architectural ecologies from new readings of space as conditional atmospheres, their topologic relationships, and capacities as built environments posits new spatial rigor to understand how the shape of these environments promotes wellness.[6]

With these ideas in mind, the focus on extending the territory of well-being through a data-driven design approach suggests a transition from evaluating architecture as a building in isolation to studying the interactivity of environments as an urban ecology. Within these systems of study, the product is inherently dynamic and, therefore, not a singular approach to a building but rather the combined aesthetic and typological definition of shelter. In essence, this premise speaks to greater integration of interrogative measures optimizing design as bridging these ecologies and reconsidering the role of space in shaping an environmental product.

Availability

McCullough's service ecologies validate Levesque's arguments that defining access is critical in determining civic infrastructure informs capacity and how capacity establishes the experience of an environment. In the discussion of

healthcare, these definitions of access, particularly availability, are influenced by the social determinants of health and recognized in this text as a critical component in designing and shaping the acceptability of healthcare for patients based on perception and health outcomes. Central to this understanding of how inclusive design practices inform health access is the engaged facility in creating, managing, and maintaining the built environment, which measures the availability of medical resources and their impact on social determinants of health and well-being. The comprehensive approach to planning and programming healthcare spaces before extensive data sets were available through travel time modeling had been to observe the physical spaces where people live, work, and interact during or after an event (Whyte, 1980) and record the impact on conditions—whether urban neighborhoods, rural homes, or specific facilities—in determining the influence of the event on medical support, food supply, water cleanliness, and shelter.[7]

Post-pandemic, these analytical mappings are now valuable in tracking the settings for services, as the proximity of resources around an event is actively impacted by routines and engagements away from an epicenter as extensions of a healthcare network. By mapping the availability of health resource centers and emphasizing the measures needed to reduce pedestrian travel times to a facility, this research has found that there is greater separation between health centers than previously considered adequate based on patient-to-personnel ratios of 1 per 10,000 and that these disparities increase the number of vulnerable populations. Developing new urban topologies to respond to a growing gap in available health centers requires understanding more about the shape of vulnerability in a city. It changes the conversation from land availability in planning health facilities to interdependence and community engagement in determining the impact of interventions on wellness. It also introduces new roles to consider in defining an intervention during architectural production and the implications for producing solutions that respond to specific vulnerabilities within the propensity for evaluating urban and building ecologies.

Spatial Vulnerability

The concept of spatiotemporal disparities is derived from interrogating the pedestrian travel time to leave an area depleted of resources.[8] A definition of vulnerability emerges from recognizing that not all populations can recover from a catastrophic event (Singh et al. 2020, 317–334). In mapping the difficulties that persisted during the pandemic for a given community, the research noted that specific populations were more susceptible to health risks due to the limited availability of health centers based on the absence or depletion of personnel, medical space, or resources. Spatial vulnerability is a multifaceted issue influenced by physical, social, economic, and environmental factors.

For example, poorly designed urban areas with limited access to green spaces and inadequate infrastructure can exacerbate physical vulnerabilities, leading to higher rates of chronic illnesses and reduced overall well-being. Similarly, as Singh and Mall point out in their discussion of urban ecology, social and economic vulnerabilities began to impact more people when facilities that provide interventions failed to account for the unavailability of municipal infrastructure impacting the whole city, specifically children, older adults, and persons encountering a spectrum of physical, social, and economic limitations.

As proposed, the discussion of available environments is about expanding the available resources, starting with the land buildings are situated on to the urban space between buildings.[9] A concept that was most evident in *Life Between Buildings* by Jan Gehl is that the prototypes of adaptive utilization have significant implications for how people move about the space between buildings, which correlates with this discussion on the approaches to responding to health reform within architectural practice. It suggests that architects and urban planners are engaged in the symbiotic practice of health planning from the earliest stages of design inquiry. Correspondingly, as architectural and urban planning consideration of existing context evolves to incorporate health perspectives in defining sustainability models, the concept of resilient buildings will be determined by the interaction of existing spaces with new spaces. These considerations serve as a background and set the stage for exploring how architecture can more widely incorporate adaptive reuse and transition to evaluating the existing infrastructure alongside new propositions as a balanced tool for health optimization. In this context, developing analysis tools, like those available through travel time mapping, incorporates existing conditions with new buildings and improves the ability to quantify spatial vulnerabilities.

In determining a scale for mapping the capacity of buildings and public spaces to address health service, a five-minute pedestrian increment, inherited from travel time map tools, is proposed to evaluate pedestrian activity common to post-event activities and promote long-term health and well-being in areas with a higher propensity for socioeconomic and environmental challenges.[10] The utilization of the five-minute model in design requires a holistic approach to implementation that changes the perception of site and site control, sustainability considerations, social equity, and healthcare availability when optimizing spaces. By analyzing the structure of atmospheres, both existing and proposed, the spatial research establish a relationship among room size, light exposure, airflow, and noise levels. The modeling of urban conditions provides a platform to create environments that optimize sound attenuation while considering the health of spaces from a communal perspective. Moreover, in building resilience to counter disparities in vulnerable populations, any reparative intervention improves its surroundings by

mapping its conditions when documenting climatic challenges or withstanding environmental stressors like natural disasters. These examples are prevalent in cities such as Singapore, where form-based codes are more prevalent, and the implementation is treated as an incentive. By adopting these methods, architectural inquiry can move from being a reactive process—responding to conditions within a boundary—to a proactive one, shaping the space of a project in collaboration with neighboring environments that inherently support improving human health and resilience while working to repair and improve the conditions that shape communities.

Urban Ecologies

Given the complexities in ecology, understood in this writing as the relationship between environmental design and human health, it is necessary to determine what the built environment means to assess its capacities and components' impact on health determinants. As a recap, the space between buildings in contemporary society influences everything from physical activity levels and mental health to access to healthcare and social cohesion, as how we navigate these spaces shapes perspective based on perception. Availability, a tenet of accessible building design, has recently become a point of discussion for determining when exploring sustainable architecture through the adaptive reuse of available infrastructure.[11] Similarly, strategists addressing building availability when placing services post-COVID are looking more closely at how vacancies across the built environment and the prevalence of constituent disparities are significantly higher for minority and low-income communities.

Buildings, the appropriation of space, and the requisite debate over the absence of health facilities for vulnerable populations post-COVID require a hard pivot on strategies to provide health and wellness facilities specific to the cultural gaps in serving these communities. For this reason, the hospital, traditionally a centralized figure in promoting medical service and generally conceived as an introverted system of highly territorialized space in the contemporary city, has come under increasing scrutiny as analysis of the right to health points toward these internalized systems are detrimental urban environments that can in isolation negatively influence public health. These new convergences of community space and outreach services in care necessitate repositioning the programmatic components and engagement policy previously focused on insurance-driven procedural care space to shift focus to procedures working toward community-centric preventive care models.

In the *Charter of Athens* (1933), widely held as a critical juncture in the development of urban design, architecture theorists sought to define high-rise buildings as the definitive approach to dwelling, work, and recreation use previously noted as leisure time. These practices promoted leaving the

common grounds between buildings devoid of any engagement with people beyond transportation as priorities defining a functionally accessible city were shifted inward to the interior conditions of buildings.[12] A critical examination of these early urban planning concepts and how they disassociate the life between buildings from a practical understanding of the value of connecting outwardly reflects a similar loss for comprehending the value of connecting the social strata of the city with medical space, a move that Guenther and Vittori have pointed out in *Sustainable Healthcare Architecture*, has proven detrimental to integrating health practices into the lives of vulnerable populations even when those populations exist on the hospital's doorstep.[13]

The continued practice of designing medical facilities based on austere modernism has, in many ways, directly influenced separatist idealism and resonant biases between providers and patients in these facilities. To depart from these approaches in favor of current trends of inclusive design and correspondingly equitable healthcare engagement for vulnerable populations is to focus on the patients, their families, and even their caregivers in planning hospitals and medical services. Understanding the hospital as a place beyond medical practice alone is shifting to a new focus in healthcare from prioritizing procedures as service to creating places of equity that entertain the necessity for new systems of promoting and delivering medical services as mechanisms based on mobility, information, hospitality, and waste. Criticizing the extent to which previous conceptualizations of healthcare facility and hospital design for the working class relied on the adages of modernist idealized mobile city concepts.[14] The contemporary reimaging of building availability into hospital and medical campus design involves questioning whether, at the front lines or on the borders between institutions and neighbors, a hospital can deliver and meet the increasing need to reform itself and be more inclusive by inviting the very people who are its neighbors to engage the facility directly for services.

In developing a more personal model of care, this functional decoupling of hospitalization from caring for health and disassociating the hospital from the ideal city creates new models for healthcare distribution.[15] It is prevalent in Borasi and Zardini's arguments in *Imperfect Health* that the reprioritization of comprehensive systems for delivering healthcare to communities exists at the core of a non-medical concept of health and at the fringe of service, particularly those associated with a disparity in primary care, who tend to be low-income patients and their families. The debate over whom the spaces of a hospital serve is changing, and the landscape of medical resources that were once insurance-driven models will need to be updated as more communities are recognized as being vulnerable.

As the examples from Borasi and Zardini suggest, many environmental factors influence the determinants of health, including social cohesion across regional differences, ecological barriers to access, and even environmental

inhibition on recovery times. These findings are equally valid in rural or urban environments to promote interaction and provide access to a broader set of services, affecting far more factors across communities and their interactions. From these instances of engagement at the larger scale of neighborhoods and even the city or townscape we can begin to track the influence of architecture as a determinant of health as both commercial and public spaces maintain a variety of conditions where the resulting outcomes can both prevent and lead to social isolation, which is a known risk factor of the social determinants of health.

Similarly, spatiotemporal determinants of health, such as the length of exposure, wait to access affordable housing, and pedestrian access to medical facilities, are frequently referred to as critical issues post-pandemic. Matters of availability are increasingly becoming matters of sustainability as the negative impacts of conflicting management of available space are coming to light due to the increasing ability to decipher data on behaviors in cities post-pandemic, which is now found to be deeply intertwined with the spatiotemporal determinants of health.[16] One successful example of the change in making health space more available is the affordable housing projects prioritizing pedestrian or direct public transportation to medical facilities within a nominal distance, which represents a balanced condition that is both resilient and reparative. The pedestrian connection can significantly improve the chances of seeking medical care. For example, the HOPE VI program in the United States aimed to replace distressed public housing projects with mixed-income communities that offered better living conditions and access to primary medical services through on-site community resource centers. Evaluations of the program have shown improvements in residents' health, economic stability, and overall quality of life, particularly in communities with senior adult care facilities, demonstrating the positive impact of health services available on affordable housing sites.

While highly noted, environmental determinants of health are primarily associated with the functional availability of transportation to facilities rather than efficiency in architectural decisions. However, applying several essential practices varies by interpretation and can often lead to improved resilience during an event. For example, in *Design for Diversity*, Emily Talen points out the measures that increase the availability of collective space, commonly referred to as communal space accompanied by natural settings, are noted to improve the environmental transition from exterior to indoor climate, as they filter pollutants and increase green space in urban areas.[17] These ecological benefits directly affect public health, as improved air and water quality are associated with lower rates of respiratory diseases, cardiovascular conditions, and water filtering before entering stormwater management systems. In addition to the presence of greenery and foliage at the periphery of buildings is its introduction to the liminal spaces adjacent to the lobby, which strategically

extends the transition zone to other green spaces by implementing green roofs and verandas when feasible.

Moreover, greening existing buildings and the transitional space between them is a model for the interconnectedness between architectural decisions' social, economic, and environmental impacts. For example, spatial analysis software used to map chrono-urbanism—the proximity of destinations based on time—can be coordinated with calculations on solar radiation levels, creating visualizations and identifying areas where design interventions are needed to improve greenway connections that enhance pedestrian access conditions. These data-driven approaches ensure that design decisions are based on a comprehensive understanding of neighborhood conditions, leading to more inclusive and resilient environments. Talen highlights that when coupled with Geographic Information Systems (GIS) from urban planning, these tools can optimize accessibility criteria, amenities, and public spaces to benefit health outcomes.[18] Combining chrono-urban mapping analysis with thermal mapping and resource management tools from GIS allows planners to visualize spatial data, such as the distribution of healthcare facilities, parks, and schools, to interrogate the specific value of new interventions as well as work toward the maintenance of existing ones across a geographic area. By overlaying this data with demographic information, planners can also identify vulnerable populations and areas underserved by the existing infrastructure. Information such as this can then inform the design of new developments and encourage new adjacencies between programs, activities, and resources, ensuring that they address gaps in service provisions and contribute to a more equitable distribution of resources.

Building Resilience

In addition to justifying design decisions and their impact on health outcomes, optimizing architecture against various issues can build resilience in the face of socioeconomic and environmental challenges. Resilience in architecture refers to the capacity of buildings and spaces to withstand and recover from adverse events, whether natural disasters, economic shocks, or social upheavals. Recognizing that for vulnerable populations, their vulnerability is based on their inability to avoid or recover from these issues, addressing resilience as an inclusive design measures nature around and within buildings requires an approach that integrates consideration of the dynamics that isolate specific communities and the capacity of buildings to assist them in withstanding the event or recovering from it.

A key strategy of this text for building resilience is utilizing municipal infrastructure to increase the increment of facilities offering medical assistance. These conceptualizations incorporate designing buildings as infrastructure that can adapt to changing conditions and are readily associated with specific

numbers of people. The solutions also incorporate inclusive design practices that involve flexible design elements that allow spaces to be reconfigured or repurposed to facilitate emergency needs. These interventions extend beyond emergencies to address the daily status changes, which, for many, generate unforeseen vulnerabilities. In *Good City Form*, Kevin Lynch highlights the case for flexibility as significant access in urban form, which in hindsight benefits the service ecologies previously mentioned by McCullough, when providing medical and social services, where the ability to quickly reconfigure spaces, often between floors, to accommodate changing needs or respond to public health emergencies is crucial.[19]

The role of optimization in studying resilience is the integration of criteria, factors, and protocols within a design solution that reduces environmental impact and evaluates the spatial implications over extended periods. In this capacity, sustainable design contributes to ecological resilience by conserving resources, reducing emissions, and reducing the chance for new disparities to form. The apparent resilient design factors include designing safe, durable, and available facilities for all residents in need, as resilience involves creating and maintaining public spaces that facilitate social support and community cohesion. As it was learned during the pandemic, the design and location of community centers, parks, and municipal spaces places play a significant role in fostering support by providing spaces for medical, emergency, and other personnel to engage people in sheltered conditions, share resources, and support one another during times of crisis.

In healthcare, resilience is essential as health clinics and hospital facilities are assumed adequately designed to withstand natural disasters while continuing to provide services as communities recover. However, when these facilities close, or there is increased distance between them as resources, it is important to determine how to provide robust infrastructure in these locations that will also allow the facility to adapt to changing demands, such as surges in patient numbers or the need for isolation in public spaces. Therefore, integrating flexible redundancy into the intervening transition spaces will ensure the facilities operate effectively and efficiently under all conditions. Collectively, these are the primary features of optimizing for resilience and illustrate the need to study how alternative facilities can contribute to helping communities recover.

Ecological Disparities

The preeminent reason for decentralizing care is that hospital space is shrinking. According to the COVID-19 Hospitalization Tracking Project, the most extreme urban and rural hospitals reported overcrowded Intensive Care Unit (ICU) beds with an upward capacity of 75 percent in 2020 and upticking again in 2022.[20] With the continued surge in medical care and, in particular,

the long-term intubation of patients experiencing long-term COVID complications, space for procedures comes at a premium. Concurrently, as per the American Hospital Association, the expense per capita in the hospital is approximately $4,500 per patient, and considering that in these conditions, patients are primarily confined to a bed in a shared environment, the cost for recovery in these spaces is already over-extended past the capacity typically associated with providing ample space for recovery across different types of care.[21] The exponential price increase drives patient facilities to either decrease space devoted to long-term care or reduce patient privacy to facilitate overcrowding. Cases like these are happening worldwide as patients, turned away from medical care if their condition is not life-threatening, have to find solace in waiting for their conditions to worsen before returning with symptoms that require ICU treatment. By comparing the number of instances per week of COVID-19 against the number of available beds, the discrepancy in the number of beds available for care is evident in the facilities where treating patients suffering from COVID-19 takes beds away from maintaining other hospital in-patient services. Therefore, it is logical to conceive that the direct solution to the increased challenges associated with finding medical services would be to find alternate sources of care without continuing to alienate those for whom medical services are most necessary—acknowledging that overcrowding significantly contributes to the fear that pushes many needing patients away from care.

Demonstrating that the social and physical aspects of access to natural environments directly impact health and, in particular, health recovery, Roger Ulrich's seminal research in the 1960s found that post-surgical patients with a view of nature required fewer painkillers and had shorter hospitals stays compared to those with views of a brick wall.[22] In parallel, research by Anjali Joseph recently interrogated safety and performance outcomes in the operating room. Joseph's work reflects optimization based on room design and orientation at this exact moment, looking at traffic-related factors as an ongoing study of flow disruptions using digital evaluations of interactions between medical personnel and the patient.[23] Each of these research pursuits, spanning 40 years, offers illuminating discoveries and vividly illustrates the profound influence of optimizing architecture on the recovery of individuals. Their work evidence underscores the importance of considering the physical determinants of health—such as light, air quality, and spatial arrangement—in the design of health-related environments.

Additionally, in the conversations with community experts involved in addressing health disparities directly through various disciplinary mechanisms, they have spoken openly about the heritage of fear and cultural neglect in health services, precisely the dilapidated conditions commonly encountered in spaces rendering health services to the African American community.[24] The frequency of "out of date" architecture related to these medical

spaces increases the need to study the feasibility of new buildings and adaptive reuse interventions that increase access to healthcare immediately adjacent to places not previously programmed for these activities and examine the possibilities of using the design of building components to respond to a range of physical and social ailments that are typically fostering health disparities. These include social isolation, the absence of primary places for medical consultation, and the role of design in working against specific illnesses that tend to plague minority populations. In translating health interventions into a design agency, the context for these spatial practices post-COVID involves the consideration of informal, open, shared, and infrastructural strategies to create a taxonomy of terms that are the basis for intervening archetypes.[25]

As a priority agenda, spaces serving Medicaid and Medicare communities are increasingly being distanced by the rising costs of delivering healthcare in the hospital.[26] To address this growing disparity, there will need to be a shift from prioritization of the efficiency of cost-saving in care to a preference for prevailing proxemics, increasing the number of provisional areas serving health and wellness and addressing the often-hazardous conditions common to an absence in health facilities for low-income communities. Therefore, in health, particularly healthcare, it is vital to discuss the available environment for health access in every community as the intent for medicalization and the aspiration of wellness.

Informal Strategies

Another strategy for increasing availability through an inclusive design model is the introduction of informal spaces to provoke a dialogue between providers and the surrounding community about health by operating casually outside the default conditions of medical space. Through informal interactions in spaces shared between the medical facility and the community, personnel can expand on their role as doctors by becoming community citizens, understanding the position and application of their social engagement as a framework for health, and delighting in the context of seemingly insurmountable challenges by delivering health services through local businesses. One example from a vocabulary of broad approaches, the presence of medical checkups in a barbershop, and the cornerstone of culture for African American men redirects the conditions associated with healthcare in contemporary society by refocusing from the doctor's office to a more direct cultural engagement.[27] In addition, this in situ example of direct engagement through civic concern for the community represents the collaborative possibility for repairing the medical disconnect.[28]

Examining these interventions in the context of enriching doctor-patient-family relationships again reinforces the argument for redundant activities continually available and operating as essential components of the healthcare network to improve health and well-being—specifically, those interventions

that are associated with outpatient spaces and provide private examination activities in public spaces. In this regard, doctor availability is extended through the expansion of what constitutes a medical environment and the role of non-medical personnel as health professionals, thereby amassing new spatial and temporal associations beyond the substantive parameters of a single building type, the hospital and its material characteristics as building defining the availability of healthful engagement. Consequently, it requires shifting the priorities in the planning and programming of healthcare toward new delivery models and conditions for the enjoyment of medical space at scales ranging from domestic to institutional, even civic, when they exist within the regional definition of medical institutions.[29]

Informal spaces are not new in architecture as there is a distinction between them and formal counterparts, uniquely characterized by adapting formal spaces to spontaneous use for activities. A parallel consideration of informal space is space considered liminal, such as corridors, lobbies, elevator bays, and even promenades. The relationship between liminal space and informal space depends on the determination of placement and level of activity. While not all liminal spaces are informal, many can be. In determining the availability of environments for mediating the transition into medical space, the claiming of these liminal spaces for informal engagements blurs the differences in the definition of liminal space for programmed activities as the consideration of pre-checking, consultation, and checkout procedures in these spaces changes the shape of use for the space.

The terms "informal" and "informality" have been applied in architecture and urban planning to discuss the unplanned settlement of a region or the self-made aspect of building. For these discussions, the role of informal strategies outside and inside the hospital as a transitional space mediating patients' transition into medical space would better fit the description as spontaneous activity-generated spaces curated to the different contexts. The following elements of a building program or room provide an intriguing medium for an informal liminal space: corridors, lobbies, elevator bays, window seats, promenades, stairwells, courtyards, and rooftops. Each of these liminal spaces' capacity for informal patient and doctor consultations can be influenced by the location and degree of access, most notably by the level of engagement they offer to persons arriving, engaged in waiting, or departing an activity or facility. The openness of these spaces, which provide access to healthcare, welcomes people into the presence of a hospital as a community entity, reflecting the civil concept of healthcare as a human rights matter. These concepts parallel Henri Lefebvre's idea that the right to the city involves access to housing and essential services and the right to shape and experience urban space. The hospital is one of the most critical spaces where informal spaces and social interaction in everyday spaces would reshape the cultural expression of health.[30]

Reparative Health

Presiding over these new agendas for informal spaces is a familiar narrative on access and whether heavy investment into flagship healthcare facilities renders a diverse enough balance of care opportunities for the uninsured and vulnerable populations at a scale accessible to them. Different considerations on the engagement of these persons comparable to the scale of their need are debatable when addressing minority health, which in the context of the arguments posited here involves interrogating the concept of a hospital or health center providing public amenities. Public amenities, by definition, provide the utility of service to everyone in an area as a provision or incentive for the building's development. In this approach, the amenity is analyzed for its ability to provide visual, spatial, and physical access simultaneously, considering that it serves a need more significant than the occupancy supplied by the facility.

It also incentivizes the capacity for architecture to be configured and arranged to benefit said services, which in these cases would involve a significant amount of access to public health, meeting the criteria of healthcare at the level of the uninsured and persons receiving financially assisted living. Of the approximate 6,120 hospitals reported by the American Hospital Association, 5,129 were listed as community hospitals, and another 2,987 carried non-profit status as a community hospital. However, for the majority of urban environments, particularly cities where the population is within the upper 10 percent of minority populations in the United States, the hospitals prevalent in these communities fall in the category of investor-owned community hospitals where the facility's priorities are more aligned with insurance policies and investor-led criteria of patient admission and care. Each of these hospital typologies offers areas for improving access for underserved minority populations in as much as it is currently considered in addressing contemporary healthcare reform and whether the conditions appropriately align with the Triple Aims of Healthcare (Berwick, Nolan, Whittington, 2008) and its appendices regarding the interventions for improving the personal health, safety, and welfare of populations and caregivers while reducing health-related costs.[31]

The gaps in healthcare are particularly alarming since the United States Department of Health and Human Services Office of Minority Health reported that the death rate for Blacks/African Americans is generally higher than for Whites for various complications, including heart disease, stroke, cancer, asthma, pneumonia, homicide, and recently COVID-19. All of these are complications typically treated within hospital environments. Understanding also that Blacks/African Americans are twice as likely than their white counterparts to seek medical help at one of the previously defined community hospital types, these facilities must remain open despite financial or facility complications. In a critical sense, it is the community hospital or federally

qualified health center that provides space for renewal through the reclamation of healthful space for Blacks/African Americans and Hispanic/Latino people, whether arguments for open space engagement, informal service provision, or a shared response to medical needs, the necessary infrastructure of health that is missing in the absence of community hospitals and healthcare that is culturally familiar in the conceptualization of health is a realization of these facilities as both an agent and agency.

Any restructuring or repair of health services for underserved populations that primarily consist of Black/African American and Hispanic/Latino communities requires building back against compounded generations of health disparities. It is important to acknowledge the differences in how Black and White communities experience illness, as well as the historical context of the mistreatment that has occurred between these groups. The atrocities committed, often with governmental support, have severely damaged the relationship between Black individuals/African Americans and the healthcare system. It is from this pretense that the architecture of health has failed to serve Black/African American communities and other minority groups as well, as the lack of trust in measuring wellness and welfare differs within the contextualization of health for each community. It is the conceptualization of a universal approach that, for some facet, arrests its expansion while simultaneously immobilizing any health intervention by external health networks within these communities. In making the parameters of this morally philosophical debate architecturally tangible, the work of building any capacity for healthcare in vulnerable communities must examine the measure of each commodity as having a unique agency with outcomes that posit agendas, interventions, and the assessment of prototypes working in favor of improving health as first steps. In this context, the work seeks to define the appropriate manner of criticizing an architectural concept for realizing healthful goals and the aptitude for a healthful agenda cognizant of culture as wellness for these groups first.

At this moment, post-COVID, the social space of health is primarily charged with reconnecting communities and directly related to the juncture of space provided and the willingness to fulfill cries for justice in the maintenance of cities. The remaking of narratives in health requires an assessment of success in electing to increase funding or decommission health space in the vicinity of minority populations. Metrics such as maximizing resident space in a facility for a particular constituency may not be appropriate in defining the facilities' capacity for engagement in either inpatient or outpatient care. A much broader understanding of metrics such as these and the unique capacities associated with minority populations in healthcare and hospitalization must be considered to define the gap that any new interventions will address when serving the needs of these communities. As ascribed, health access is the absolute politicization of space, whether employing travel distance to and for service, type of service, or capacity of the service center, and

the character of urban conditions further defines how public space involving healthcare shapes the lives of all people.

These criteria are dynamic and include the social and behavioral aspects of people in the politicization of medical facilities, mainly when they conflict with the values and community culture. While there is very little doubt about the role of community values, the question at hand is whether it is advantageous to provide health services without improving the economic strategies for the community, which significantly reduces any sense of equity. As such, the criteria of this research is to integrate approaches to health interventions without introducing financial burden, a goal prescribed through the tenet of the Triple Aims of Health, an infrastructural framework defined by the United States National Quality Strategy, for strategies of public and private healthcare.

Interventions Not Institutions

What is intriguing about the criteria established in the Triple Aims of Health are their specific applications in architecture and the way they establish a dialogue with the institutions of medical service to assess patterns of interaction between patients, staff, medication, information, supplies, and equipment. By examining a singular element within each of these criteria, it is surmised that there are essential elements to consider in improving the experience of care, improving the health of populations, and reducing the costs associated with services for the target individual or group within medical environments. Expanding beyond these as a core approach to the environment (patient-centric, family-centric, staff-centric) are studies on the quality of space for the newly derived fourth and fifth aims, which consider provisions for medical staff burnout and the varied approaches to equity in these environments.

As a system for addressing disparities in the health of minority populations, pairing the triple aims of health care with guidelines on the flow of healthcare and principles of inclusive design is the equivalent of compounding attributes of each constituency toward a multifaceted prelude for which the conditions provide more than the needs of a single population. In theory, by meeting the needs of minority populations, these design approaches are also creating the capacity to define a much more equitable interpretation of how the social disparities of health and healthcare impact the larger body of health across multiple levels of socioeconomic status for the built environment. Justifiably, in applying the critical definitions of health in this introduction of the pairing of health and architecture, it is essential to unpack the flow between states of any given criteria as they relate to the creation of new medical space by reframing the patterns of movement previously limited by barriers to access for another group in the activation of a health facility. More specifically, the connections derived from the different alignments in overlapping frameworks help architecture to translate the interdisciplinary spatial

legibility in connecting building elements to the prime narrative of healthful environments for healthcare.

In principle, the work focuses more on the community intervention in place of the institution, a phenomenological shift in the conventions conferring healthcare flow outside a hospital as part of extension services. Design criteria work best in prescribed manners, especially when built to serve the creation and analysis of iterative speculations. However, the discussion thus far posits that the institution alone is inadequate based on its previous interactions with minority communities, revealed by the challenges of a post-COVID society. In disarming the emergency mode of community healthcare, the non-medical environment intervention represents a direct level of engagement without constricting parameters or prescribing territories for service. Since many of these applied learnings already exist in some capacity or another across the planning and programming of community health, this narrative is primarily charged with comprehending how subjects such as flow or movement in a medical facility uniquely impact minority communities and, as pointed out in these works, the means for reinterpreting contrasting guidelines away from a situated understanding of care to any plausible combination of communal flows of healthcare and acknowledging that each is working toward rethinking and reimaging the distinction between clinical and public health as synergistic wellness.

Working with interventions over institutions is about challenging the current barriers that may be accepted conditions within an otherwise working urban environment and determining how these conditions create inequities in healthcare. The contemporary landscape is fraught with issues, many germane to the city's complex densities. To interrogate these complexities requires learning from Black/African American communities directly about what they have encountered that restricted their access as precedent and establishing new vehicles around cultural preferences as a means of taking and then developing equity through the architecture. Improvements are not limited to building access but also frame doctors willing to engage patients in their communities as a critical component of these investigations, which include their ability to provide, access, and maintain current medical equipment within conditions that are feasible for the utility of devices in service to communal health. A tenet of communal health is the widespread distribution of medical services, health mediation, and health protection across the population as the ecology of health. The role of the intervention is to examine these gaps in medical services, personnel availability, and public health infrastructure, investigating mediums and methods for delivering services outside of the centralized hospital as a primary medical resource.

In the broader context of challenges for isolation and dwindling infrastructural support through Medicaid/Medicare, there exists, at scales typically not addressed by mega-hospitals, a chance to revive the heritage of local doctors

working immediately within their communities when discussing more holistically health provisions and services. By looking more closely at the impact such interventions would have on a community and the means for engaging the community as learned from the engagement of Black doctors within the Black/African American community during the pandemic, this narrative proposes specific interventions to clinical procedures and their agency by dispersing them across civic interventions in addressing public health. These speculative studies delve into territories of urban design, thinking of architectural concepts for public health while postulating on the relationship between public life and healthfulness. The results of these postulations speculate on intersecting modalities and scales of domestic and commercial buildings as instruments of healthcare distribution outwardly across the city.

Given the complexity of providing healthcare, the concepts of clinical health and public health served in smaller capacities, from a kiosk or mobile unit through to more commonly familiar building additions or reuse interventions in residential doctors' offices, harken back to the scale of interaction and distribution pre-Health Maintenance Organization (HMO), wherein Black doctors and their constituencies served as mediators for various issues ranging from disease to disparity. As a host of new challenges emerge from the increasingly dense conditions across the world, the territory of each—the clinical and the public—becomes more difficult to recognize, with the same being true of the role of facilities burdened with the task of sheltering the healthcare enterprise. These compelling arguments for thinking of urban ecologies holistically as health ontologies expand the scale of facilitating healthcare from a singular approach as a clinical perspective toward public health as an equitable condition mediating both the physical and social wellness systems. In this regard, the hospital is not a building; instead, it is an operative situation for cultivating a holistic approach defined by common sense in care and the community's heritage as bedside manner.

Available Resolution

While these arguments posit that architecture has the transformative potency to reduce vulnerabilities and enhance health capacity through data-driven, health-focused design, it is essential to reflect on the limitations inherent in this approach equally. Architecture, as a discipline, does not operate in isolation. The success of any architectural intervention, particularly in addressing health and vulnerability, relies on its ability to remain engaged with broader socioeconomic, political, and cultural contexts. The interdependency of project design and client needs raises important questions about the extent to which architectural ideas are formed and the transparency that the information-gathering process maintains, which genuinely influences the

acceptance of the findings and the corresponding proposition. The continued presence of a design team within a community is significant for working with vulnerable populations as their contributions are often significantly different from the assumptions of a design team working in isolation from a project problem.

The significance of community participation in data development and verification is representative of the complexity and variability of the determinants of health. While architecture has a history of addressing the many physical aspects of the built environment—such as air quality, light, and spatial layout—there are numerous social and economic determinants that fall outside a commonly referred influence of architectural design. Issues such as poverty, unemployment, education, and access to healthcare are often referenced as being driven by more significant systemic factors that architecture, in the sense of building design, cannot resolve. Even the most thoughtfully designed elements cannot compensate for the broader socioeconomic disparities contributing to health inequities. Therefore, it is plausible to render these approaches overly optimistic when implying that architectural interventions can fully mitigate vulnerabilities or build comprehensive health capacity without parallel policy, governance, and social service efforts.

Optimizations do not end suffering, and while reliance on data-driven tools and analysis is robust in facilitating new conceptualizations to address issues, it also introduces its own set of problems. The precision and objectivity these tools promise can sometimes obscure the nuanced and subjective aspects of human experience central to inclusive design. With their potential for an infinite number of variables, parametric tools may be efficient in optimizing building performance or resource allocation. Still, they may not fully capture the lived experiences, cultural values, or social dynamics that influence how people interact in space with one another or the spaces themselves. The social and cultural acceptance of architectural interventions frames their effectiveness. A theoretically sound and data-driven design may still fail if it does not resonate with the beat of a community. The sharing of findings and medium for implementation is equally important to the process of gathering the data and highlights the importance of engaging communities in the design process, ensuring that architectural solutions, even when data-driven, are culturally sensitive and metered by community involvement.

These limitations point out that while architecture has the potential to influence health outcomes and reduce vulnerabilities significantly, it is not a panacea. Architecture must maintain a broader, multidisciplinary effort that includes the design within an ecosystem of policy reform, economic development, and neighborhood support to establish resilience in the face of vulnerability. Without these complementary efforts, the impact of optimizing architecture using health criteria to address resilience may be limited or even counterproductive.

However, acknowledging these limitations does not diminish the importance of architectural optimization in building health capacity. Instead, it reinforces the need for an integrated approach to architectural design that is accessible in both education and practice. The challenge, as outlined in this introduction, highlights the necessity of viewing health and its comprehension in design optimization as a critical component within a larger ecosystem of architectural determinants, an approach that differs from seeing architecture as a factor in health determinants. By recognizing the interdependencies between architectural determinants, defined as social, economic, environmental, functional, and material, it can be better understood how to leverage architectural design to meet the potential of addressing health determinants while addressing the broader factors that define vulnerabilities and influence resilience.

In resolving this argument, this book emphasizes that the viable application of architecture to support and enhance the efforts of other disciplines to improve health exists within its ability to shape the physical environment in ways that it, as a discipline, is held accountable. While architecture alone cannot resolve poverty, malnutrition, or healthcare deprivation, it can create environments that empower communities, improve access to services, and support economic opportunities that increase the chances for shelter and housing. Similarly, while data-driven tools cannot capture every nuance of human experience, they provide a valuable framework for making informed, evidence-based decisions that can be fine-tuned through community engagement and cultural sensitivity.

Integrating architectural design with public health, urban planning, and social policy offers a powerful synergy that can more effectively address vulnerabilities and build resilience. As an interdisciplinary collaboration, this book aligns architectural interventions with broader health and social goals in facilitating agendas to ensure that architectural approaches are sustainable, equitable, and contextually relevant. The conversation this book frames represents a conceptual bridging of spatial vulnerability across different perspectives on the built environment of health and healthcare. Framing this exploration as practical considerations and theoretical strategies, architects can use to address spatial vulnerabilities, including the role of cultural sensitivity, design optimization, and the integration of community-oriented sustainable practices for architecture and urban planning. In presenting practices and personal perspectives, the contributions demonstrate the challenges and effectiveness of architecture as a field when aligned with social and health objectives. And while the contributors are limited, their influence on architecture in addressing health and vulnerability is real and significant. Each underscores the importance of a comprehensive, collaborative approach that integrates architectural design into new health mediums while incorporating new resources into the architectural design processes.

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3

ACCOMMODATING AFFORDANCES

Ulysses Sean Vance

Accessibility and Disability Acts worldwide outline the comprehensive requirements for buildings and facilities to meet various impairments. Primarily focused on clearances, these accommodations establish affordances for approach, maneuvering, transiting thresholds, occupancy within limited confines, places for seating, travel paths, and content legibility when traversing an environment. Each maintains its minimal requirements, but they are all typically associated with mobility, motility, and exertion limits when operating a device or navigating a space. Adherence to the standards they define is typically locally enforced. Each locale references the broader intent defined by a country or state and the associated governance of the rights of disabled persons.

In the United States, the Americans with Disabilities Act (ADA) is a comprehensive law prohibiting discrimination against persons with disabilities. The ADA comprises five titles, each addressing different areas of discrimination.[1] Title I addresses employment and requires employers to provide reasonable accommodations to qualified individuals with disabilities. Title II applies to state and local government and requires them to provide equal opportunities to persons with a disability for programs, services, and activities by the municipality, requiring compliance for the facility, whether new construction or adaptive reuse. Title III applies to places of public accommodation and requires these entities to remove barriers to accessibility. The modifications can be in the form of a step-less entry to an existing space, the alleviation of communication barriers, challenges to legibility, or discriminatory policies that prevent equitable access by all persons committed to using the space. Title IV requires telecommunications companies to provide intermediary services that assist people with disability when communicating

DOI: 10.4324/9781003535768-4

across noncompatible devices. Title V maintains the technical description of liability and mediation concerning the guidelines' assistance, enforcement, and administration.[2] The five titles define the capacity to address discrimination against people through liability but do not frame the obligation to apply the criteria toward creating buildings and facilities. The ADA Accessibility Guidelines (ADAAG) is a set of technical standards developed to promote the interpretation of a requirement for buildings as mediated by a local or state reviewing body.[3]

Accommodation and affordances are closely related to the guidelines from accessibility acts but are not limited to space planning applications. From an architectural perspective, accommodations refer to a device's physical space or dimensionality required for a particular function or activity.[4] These include the approach of persons or devices to a space or appliance and the necessary room in a location for people to carry out their tasks comfortably and efficiently.[5] Similarly, affordances are the actions that a space invites or enables. Affordances, in architecture, tend to focus on the clearances associated with use in space but can also include factors regarding the physical characteristics of assistive means and the location of these means based on the size and layout of the space. The connection between accommodation and affordances lies in the comprehension of the physical design as influencing the interaction in a space, which includes an understanding of kinematics and the appropriateness of the space concerning the features that occupy the space and the character of the space itself.[6] Across this chapter, the discussion will cross-examine the articulations of perception, occupation, and materiality as an embodiment of experiences informing the production of an architectural solution, as well as the integrated role of health capacity as a matter of accommodating affordances in spatializing health.

Transitional Activities

In theory, providing adequate capacity for an activity should render comfort legible in a space. To connect this thought to transitional space, the resolution of activities and interactions happening within a space, such as a passageway, becomes complex when sharing the space with fixed or sedentary behaviors. The preparation of liminal space to accommodate informal activities depends on the manner of engagement acceptable in the space and the ability to calibrate the boundaries between degrees of privacy in public space. In establishing the boundaries of activities in liminal spaces to allow persons to transition from one environmental experience into another, this research considers four types of engagement, which will frame the discussion of experience in the resulting transitional space. First is de-escalation, which, according to the National Institute for Health and Care Excellence (NICE) Guidelines, involves providing space for a crisis intervention to prevent more aggressive or harmful

actions.[7,8] In establishing transitional spaces on approach to a medical facility, the de-escalation spaces are intended to reduce the intensity of anxiety patients or staff bring into the medical environment. These include finding space for the peaceful management of conflict and interactions, giving patients an environment where they can effectively navigate challenging emotions by experiencing natural settings to promote positive emotional preparation.[9] Next is decompression, which, while not explicitly defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM) as a treatment, does include assessment related to the resolution of various mental health conditions, such as anxiety disorders, post-traumatic stress disorder (PTSD), and sensory processing disorders. These disorders, according to the American Psychiatric Association, do suggest the readjustment to a less intense or stimulating environment after exposure to a highly stimulating or stressful one.[10] Resilience is the third criterion and is the ability to recover quickly or easily from misfortune, shock, or illness.[11] Resilient spaces, coupled with a decompressive space, give people a moment to recover, feel supported, and be ready to talk with others about the conditions that ail them. Resilient spaces also, in the context of a natural disaster or other large-scale event, attenuate the adverse conditions and are planned in such a way as to connect incoming persons to safety in a removed section of a facility. These may include the gradual elevation of grounds surrounding a building to the second floor to account for flooding or the incremental establishment of vestibules to control external temperatures of an extreme nature. Lastly, the reparative spaces present incoming persons with the hope that matters will be resolved positively. The upcoming chapter discusses the concept of a reparative space and concerns regarding cancer patient consultations. The discussion involves the consideration of color psychology, lighting, furniture layout to maintain eye contact, and views of nature or other sensory elements that present pleasant, immersive experiences.

The foundation for transitional spaces is in the human experience of space and is the rationalization of capacity as an immersive experience measured by perceptions set against occupancy and materiality.[12] In designing based on this understanding of capacity, the realization of perception as a matter of affordances is derived from actualizing affordances as an actionable object in space. The ability to sense, in some capacity, the space as an environment is different from the objects as bodily figures in a space. In this definition of affordance as a capacity, the space as an element is separate from the engagement with the body of an observer interacting with the physical element in that space. Recognizing that the affordances are separate reframes capacity as the volume allowing occupants to navigate a space and enact some task. The actualization of perception as a component of capacity in accommodating a presence with a bodily figure in a space encompasses the totality of that form against some constraint of proximity and interaction. Establishing

parameters that ensure the inclusion of individuals with disabilities is crucial for promoting equal access to sanitation, hygiene, shelter, and employment. This approach highlights the importance of physical spaces and how various elements interact with the human body. By focusing on these aspects, we can better address the wide range of human experiences. It involves embracing the physical along with the emotional and psychological dimensions of bodies and the conditions of utilization, incorporating the differences in dimensions of bodies and the perception of space for those bodies, and recognizing the anatomy of affordances as bodies themselves with distinct conceptualizations inextricably linked to the space of an object and its use.

Conversely, studying bodies, in all their diversity, also means examining the qualities and character of their movement in terms of people and building elements. In this comprehensive view, capacity is an understanding born from the comprehension of kinematics for people, places, and things, providing insight into the nuances of occupancy that are presumptively prescriptive.

Elastic Affordances

James J. Gibson's conveyance of the perception of things is interpretively some combination of space and capacity set against an object. However, the character experience from this observation is limited as the criteria are presumed to be visual based on the isolation of shape, size, and color.[13] Still, the totality of perception is best comprehended as the reasoning of multiple senses together. The encounter of a thing determines what the thing, such as a space or object, can afford to do, and the remembrance of these occurrences frames the proprioception as all bodies have affordances based on past experiences, for which memory assists in assessing the risk associated with their interaction.[14]

In creating new experiences that disrupt the hindrance from bad experiences in previous encounters, it is vital to recognize the presence of the objective body in space as directly attributable to the subjective communication of emotions and ideas based on past experiences. The stories that come from a remembrance of a place are the embodied interaction and engagement encountered from those experiences in the space and form a unique interpretation of the space as a dialogue of what they see, feel, and attribute to a sense of intimacy within the setting. The illusion of intimacy in a room directly correlates with Merleau-Ponty's articulation of an embodied perception as the spatial exhibition of comfort or coziness attributable to the ability to find shelter within a confined space. Like Gibson's argument, the Smithsons architects argued that the volume of space around or within a building frames the human experience as architecture and articulates the feeling of intimacy for a space, involving the human scale in designing spaces that facilitate good communication and interaction between activities.[15]

For both, any phenomenon that disrupts access to a space or the experience of space produces uncertainty, and this hindrance in promoting wellness and well-being is detrimental to a healthy space. Instead, exploring opportunities to offer open and flexible spaces that encourage interaction and support different modes of communication allows persons to more readily transition into whatever role their participation may play in entering a healthful environment. A closer reading of Merleau-Ponty implies that recognizing the role of perceiving different aspects of space in the communication and interaction of people through the habit that forms around the materiality of a volume or conceived emptiness as an affordance is the character of that volume of space.[16] The application of materiality is commonly inferred to be the designation of surface quality of objects that are respectfully the elements of the confine toward an experience beneficial to the occupancy and navigation of the space. Proprioception, alongside materiality, is reimaging these characteristics as belonging to the volume of emptiness associated with affordance as much as they belong to the object or element.[17] Embracing this perspective of materiality as communicating with proprioception, the encounter of a volume between objects has form and a subsequent mass that can be zoned, measured, and arranged to communicate formal and informal activities as a transitional experience to accommodate different engagements between the occupants of a room. Note that occupants in this writing are understood in the standard terminology used by architects to describe the subsequent capacity a mass carries based on its occupancy, occupancy load, and ascribed movement within the volume as an association of clearance for approach and activity attributable to the specifics of an object or element as a device or appliance providing assistive accommodations.

The anticipation of surfaces from proprioception in a space influences the overall shape and configuration of the enclosure and, subsequently, the architecture. Assuming, like the Smithsons outlined in *A Charged Void*, that space designed to fit the human body and its sensory experiences of the material informs a surface's shape, color, and texture is conveyed through the manipulation of its flatness or curve, its levelness or acuity, or even its durability as to invite or deter some form of engagement, whether to sit, stand, or hide. In this case, these perceptions, on the whole, which are collectively visual, audible, and tactile, are the conception of shape and shelter as formed, experienced, and relied upon by the measure of that experience. Applying a proprioceptive approach to accommodations based on the interpretation of mass, volume, and form of their affordance as a body in architecture involves representing the perception of the body in a way that is informative in depicting activities in various states. In these capacities, architectural representation must elect to accept or challenge societal norms and stereotypes about the body and how its capabilities differ based on age, illness, or impairment. Before deriving a volume associated with proprioception, it is critical to establish a means to

evaluate the kinematic understanding of bodies and the manner of movements in the corresponding parts.

The architectural act of procession, which is the association of activity with a progression through space toward a destination, involves framing clear and intuitive means for navigating the space and the ability to orient relative position from where the travel started and the intent of where the travel is going as a destination.[18] Additionally, considering inclusive design involves comprehending exertion in travel, the physical capacity of effort, and the corresponding assessment of places for rest during transit. Levesque's interpretation of access emphasizes the importance of available space and, in the reasoning of availability against acceptability in the context of movement, stresses the importance of designing for the limitations of the body as much as its capacity. Considering the effectiveness of environments as spaces that are not only physically accessible but also inclusive and welcoming to the needs and experiences of diverse individuals is essential.

In working to understand the characteristics of diverse bodies, the author's research at the University of Michigan established an initial position on the physical presumptions from ergonomic studies that could be applied to visual programming language in a three-dimensional modeling application. The research documented the simulated movement of early adolescent bodies to generate the parameters that would later be applied to a compendium of classroom layouts, modifying the existing furniture spacing to allow coordinated exercise breaks within the classroom without disrupting the classroom arrangement. Using Microsoft Kinect's three-camera system, the research team recorded and converted simulated activities into a catalog of measured displacements from a standing start position through one minute of the selected activity. The resulting documentation of displacement by the body was categorized into three levels of exertion, from which simulations were charted based on the range of movement, displacement, and level of exertion exhibited in the diagram. The running of these simulations allowed the research to conclude the amount of spacing recommended by partners in Kinesiology and Education and directed layouts modifying furniture arrangements in a classroom template created by the author.

By running the simulations and presenting the findings through a classroom modification template, the research has effectively contributed to a significant number of interventions for activity breaks in third-, fourth-, fifth-, and sixth-grade classrooms as part of the Interrupting Prolonged sitting with ACTivity (InPACT) program across the State of Michigan.[19] The research categorically profiled low (stretching to light walking), medium (moderate walking and stationary activities), and high (climbing, jumping, and running) as the minimum to maximum criteria for movement in the spaces between desks, chairs, and other furnishings. The Kinect-Rhino3D Movement Simulations

defined the minimum criteria for aisle width based on the activity type. The optimization of space between seating and furniture differed from the optimization of space per child for entering and exiting a specific furnishing. The research project came as a result of the realization that there was not a definitive criterion for the spacing of children in a classroom based on either a maximum determination for overcrowding or practices such as an activity break in the classroom. As a result of the interrogations of the different work zones in the classroom, liminal space uncovered in the analysis was consolidated into activity zones and transitional spaces were developed, forming buffer spaces throughout the students' transition to the activity zones from their desks. The research studies are, in many ways, an early attempt to identify affordances for an activity and provide accommodations not present in any building or occupancy code.

Consequently, the research findings of this study, Active ClassSpace, and its parallel study in Kinesiology, InPACT, determined the effectiveness of an active buffer surrounding the room when students are arranged in one of 20-plus room arrangements, which fell into two categories for prioritizing organization: (1) teacher observation and (2) occupation of unused storage space in the classroom. The categorization of these priorities facilitated directing the activity spaces toward the students and away from the teacher based on in-field observations of the teacher's movements during early testing. The observations also uncovered the need to locate the teaching during simulated patterning of the furnishing arrangement. These strategies for locating random variables that disrupt the organization of established patterns informed the way the research determined success for layouts of furnishings and the optimization space for transition, buffer, and activity zones, as there are at least three types of participants that can influence an outcome based on (1) participation in the activities, (2) non-participatory standing observation, and (3) non-participatory seated observation. These findings have significantly influenced the production of patterning for transitional spaces and the separation of activity, buffer, and transition spaces against other existing factors that include (1) visual connectivity studied through isovist mapping, (2) chronotopic cartography measuring displacement in activities, and (3) the array of resources associated with informal activities that aid or prevent conflicts as determined by a simulation where exertion, space, and time are managed together and given adjustable relevance. Together, each of these preliminary interests in the organization and arrangements of furnishings in a room collectively influences the characteristics of the experience of the space. Still, most importantly, they establish a means for determining priorities in the configuration of elements and the resolution by which existing conditions can be interrogated for their dynamic adaptability when effectively accommodating activities.

Effective Accommodations

As the previous discussion of work zone versus activity zone study established, understanding displacement from simulated human modeling clarifies optimizing affordances to meet accommodating expectations. The optimization of affordances is vital to note across various increments of spatial scalability as architectural concepts remain guided by Aristotelian conceptualizations of bodily affordances, even as the digital expansion of architectural investigations transitions from two-dimensional exploration into three-dimensional exploration of displacement with the advent of digital modeling. Additionally, immersive analysis and performance testing mediums using computer-simulated reality expand the post-digital argument of architecture as a static resolve. The introduction of chronotopic studies and the use of time displacement in interrogating building elements, objects, and spaces are understood in this research as defining the performative measure of how a building or space shapes the experience of time per engagement for those who inhabit it. The performative measures include the spatial organization of pathways, places of respite, and spaces for informal gathering along a direct or alternate route and exploring these spaces' social connectivity. Despite their differences, these constructs, such as urban, building, and virtual ecologies, are essential in defining a spatial practice based on affordances as a narrative basis for inclusive architectural design.

The crafting of any performative measure of spatial organization in post-digital architecture has long moved beyond the empirical geometries regarding the occupational tendencies that persist for the human body mobility between destinations. Transitions need not only present themselves in a space as flat surfaces. Instead, the progression itself can present a sense of awe and reverence to the movement between places, making the experience less about the destination in front as presented in Gordon Cullen's concept of serial visioning in Townscape but rather creating an immediate sense of shaping how spaces are encountered in a moment that connects across an expanse of material experiences along the progression. The inversion of attention is shifted from the soaring character of a space to the complexity of transiting topologies more immediate to the body, as in a railing or a wall, and the continuity of that experience creates a sense of progression. Munari understood this in 1966, as he looked in upon the topology of a cube made of rubber in the context of sculptural form. His connection of how forms and spatial relationships are bound and manipulated beyond traditional geometries opens the consideration of shapes and surfaces as bodies that possess continuity and transformation. His observations of the Mobius strip as a material being, a body under constant deformation, stretching, and bending but not tearing, aligned with the sculptural plasticity of the human form, another body made enjoyable from the fluidity and flexibility in its parts as they move through positions.

Like the topology of the human body, architectural bodies result from their fluidity, facilitating interaction amongst interconnected forms. A matter of shapes given form through the material being, becoming affordances made unique and whole from the accommodation of shapes, sizes, and movement through cavities. Topology gives architectural affordances abstract conditions for interpreting boundaries, as these accommodations are also an acceptance of internal and external presence and are constantly negotiated as terms and conditions for occupancy. In this capacity, topology gives architecture a formal construct, meaning it is the production of a body that exhibits measured outcomes and rules to advance the articulation of it beyond geometry and similarly creates its informal presence by which events that exist happen and are spatiality are embodied. In these capacities, the purest topologies are full of otherness from an intuitive place between conscious form and subconscious perception, which, even when unseen, is felt.

Thus, the *operation* of architecture, the conditions of its production, in particular, is also responsive to the fact it adheres to both the formal and informal agendas in ascribing an atmosphere to an area that is not solely defined by the body of the object but rather signifies the ecology as a relationship between the individuality of it as a body in use. As an architectural body, the interpretation as an ecology presumes an exterior and interior, and these inferences of formality and objectivity charge the intent of its presence in occupation. The notion of occupancy makes architecture different from other bodily affordances, defined as sculptural experiences from the outside without an intent for habitation. Structuring these bodily affordances together forms the basis for a specific type of spatial engagement when deploying different devices: enclosures, thresholds, rooms, and grounds.

De-Escalating Topologies

In strategizing architectural elements to accommodate persons transitioning from one environment to the next, differences in an attendee's mental and physical state can shape their transition into medical care. Spatially, the transitions give attending staff time to prepare for unique challenges as they present themselves, often assisted by security measures that can further antagonize an already traumatized patient as well as staff. In exploring options for interventions that incorporate an empathic approach to first contact in medical facilities, transition spaces provide time to assess the situation and alter an intervention relative to a social gathering to render support, physical action, or activity, and even time alone to calm or relieve anxieties. Each of these, in part, contributes to an experience and, when brought together, works as options assisting attending staff to communicate the transition into a facility. These concepts work for multiple intervention types as methods for de-escalation, and the initial work investigated for transitioning between classrooms within elementary schools

is indirectly applicable to persons arriving at a medical facility as the primary concern is providing an experience that allows each person to find a means to relieve the stress from a previous encounter.

In an architectural sense, the interrogation of a building as the elements of a building's composition, its walls, roofs, ceilings, and floors, and most importantly its thresholds and apertures, offer a reasoning of the experience associated with these elements as objects in part and as a whole. Objects can have both an implicit and explicit gestural meaning. For example, visual characteristics differ from hand and finger positions when gripping an object, as defined by how one engages with the object's shape versus what is perceived when seeing the object. Changes in an object's shape, weight, and materiality challenge the manner of human gesture, and the differences, whether large or small, define the corresponding behavior of the hand and body and its relationship to its use. The physicality of the individual object as a unit of a whole is significant in the definition of aesthetics. As Roger Clark and Michael Pause point out in *Precedents in Architecture*, the definition of the unit is its relation to the whole, wherein the unit identity can be unique and maintain a relationship to other units in a particular manner as to form a whole in the creation of a form.

In understanding the relatedness of the unit within the context of architectural elements, the floor, seat, and wall are identified in an earlier study by the author as intriguing elements to evaluate the concept of a part of a body and its variability in relationship to the size, shape, and pliable distortion of objects. In examining the floor, seat, and wall as a tactile interface, we can explore the characteristics of a unit and its capacity to twist, stretch, and bend. These movements define a range of interactive motions that, when applied consistently across the entire structure, adapt to varying levels of physical engagement. In these early studies of a haptic interface, the research project by the author titled Drop, Kick, Push, Pull categorized low (seated or resting movements), medium (stretching to light walking), and high (climbing, jumping, running) engagements and corresponded the activities to the aggressiveness of a complete form.

In Drop, Kick, Push Pull, the physical adjustments across the whole body of the installation relate directly to adjustments in each part and are controlled by the uncertainty of playful engagement when encountering the variegated surface. A range of varied placements of large-format haptic interface devices, or controllers, mark the displacement in the surface, continually changing and challenging the body to move without causing discomfort. Devices like these controllers have proven quite effective in research on multi-sensory environments for autistic children. As derived from the conceptualization of sensory rooms, the research project questioned static soft or hard surfaces by testing the plausibility of kinetic resonance within the same surface while

demonstrating methods for physically suggestive encouragement of bodily movement by the surface. The research was limited to formal considerations of the handgrip, weight-related displacements in standing and seated positions to engage the wall elements, weight displacement by hand slap, and displacement by isolated muscle movements specific for standing or seated positions. Research development evaluated each wall variation for the ability to facilitate interaction at varied heights relative to horizontal movement along a corridor. The temporary colorization of the wall from onboard lighting gave the tactile interface a visual response. In contrast, a light buzz gave a haptic response.

Thus far, in this chapter, discussions of affordances and accommodation focused on the physical studies of successive movements to determine available space. These studies include the conditional analysis of accommodating bodily affordances as the space created to facilitate engagement at the scale of urban, building, and spatial ecologies that support social interaction. Applying the scholarship gained from the Drop, Kick, Push, Pull project to the mechanics of social interaction not only includes accommodating bodily affordances in the speculation of buildings and rooms but also includes diverse experiences in achieving equitable conditions shared by persons interacting across transitional spaces. The communication of empathy in accommodations relies on the recognition that each party to a space has a different encounter with the space, and the process of making adjustments or allowances to meet the needs of each person is related but exists as distinct concepts.

Communicability accounts for different types of transmission depending on the discipline. Traditionally, architectural legibility, a form of communication, relies on visual, audible, territorial, and informational means of transmission. In medical situations, communicability often refers to something transmitted or spread between persons, places, or some external vectors as an infectious agent. In the context of addressing architecture and health, the consideration of both terminologies, medically and spatially, is important to understanding the value of transmission in communicating between bodies. Communication supports inclusive design. Equally, maintaining communication is a relevant criterion in architecture due to the differences in perception during engagement in the association of confinement in space for a body.[20]

Defining communication using visual connectivity tools to examine precedents using three-dimensional digital modeling, the studies evaluated maintaining a group of bodily representations as points on travel paths within, around, and through obstacles. The particle movements were shaped by criteria guided by orders derived from "the Principles of Universal Design," a predecessor of inclusive design in architecture, to determine the level of togetherness maintained as the particles traversed variations in the travel

paths. The examination of compositions in particles that represent bodily affordances focuses on the regional impact a surface has on a group's changing formation. It also considers the group's overall position as a pattern of movement, which reflects the communication of progression as an architectural expression. These studies contribute to the development of the four typologies of this book, environment, body, engagement, and agent, as specific interpretations to Levesque's definition of access and volumetrically assesses form as a representation of the lexicon based on the often-subtle differences in interpreting accessibility. Choosing space for these prototypes meant defining a boundary, including a ground plane, and reasoning the figural orientation of the bodies in isolation but connected to the patterns of movement established in these digital studies.

The value of these prototype studies was developing a position on access as a concept no longer tied to the singular narrative of approach and use, which was found to limit a design, but rather as bodies bound to utility, figuratively and metaphorically. Instead, these studies in access revealed that the topography of a body, its surfaces, volumes, and apertures work as a collection of resources outside the limitations defined by mobility, motility, and exertion to propel convenience and choice. In this capacity, bodily affordances are a means to an end toward thinking about issues, not solutions to physical limitations.

These new determinations highlight a common misconception in practicing universal design as "design for all." First, the narrative intent of universal design is to operate beyond accessibility law, with the misconception being that the principles would suffice in achieving expanded outcomes. Second, universal design assumes the design community would inherently know or comprehend the successful application of the principles toward new ideas. These behaviors position universal design and "design for all" as guidelines, which they are not, for circumventing an engagement with what produces the variables found across a constituency's diversity. However, an inclusive understanding of accommodating bodily affordances is the ability to comprehend what is common and uncommon for any grouping of input from the process. It is not an ability or the ability to control decisions or actions; therefore, it is not a lone decision in assessing engagement for accommodating bodily affordances. It is instead an opportunity to understand how all definitions of a condition between bodies will ascribe value to each encounter from various situations that could redefine the body as a whole or in part based on the successful navigation of the element and surrounding space as a collective spatial body. It is, therefore, important to understand that the demographics associated with inclusiveness are not categorically limited. They are effectively the acceptance of vulnerabilities as informative to the fullness of both physical and cognitive diversity and impairments generated by the product.

Pathway as Decompressive Space

Beginning in 2010, the author was allowed to engage medical personnel from various departments, including pathology, pediatric surgery, obstetrics, and the cancer care unit, as part of the medical innovation center at the University of Michigan. These collaborations would ultimately lead to nine years of participatory research projects to bridge the gap between medical and design practices. Of the many discussions, two aspects are directly related to the work of this book. The development of a vocabulary bridging game that was used to facilitate the conversations between architecture faculty, students, and medical personnel, and the development of a transitional approach to space based on pathway studies to determine the efficient engagement of personnel with two audiences, patients and students, in liminal spaces. The prototypes developed for the cancer care unit medical isolation cart and the kinesiology-based interruption of sedentary activities explored the documentation of equipment, services, and procedures related to proposing new modalities for public health. The development of these strategies included redrawing medical instruments, health centers, and healthful activity spaces to understand ways to gamify conversations of medical and non-medical health procedures. The process included gathering data from a participatory panel of experts to map the voids in a health service system as they branch outwardly from the traditional medical resources commonly providing healthcare into the places and spaces of civic and domestic engagement. The gamification of the participatory process helped determine a practical application of inclusive design in architecture that was communicable across disciplinary differences in vocabulary through a simple card game. Throughout the game, participants defined the programmed spaces and the corresponding challenges for medical environments by placing the cards across from one another to create situations. Discussing, with each hand in the game, the feasibility of creating equitable innovations that distribute health-related services to areas where disparities and vulnerabilities are most prominent.

These participatory projects and conversations reimagine people, as patients and personnel, in situations that shape the public relationship with health. Specifically, the conversations helped determine that the liminal spaces of institutions benefit health services by examining environments such as the bathroom, the car, and even the school nurse's office to determine how they accommodate the perception of physical bodies in rooms. The conversations also set up a discussion of behaviors intertwined with what many believe to be healthy activities, such as taking a pill, doing exercise, and meditating, against those understood to as being unhealthy, working long hours, commuting, and being sedentary domestically and at work—all toward rethinking and reimaging the distinction between clinical and public health as a synergistic wellness.

The conversations with medical personnel underscored the complexity of health, revealing how the prefixes of clinical and public reflect the scale of interaction and distribution, serving as crucial mediators in addressing issues that span from disease to disparity. As a host of new challenges emerge from the increasing density across the world, the territory of each—the clinical and the public—becomes more difficult to recognize, with the same being true of the role of facilities burdened with the task of sheltering the healthcare enterprise. These present a compelling argument for thinking of urban ecologies holistically as health ontologies, expanding the scale of facilitating healthcare from a singular approach as a clinical perspective toward public health as an equitable condition mediating both the physical and social wellness systems. In this regard, the hospital is not a building but an operative situation that cultivates a holistic approach defined by common sense in care and reasonable bedside manner.

The rearticulation of architecture generated from these conversations established the position that architectural inquiry, as an investigative module, built off biases, was not autonomously evaluating conditional assessments within a given spatial construct as many might believe. Restructuring these model approaches to the design of ecologies through a hybrid architectural/medical inquiry process requires analyzing the deployment of devices responsive to personal preferences, judgmental references, modifications in the traditional placement of the equipment, and even surveillance in proximity to patient proximity to caregiving mechanisms as part of the decision-making. The conceptual nature of this work, both in urban design and in hospital design, is intended to clarify the relationship between medical centers and civic infrastructures in attaining increased access to health services. These stem from the understanding that the character of the street informs and relates to the character of the corridors and courtyards of civic spaces and that by addressing the problem of hospital grounds as closed environments, this research is establishing a range of responsibility that extends the determination of care to the time before and long after a medical procedure. To understand the plausibility of the hospital grounds as part of a community, the research team derived a visualization tool to map the walkable zone associated with defining a pedestrian activity zone using chronotopic mapping and web-based travel time mapping tools. These established a comprehendible range for considering the total number of pedestrians that would be able to take advantage of walking to a medical facility based on the existing density of housing and assumed an attrition rate of 3.3 percent on a ten-year cycle, which is the average turnover rate across industries at the time of writing.[21] The research proposed did this to calculate a baseline number of patients transitioning to Medicaid or Medicare and takes into account a slight increase when considering a transient population in response to the challenge of urban populations. The research used this material to establish a series of density-based population studies for health

centers based on the possible urban scenarios when considering the design needs of communities and the pedestrian behaviors to and from a medical center that would promote the safe continuation of primary care.

While actively advocating for these criteria in urban areas, it is also understood that these overlapping conditions foster certain shared behaviors that may not be readily available across neighboring bounds. It is also understood that medical service boundaries do not always follow municipal divisions and that separations defined by arterial roadways restrict and can negatively influence the pedestrian routes defined by these measures. Modifications, such as those that increase pedestrian access, should be addressed by adding urban apparatuses that mitigate the disconnect or discord rather than reinforcing it, prioritizing the connectivity between hospital grounds and the community more than causing remoteness or separation. Across the course of this research, there has been much discussion of when and where the territory of healthcare begins or ends. In a very traditional fashion, the hospital is considered an elevated healthcare site, and the doctor's office is considered a minor one. The start of care is assumed when a presumed patient enters the facility boundaries associated with medical activities. In contrast, decompressive care begins with an event. In the case of personnel or patients arriving by pedestrian means, the hospital grounds extend outwardly along their path of travel, whether arriving or departing. The hospital's utilization of satellite spaces for healthful engagement extended the realm of possible interactions between medical personnel and neighboring communities and, from the standpoint of this research, is one consideration of the boundaries in walkable distances for daily activities and routines of patients and personnel walking these neighboring spaces. The realization that modifications in syntax address multiple individual needs, from behavioral to physical, is presented in this material as a study in three parts: the space of physical pedestrian activity, including the existing state of programming physical connectivity of services and entry in and around the hospital, the formulation of methods from precedent identifying patterns of activity and rest in transition zones, and the proposition of provocations as they relate to two primary building elements—the ground/floor plane of hospital grounds and the wall plane as the perimeter of buildings along the ground floor.

Skene, Pott, and McKeown (2017) found that communication is essential to successfully caring for patients arriving at an emergency department and their ability to process separation, transition, and eventually re-assimilation after treatment. The application of de-escalation in spatial practices directly relates to the psychological application of the transition when creating places for people to process the severity of a situation.[22] The concept of a de-escalation space can be applied to various contexts for hospital grounds and liminal spaces within the hospital, with the initial focus of these interpretations is in spaces for persons arriving and in waiting areas. Similarly, decompression spaces or

decompressive spaces are intentionally designed to counteract the continued escalation of psychological separation and primarily serve in places where a traumatic situation might continue to escalate on hospital grounds. The research entertained questions about when and where each patient was considered in sight of personnel within a department corridor or ward or when they were external to these spaces while still on hospital grounds to allow personnel to assist persons experiencing trauma in transition.

Discussions of safety zones, the role of assistive devices and medical equipment, and the extent of engagement when extending patient oversight were compressed, particularly in addressing the vertical movement of patients within the facility or with external activities away from the hospital. The first challenge was to address how much, if any, of the medical work zones would need to be altered and whether or not the same outcomes could be achieved without influencing the existing procedural spaces. This is not to say that this research avoided the criteria of addressing the impact of said interventions on the medical practices or procedural space. However, this stage of work more critically focused on the tenants of introducing social activities related to preliminary care or check-in into the liminal spaces and the overall impact of the various allotments on the perimeter spaces. More than a mere matter of convenience, the initial goals of this research were to posit more frequent social activity spaces throughout the facility. The significant distinction in this research is in resolving the presence of social activity in hospitals, in department or ward hallways, and on medical grounds outside the hospital through two focused approaches: the introduction of vertical and horizontal displacement through continuous syntactic activities and the allocation of pedestrian activity zones and coordinated activity outside the recovery zone with seating in all locations. These strategies are an example of inclusive design as a studio companion in developing the role of presumptive measures reconsidered accommodating affordances toward promoting wellness.

Creating Resilient Parts from Pathways

Working through understanding the disciplinary specifics of transitioning contextually from de-escalation to decompressive spaces, as the assessment of architectural figures, the topologic interrogation of architectural accommodations as bodily affordances in complex figures includes the interrogation of the space of the figures as much as their body as an object or element. The complexity of human experience comes from only working with one or the other and becomes problematic as the transition from abstract to material being interprets the external forces acting consequentially on a material body as purely geometric pursuits. In the context of inclusive design practices, the historical tendency toward compliance in meeting accommodations prevalent across accessible design primarily references affordances

in approach during use with some minor reference to minimal exertion, as is the case for opening doors. These guidelines remain somewhat abstract as they mainly assess the geometries associated with the placement of the human body during use, not the intent, counter-action, and subsequent reactions on behalf of success or failure during use. Interestingly, the missing content in human experience is communication, a utility in the advancing technology associated with computer modeling, particularly in simulation and in the documentation of feedback in the post-digital assigning of variables to associated families of bodies across different software and disciplines. Equally exciting but not fully discussed in this chapter is the role of software extensions related to transferring knowledge between systems and the capacity for much of the lexicon on topology to exist in this translation. Returning to the start of this section, where de-escalation connects with decompression, and in the context of this text examines the capacity of both de-escalative and decompressive spatial bodies to contribute to the resilience of the whole.

The *Wizard of Oz*, written by L. Frank Baum, is considered a modern fairytale rich in critique of authority and psychological command of primary concepts such as home and care. Within the story, the idea of "the yellow brick road" is intriguing as a body for its role as a referential guide in the story "The Wizard of Oz." For those unfamiliar with the story, the road is a guide with a warning to "stay on the road" and "you'll be safe," which parallels the abstract consideration of care and recovery. The Oxford Dictionary interprets "the yellow brick road" as "a course of action that a person takes believing that it will lead to a particular [goodness] desired outcome."[23] As captivating as it is, this positive connotation is structured on two preconceived notions: the characterizing the road as a body with a beginning and an end and interpreting the color yellow as being identifiably benign. The road, not concrete or asphalt, or even cobblestone, which one might presume when framing the articles for constructing a road at the time of its authoring, speaks to a storied collection of unified elements that work in concert toward the finding a place of comfort as a metaphorical representation of means to the betterment of society. These interpretations of culture are so vital that they set apart the five main characters, whose traits are seemingly out of place in a land of homogeneous weirdness. The yellow brick is personified with increasing value as the story advances, noting that peril, framed by distraction, temptation, and fear, comes at the risk of departing from the road, all too similar to the abstract concept of care in recovery. The idealism of both the road and the brick's role is a striking portrait of how actions taken by the main characters are in their own right a manifestation of character indifference in atmospheres of interaction and consequence. In this regard, the "yellow brick road" is a pure manifestation of a body that, when not adhered to, often leads to negative consequences as framed by the story.

Conversely, as it is alluded to, "all roads lead to Oz" is a misnomer, as there are differences in experience when departing from the yellow brick, which is benign. The road is interestingly an early acceptance of the topological theory, offering compelling visual discussions of successive adaptive terrain pathing and the embodiment of variety from the assortment of interferences in the grasses beyond the curb. Yet, the road's character as an artifice defined by a contiguous field of brick redefines the complex conditions of their travels, offering unique challenges associated with an ever-present accommodation as a path of travel. The road, which is visually stunning with its twists and turns, rising against each hill or crevasse, proposes an interesting interpretation for engagement in the current narrative on bodies as parts making the whole in the making of architecture. While the road constitutes an analogous attitude for access in the story, the brick is a bodily presence that guarantees durability, which ostensibly adapts to the environment.

Reparative Whole

The brick body, having two capacities and depending on the region in the world, offers multiple perceptions of its value. As a builder, a brick body is a progenitor of the surface, becoming ground, structure, and facade. The industrious nature of its body is centered on the availability of material and acceptability in moving and applying to a field in the making of a surface. Together, the bodies of bricks are the physical manifestation of Munari's rubber sheet geometry, as it can be formed and placed by common hands with very little training into various formal geometries and informal shapes, which warrants merit for its role as inclusive. In the presence of a skilled hand, the brick sings a most eloquent melody of calculus, twisting and turning in succession with such delight as to participate with whimsy in an overture of modulation. As an instigator form, its dominant perspective is the plasticity of the field made from the greater number of parts, giving resolution to the dynamism of the surface as it relates to the size of the part. Even the youth find power in it, tossing its fragments against the prevalence of decay, hoping to hear the glass crackle. So pervasive is the threat of these individual parts being hurled back against the prevailing wall, representing defiance against the very edifice such grand forms represent as monuments of elitism.

And while so much is defined in the brick's body as an instigator, more than any other material, its place as an individual body and field is a symbolic architectural article; more often than not, it is a mistreated body. Whether hidden away or thinly veiled, the brick is a beleaguered body disposed of by the panelized conditions of contemporary buildings. This lack of discernment parallels the symbolic loss of ideals for a brick, which comes from the absence of the hand in both its making and its placement, as the hand and the brickwork through the authorship and ownership of a field in their placement.

The participation of hand in placement, whether of flesh and blood or metal, gives subtlety to the brick's embrace of shape and form, and from which a certain dynamism to the field as a new body is born that teases the eye and beacons the uncommon hand to touch. From this intersection of common and uncommon manners, the brick carries humanity's capacity to bridge the difficulties of indifference by being together in that field, inclusivity personified.

As within the stories of Oz, the potency of the brick is its value as a body to both the process and the product of the more extraordinary tale or narrative, guiding an awareness of the whole, which can be found across the orientation of each brick body. On a parallel point, the purpose of the brick across architecture is to make, if not to appease an audience, a reference to the collective narrative, making magnanimous the relevance of work against idealism.

If a law, whether abstract or direct, shutters equity within this discipline, then let it be the brick body that rails against it—redefining the purpose of architecture across the multitude of social strata plagued by such indifference. As is also true for the absence of a brick, the fielded form becomes different, unbuilding the narratives of discontent, building up bodies and pathways to collective inclusion requires finding resolutions for the disenfranchised who also look to architecture with malaise instead of majesty. As Felix Klein once postulated, a mathematical surface turned inside out, as the inverting of moralities, there is this parallel between non-orientable surfaces, the inside and out, that is reflective of the need for common existence. Paralleling Mr. Young's sentiment some 70 years later, to continue "to have people as committed to doing the right thing, to inclusiveness, as we have in the past to exclusiveness."[24] The practicality of this realization is the logical observation that while our experiences are different, they exist as one body, inverted upon itself, with one experience existing inside the other.

The progress of architecture, of its deception, is in how it serves the needs of humanity. It is not mere shelter that builds comfort and trust but rather the confidence that comes from the reinvention of realities destitute of hope. It remains with the brick, whose strength is reinforced by its treatment when formed and its collective participation in building a wall. Recognizing progress will be made whole through bodies in context, beyond process and product. In acknowledging the disparity that has formed out of erasure, particularly for the bodies of Black, Indigenous, and People of Color, it is beyond the disciplinary measures future success from the absence of responsibility for what is upheld by the process, the product, and the context down to each brick that will prevail. Therefore, as a profession and a discipline, remaining "ignorant [to] the art of living," to the decency and dignity of the right to healthful conditions for the betterment of all, will further propagate the disparity that fuels disdain for the establishment.[25]

The territorializing of resources that hospitals are allocated weaponizes medical institutions against one another, counterproductive to their vision of

service.[26] Equally pertinent is this pitting of one community against another, dramatically influencing parallel institutions, including the systemic escalation of property values adjacent to the well-suited hospitals. The lack of unequal distribution of resources in the hospital supply chain is the latest form of discrimination. It directly influences the effectiveness of healthcare planning by designing and contributing to the unbuilding of conditions suited to protect a population's welfare.[27]

The problem of limited access to healthcare and healthful conditions has been made more prevalent by the onslaught of the pandemic, which is not limited to an institutional bias alone. Whether a primary family with multiple generations or families in a single home, it is hard to distance oneself from these social conditions. Many already in dire financial need cannot afford to isolate themselves from their families.[28] Whether a result of the financial strain of temporary housing or in that they are the primary caregiver, their separation would create a hazardous condition for the household, while their staying results in household transmissions of the disease.[29] Equally pertinent are the conditions those recovering from infection are returning to, as the treatment of the disease increases the likelihood of disabling the patient due to the bodily functions it inhibits. The difficulties they face are further complicated by the criminalization of homelessness and the restriction of auxiliary living conditions. The issues that come out of this are far beyond representation. They are matters of intentionality and implementation that call into question the lack of ability to depend on the system many participate in maintaining.[30]

Given this constriction in access, the built environment stagnates with uncertainty. The infrastructural systems that necessitate providing quality shelter, a social atmosphere, and a sense of belonging begin to fail. All too similar to the "yellow brick road," architecture deludes any reliance on the presence of the built alone to provide, under false pretense, their betterment. This co-dependency on the forbearance of saving objectivity is even more presumptuous when insuring healthful care through the placement of the building, its durability, or its availability as the curbed conditions and protective measures act as signals to the limited level of betterment anyone can attain. Features commonly considered decorative, such as the fence, the distance of the driveway, and other parts of an entry sequence, become detrimental to a pedestrians' sense of welcome when not arriving by car.[31] The available hours of operation and the facility's inability to shelter patients across extended hours of operation further exclude persons incapable of securing leave time during daytime hours. It is essential to understand how all of these previous points influence the Black, Indigenous, and People of Color (BIPOC) community's apprehension in finding comfort and trust for attaining care in facilities that are otherwise sheltered from their presence. The harshness of arrangements in building elements that fortify the facility

against uncivil intentions also projects a sense of unwontedness that many are unwilling to surmount until their situation is so dire that they must.[32] There are still barriers in this world for the BIPOC community to interact with the space of the city that is intended to serve as a locus of wellness and that comes from being openly interdependent on the environment. By maintaining separation in society, albeit through the unequal distribution of services, whether based on taxation or the privatization of services that should be public, this system, as well as others, is allowing the continued enforcement of racist policies that oppress instead of ratifying the "goodness" implied by their presence. The openness of these conditions must be made to meet the fulfillment of rights for all persons. Suppose the infrastructure is incapable of providing this fulfillment to the fullest capacity. In that case, it must promote the ability to access parallel resources and ensure the open engagement of the public need.

Transitive Meaning for Access

If there is anything that the pandemic rectifies, architecture should be as much about access as it is about process or product. Architecture must resolve its dependence on prestigious mountings to absolve its value in the contemporary world. It is not enough to see and be seen. The world of tomorrow demands action and relevant doing as the means for appreciation. Access not only forms from but also contributes to an appreciation for what is made, which is the fulfillment of the art of living referred to by Whitney Young. The fault of a comforting mentality forces the new ground to bear the old ways.

Even while bricks may want something more, they possess the capacity to be and break the wall, so they must also present an architecture that reflects the influence of its history and its lack of equity.[33] As so many have toiled while subsisting in the building of this land, the next act of building must account for their loss. In the light of this pandemic, healthcare space is a contemporary yellow brick road, and the works of doctors Ala Stanford, MD, in Philadelphia, and Armen Henderson, MD, in Miami, are representations of the tactful intersection of service and need.

They have prioritized healthful engagement on their terms by prioritizing spaces away from the hospital that are more familiar to their constituency. They are opening new forms of engagement while critically objurgating healthcare, working outwardly away from the institution into spaces such as the church parking lot or stoop of a barbershop that decontextualized health from the hospital.[34] It is the responsibility of each discipline, health, and architecture to promote inclusivity and inform the restructuring of the foundations in art and design, as many of the references that discriminate are born out of socially exclusive educational constructs—brick by brick.

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4

APPROPRIATE ENGAGEMENTS

Ulysses Sean Vance

Engagement is a critical element in administering care. Whether patient or staff engagement, the appropriateness of engagement based on the intimacy involved in medical treatments is crucial to the success of hospital services and the delivery of quality medical care. The Institute of Medicine (IOM) establishes through its six aims of healthcare that primary care is the integrated application of safe, effective, timely, efficient, and equitable patient-centered care.[1] The integrated approach the IOM advocates includes involving patients actively in their care as they are more likely to adhere to treatment plans.[2] As various doctors have pointed out, particularly those in writing on "Integrated Care for Complex Patients," enhanced patient experience, especially for those of vulnerable populations, leads to stronger patient-provider relationships, which, in turn, can indirectly assist the core triple aims provided by the IOM on creating significant cost savings for both patients and the healthcare system.

Any model for improved patient satisfaction also must involve engaged staff, increasing the likelihood of their ability to provide compassionate, patient-centered care. Authors Frankel and Bourgeois examine the crucial characteristics of these types of engagement in their chapter on community care as an optimal setting for patient engagement, both long-term and short-term. The concept of a "complexity center," as presented by Frankel and Bourgeois, parallels the idea of decentralizing medical services from the hospital. The center, as opposed to a hospital, fits with the experiences during the pandemic, where community centers served and often continue to serve medical treatments in varying capacities.[3] Even in the highly traumatic conditions of the pandemic, engaged staff members were motivated, productive, and committed to providing excellent care in these conditions as they were

DOI: 10.4324/9781003535768-5

immediate to the community's needs. However, not all these conditions were ideal. In many cases, the community and complexity centers do not meet the ecological needs of extended medical treatment. As such, this chapter intends to define the appropriateness of patient and staff engagement as spatial measures that make these resources feasible for extended medical treatment.

Definition

In this writing, appropriate engagement simplifies the patient-centered criteria distilled from the collective six aims of healthcare. By isolating the human-centered design performance criteria from each aim, the work prioritizes the social aspects of care over the medical procedure to spatialize the corresponding interactivities and determine affordances. From these affordances, instances of interface between patient and provider inform the placement, approach, and navigation of services in the context of complex scenarios commonly associated with vulnerable populations. The spatial adjacency, path of travel, and navigation within healthcare settings can significantly impact the level of care as the context of the facility, especially one not associated with a larger, more centralized hospital facility, manages communication, collaboration, and even infection control. The design and layout of spaces influence ventilation, privacy, and even welcomeness, which can increase patient anxiety and negatively impact their overall experience. Conversely, the proximity of medical spaces to high-intensity environments can hinder the ability of the staff to ascertain the nature of the problem for the patient, transferring the anxiety from the patient to the staff and negatively impacting other patients and their experience exponentially. In these cases, transitionary spaces help buffer noisy spaces and help attending staff limit the impact of traumatic situations that often accompany arriving patients to freestanding emergency rooms and critical care centers.

While appropriateness is the quality of being suitable, it is not absolute and can vary depending on the specific circumstances. In the context of access or accessibility, Levesque defines appropriateness as how well a resource, service, or environment meets the particular needs and characteristics of the people who use it.[4] It goes beyond simply being available or the affording approach and considers whether it is effective, as learned from a forensic examination of its use. Key aspects of the accountability of appropriate engagement are whether individuals can identify and navigate to the resource and whether the environment allows adjustment to account for practices associated with the associated care provisions. These spatial practices involve considering the physical presence of rooms, areas, and other facilities and how they affect patient perceptions of comfort, privacy, and satisfaction. The factors also involve sensitivity to the cultural differences associated with privacy in public spaces, as the availability of privacy rooms may be limited

in certain circumstances of centers also offering non-medical services. Any sensitivity to contextual factors is beneficial for appropriate engagement, as factors such as location, time of day, and formats of interaction and accommodation can increase unwanted anxieties.

As the primary models for engagement are social, determining the evaluative measures of engagement should be social parameters. However, in working through the spatial practice of providing accommodations and affordances associated with the occupational needs of patients and providers, the physical constraints of these decisions require an assessment of the context based on evaluating efficiency in care. These active evaluations of an environment are shaped to foster a collaborative relationship between patient and provider, considering more than the building or the specific room of their meeting. It accounts for the entire passage of the patient's expectations from the first encounter of the grounds to the building's form and openings and the role different obstacles play in defining and controlling the various types of engagement defined by the patient, provider, supporting staff, and community interests. The models for the engagement of these interest groups between one another and in the context of providing appropriate conditions for care are not mutually exclusive and often overlap and complement each other. The most suitable model for bridging their relationship is a combination of their interactions centered on the primary relationship between patient and caregiver, which is interdependent on the specific goals and context of their engagement in care.

Considering spatial adjacency, the path of travel, and navigation when actively optimizing the decisions during a design process increases the likelihood that the resulting facilities will improve provider response times and the overall patient experience. These optimizations work across a variety of scales within medical practice, from the most intimate of patient consultations to the proximity of different departments in facilitating communication, procedures, and support, and even the infrastructural systems critical to ensuring the facility operates hygienically with the proper removal of various wastes and the management of resources that support procedures. Conversely, if key departments are far apart, their distance can lead to delays in care and decreased efficiency—a challenge when considering the viability of decentralizing healthcare services to locations outside the hospital. As the services migrate outwardly, the definition of their engagement wain, as persons rendering care deviate from a model based on the bundled efficiency of systems to those of individual systems and privately structured health-related practices involved, occupied, and connected with a community. These new engagements imply active participation, interest, and commitment beyond the procedure and involve interacting with the community in a supportive manner rather than one defined by the proxemics of occupational efficiency.

Similarly, designing the spatial adjacencies of facilities for medical services based on engagement involves determining new strategies for successfully implementing supporting elements that benefit interacting and connecting providers with patients more socially. These new spatial criteria include capturing space for participating in extended conversations, voluntarily informally meeting with the community, and an increased welcomeness to the community when seeking help. The use of transitional space in these capacities may include porch or garden-like settings that increase the chances for casual contact outside the facility but may also include places within the facility for persons unsure about care. These models of improved customer engagement account for the uncertainty in the patient experience and seek to create opportunities through a measured approach to provide spaces for patients and providers to feel valued and appreciated while also increasing civic engagement that supports the non-procedural involvement of staff within a community.

When associated with medical services, the current primary care model of meeting patients on demand is procedurally focused and challenges the patient-centric approach, which focuses on extended contact time between patients and caregivers. By looking more closely into the people associated with the procedures and, specifically, how the time away from activities influences the form of a building, these new conceptualizations focus less on efficiency in or across procedures and instead examine how informal spaces can be adapted to play a crucial role in defining and controlling the various types of engagement that come with promoting social engagement in healthcare. As an example, a building with increased common areas, whether through the presence of a courtyard, a promenade, or incremental places for casual seating, provides spaces for people to gather and interact and when associated with the transition activities between arrival, procedure, and departure afford doctor's and personnel spaces to meet with one another as well as extended family informally. These informal conversations allow staff to promote and even advocate on behalf of the patient while keeping the support the patient needs close by. It differs from a building focused on procedural efficiency with long, narrow corridors and few communal spaces, limiting social interaction.

Spatial Integrity: The Geopolitics of How Health Systems Get Paid

While there are many drivers of healthcare and health services, from complexity of care to revenue generation, the places of service are crucial to materializing improved patient engagement. Behind the patient-centric approach to improving healthcare is the realization that healthcare costs associated with the complexity of care are the instruments driving the available services and departments of hospitals. Cutler and Zeckhauser, in their chapter on

"The Anatomy of Health Insurance," refer to the consumer identity and how the attractiveness of complications to providers drives the adverse selection based on the level of illness as it encourages competition.[5] It is a stark reality that so much of what is designed in healthcare is based on how the facility programming supports how doctors get paid. Programming that supports the patient as a product in a Hospital Information System (HIS) is the central nervous system in a supply chain, fostering an ordering process revolving around patient registration, diagnosis, treatment, documentation of treatment, translation to billable codes, invoicing, and payment.[6]

It is difficult to discuss the places of healthcare without addressing the influence of HIS on the availability of healthcare spaces, as *place of service* is one of the most significant drivers of healthcare costs. Haux outlines the value of HIS in his book *Strategic Information Management in Hospitals*, as it plays a vital role in orchestrating the entire order of operations in medical services. These services begin with registration, where patient demographics are collected and used to determine the complexity associated with the patient's visit. During registration, the HIS captures essential patient information like name, date of birth, address, insurance references, and, most importantly, medical history as it defines the potential complications. Each visit creates a unique patient record within the system that helps determine the patient complexity and a caveat of medical service premiums.

Next, the system evaluates the most efficient location for the patient appointment depending on whether the visit is appropriate in a hospital when a health system employs the physician as an independent contractor or in an individual office. The location selection based on the patient's complexity and reason for the visit is essential because the packaging of price for services and means to pay for healthcare dictates how healthcare is delivered. As pointed out later in *Inclusive Design of Breast Centers* by Manasseh and Booker, how healthcare is delivered defines many of the parameters architects are given in designing the spaces where healthcare is delivered. These parameters also determine the geopolitical landscape of health service facilities, recognizing that healthcare specialties' high cost and margin create a profit-driven complexity.[7]

Understanding the need for medical services across all communities, particularly those with high concentrations of vulnerable populations, is vital to comprehending how healthcare places are derived and developed from the perceived profitability of providers and insurance companies. While spatial integrity is not a widely established concept in the same way as revenue or payment integrity, the idea that the place of service is a driver of healthcare cost is highly relevant to the economics of health services. These decisions are most apparent in the translation of services into billable codes. After the patient's diagnosis and treatment, doctors must document the services. The documentation includes all tests, procedures, medications, and consultation

orders. The HIS tracks the status of each patient, and periodic auditing ensures that procedures are efficient and not fraudulent. The payment models for these services are considered in two categories directly related to the geopolitical differences in location for patient care. The professional fee is what physicians charge for their services, and the facility charges are for the operational cost at the location of care and its overhead.[8] If HIS is the documentation network that connects all the steps in the patient journey to protect payment and revenue integrity, then spatial integrity protects the appropriateness of available facilities to provide equitable treatment experiences at any location. From here, the primary assumption of this work is that the facility's design is actively involved in the healthcare infrastructure model, as the expectation is that medical care is equal across facilities in a given network.

Given that the fee structure defines healthcare primarily through two payment models, understanding how these criteria relate to facility planning and design clarifies the financial decisions associated with concentrating services into one building or distributing support across multiple locations. Interrogating the economic mechanisms that drive medical focus also informs how these measures could translate to scales exponentially smaller or even larger than any single hospital or department, as the distinction between professional fees and facility charges can significantly influence the type of facility a doctor chooses to practice in. The size of the facility may limit or expand their field of impact and even affect the size of support staff, nurses, and secondary or tertiary care support they can offer. The differences in capacity for the doctor operating as a sole proprietor can limit their time per patient, expertise, and the actual procedures they perform as they will need to entertain other aspects for maintaining the practice. Conversely, a practice within a hospital or healthcare network primarily differs from a professional fee-for-service model in exchange for diverting facility charges to the hospital system. The facility charges are passed onto the patient through the invoice with the intent for reimbursement by their insurance company. The middle ground between the two is when healthcare professionals provide ambulatory care in outpatient settings. In these settings, medical services such as primary care clinics, ambulatory surgery centers, and even diagnostic, imaging, and dialysis centers can maximize the benefits of more intimate patient-to-doctor communication while inheriting the support of healthcare networks and facility management.[9] The facility charges are intended to remain flat for centers within the network. However, the differences in experience may vary as outpatient services may exist in older or modified facilities adapted to provide care in areas unable to support the presence of a large hospital facility.[10]

Outpatient facilities can also influence the types of patients a doctor receives and the complexity of cases, as historically hospitals often handled more complex patient services. At the same time, private practices focused on routine care. Medicare and Medicaid have traditionally supported these

preferential locations of service as the relative complexity of the patient's primary diagnosis, including their history, is compared to benchmarks from other patients with similar diagnoses to determine the best course of action so as not to put the patient, the provider, or even the facility at risk. The redundancy is important because if the diagnosis is missed or documentation is not provided as part of the claim record, the hospital risks losing revenue associated with the degree of complexity or complications. Hence, there is a preference for increased testing as documentation in determining accuracy often involves repeating steps to ensure the criteria of proper diagnosis are met.

In planning an outpatient facility, condensing different departments into a station or location can expedite the diagnostic process and improve response times. However, compressed conditions also mean an increased likelihood of spatial conflicts as departments transition into rooms or clusters of rooms, and space limitations increase the need for improved scheduling. In hospitals, how staff members move within a facility definitively impacts their efficiency and workflow, as long distances between stations or patients and complex corridor planning can lead to wasted time and effort, reducing the time available for direct patient care. Similarly, outpatient facilities, which tend to reside in smaller facilities, require clear demarcation of pathways to prevent conflicts between staff, and proper staging is essential for ensuring patient privacy and safety. For hospital and outpatient facilities, confusing layouts can increase the risk of patient disorientation and lead to accidents or other complications. Integrating incremental observation stations at critical junctures in a facility layout can help support the observation of staff and patients. This allows lines of sight to support efficient navigation to ensure patients receive timely care and properly orient themselves when transiting the facility.

Interpretation

The location of healthcare services is pivotal in determining how services are billed in different settings. The differences in payment and billing structures unique to each setting, such as hospitals, outpatient clinics, or physician offices, primarily drive this. Hospitals commonly rely on Diagnosis-Related Groups (DRGs) as the foundation for inpatient payment systems. DRGs bundle all services provided during a hospital stay into a single, predetermined payment based on the patient's diagnosis and treatment plan. This approach incentivizes cost efficiency by offering a fixed reimbursement, regardless of the services rendered. By standardizing payments, DRGs encourage hospitals to streamline operations while maintaining quality care.[11] Outpatient facilities and freestanding clinics are different in that they predominantly operate under a fee-for-service model, where each procedure or service is billed individually. Reimbursement rates can vary significantly based on the setting, with hospital outpatient departments often commanding higher rates

than independent clinics. This variation reflects differences in operational costs, infrastructure, and regulatory requirements when choosing a care setting as a key factor in cost management strategies. Hospitals inherently carry higher facilities and overhead costs, driven by round-the-clock staffing, emergency services, and the complexity of their infrastructure. These operational demands are reflected in the elevated charges associated with hospital-based care. In contrast, outpatient facilities and freestanding clinics typically operate with leaner overhead structures, allowing them to deliver services at lower prices. This cost differential underscores the importance of strategic site selection in managing healthcare expenses.

A central task of finding appropriate engagement amidst these criteria is clarifying who the client of healthcare services is. Determining whether the client is what the financial or administrative model dictates, the provider, the patient, or a product of procedures associated with the survivability of a body based on comparative morbidity is critical to evolving solutions. It will direct the order in constructing social equity by making healthcare financially accessible. These practices involve unpacking the purpose of everything from the current procedural terminology and connecting them to the programming of spaces and equipment—the articulation of a non-financially driven model that considers the relevance of equitable conditions and eliminating disabling environments. The intention is not to usurp the financial liquidity of the institutions in favor of accessible policies; instead, it seeks to subvert the reliance on design for productivity and efficiency in favor of improving patient care. The main aim is to present alternative ways of promoting inclusive design through new processes outside of financially driven models for determining physical, social, and behavioral design parameters primarily focused on the most challenging of situations to determine when and how often the optimization of these practices benefits a wellness model over a prioritization of sickness and complication.

Again, this is important because the means of paying for healthcare dictates how healthcare is delivered, and the place of care matters to those in vulnerable situations. The criteria for determining whether environmental conditions threaten the economic model to maintain healthcare services involve determining whether the spatial integrity of providing care, that is, the providing of assistance, motility, mobility, or utilization, is an impediment to the top-line revenue growth or bottom-line margin depending on the level of activity in providing care at a location. While there is a clear intention to provide accommodations that meet the tenet aims of improving healthcare associated with accessibility, there remains a significant challenge to delivering equitable engagement to the broadest range of persons that financially benefits an institution implementing the practice of passive inclusive design, that is, a facility at a community scale that natively provides accessible healthcare provisions unilaterally without undue financial burden.

Application

Architecturally speaking, the concept of engagement is as simple as the conceptualization of fostering communication between two people. The indicative need for privacy unique to medical conversations challenges the simplicity of engaging within an enclosure. The arguments that translate occupational discussions of engagement into the interrogation of health space narratives on access are minor in spaces facilitating services to vulnerable populations when comparing them to the practices more commonly associated with communities with affluent neighbors and financially resilient populations. In this capacity, the discussion of engagement focuses on the debate about the socioeconomic relevance of accessibility. While slightly different in meaning, accessible is the means of offering access without negative consequences, particularly when it comes to financial barriers. So, whereas access is the presence of an entrance, accessible implies a particular understanding of authority to offer or remove the ability to move between the interpreted differences separated by some enclosure. Even when an entry is present, financial inequities in access may exist, especially when the differences in separate entrances depend on the availability of a personal vehicle for transportation or the arrival, and accommodations to the location by public transit translate into differences in appropriateness between the two. These differences in location translate to behavior-shaping perceptions and establish why similar access to a common point of engagement is essential in discussing differences between people and spaces across the continuum of care.

The shift in priorities across the socioeconomic status of a community challenges the current definition of access, as access often considers the rights of both parties as one related party in a setting moving toward a place, thing, or activity. The prior bounds and definitions, which included, in certain circumstances, the ability to exhibit some degree of ownership and authority over space, are challenged by the open character of health space now inexplicitly intertwined post-pandemic. Understanding the connections between perceptions of belonging, the experience of belonging, and creating an environment that fosters belonging in various types of care is becoming increasingly important. This awareness is set against the backdrop of advancing technology, which provides access to information and necessitates the ability to process and evaluate data that is often in a state of constant change. Renegotiating these interpretations of data across devices, people, and space challenges the ability to be present in the act of wellness needed to provide what is commonly understood as comfort and trust for any population, irrespective of their socioeconomic status, thereby redefining access to healthcare in architecture.

Engaging environmental wellness at a smaller scale puts the features of healthcare service right up against matters that directly impact the everyday

physical and social providence of population health outcomes. For architects, this includes understanding how building spaces without enclosure provides shelter and promotes health betterment while acknowledging the financial integrity of the places they create. The architecture of environmental wellness, which examines the health and safety of the built environment, is about realizing in impressive ways the space between bodies, as a body, can assist with other means to deliver healthful resources in an engaging and enigmatic manner, particularly in non-hospital spaces. In this capacity, informal health engagements can range from casual activities to domestic interventions. However, each new engaging space should support evidence that these informal settings have successfully reached people, connecting them to the means to improve their health without being impacted by financial limitations or personal differences with a particular aspect of the built environment.

Critical Concern

A primary concern of this chapter on engagement is the connectedness with the neighboring community through transitional spaces and whether informal strategies are viable as solutions in providing the controlled conditions of medical facilities for improving the availability of health services to underserved populations. The traditional boundaries of hospital facilities underscore the misconception that healthcare and health disparities begin and end with the environment of medical procedures for a patient. As learned from the impact of the recent pandemic, the provision of health services, whether clinical or not, is fragile. The unavailability of space and resources quickly disrupts the conditions for doctors and staff in maintaining patient care. The impact of which ripples across a range of other ecologies of health. While these ecologies of health do take into consideration quite significantly the needs of a patient, there is often an unintended exclusion of persons at the periphery of the patient, the extremities of a social and cultural body defining family, and an even greater network of people working in tandem associated with care outside the facilities where health maintenance beyond medical services takes place. Each encounter for the patient, the family, and the caregivers contributes to defining the far-reaching infrastructure of systems, needs, and services formulating the healthcare ecosystem.

What is essential to this argument is how architects measure clinical care activities. However, before getting into the material questions architects consider, understand that the core of clinical services is the criteria established in the nursing field that offers comfort and trust as equal medicine to clinical procedures in treating ailments and diseases. In this capacity, patient engagement is prioritized, often at the expense of staff, and movement that requires extensive exertion occurs quite frequently. These concepts have historically been challenging for caregivers inside hospitals, and moving these practices

outside medical facilities requires working to create barrier-free environments while reducing the effort associated with procedures and the navigation of built space. The more common resolution of these differences has been the proposition of domestic and institutional hybrid facilities capable of operating curbside through mobile units and pedestrian equipment for in-home care commonly used by emergency response crews. While these provisions are helpful, the practices of providing care in existing community spaces such as bodegas, barbershops, and storefronts are about creating new ways of understanding more about how and where people already engage in post-prescriptive clinical services. More importantly, in the context of this approach, how we measure the success of interventions in providing a range of services outside the hospital.

As a tenet of wellness, actively engaging the emotional state of people, particularly patients, includes the cultural integration of de-compression zones to de-escalate anxiety associated with health services into everyday routines for a facility. Addressing the active role of improving the distribution of healthcare across the urban landscapes that diversely define cities involves reimaging the means for engaging healthcare equitably as a spatial medium across the built environment. In this regard, informal health spaces open the discourse between medical and non-medical health professionals on what health spaces can be as an outreach device. By including in the discussion contemporary issues on spatial limitations in urban environments, climate change, and extended work hours due to reductions in medical personnel associated with the extended periods of care in urban areas, a building and its experiential components are as much a participant in healthcare as the moderation of experience and engagement is directly related to the success of health services.[12] While the prevalence of arguments for an informal medium of care in these capacities is new for these conditions, they are founded on a spectrum of references from the historical accounts across an emerging fantastic body of healthcare as a service as much as it is culture-allocating space for the benefits of physical, mental, and social wellness in the daily practice of mediating clinical and behavioral challenges.

Facilitating Appropriateness through Informal Engagement

The history of bringing medical services to a community's doorstep is undoubtedly full of negatively charged behaviors. Yet, the defining moment learned from the recent pandemic is that resolving the gaps in care for disadvantaged communities revolves primarily around prioritizing their direct engagement where they can afford to be. Incorporating health services in places of work, education, neighborhoods, and civic institutions that serve the community is about meeting the people where they feel comfortable and are willing to trust the presence of people willing to provide care. However, from the same

perspective that disability warrants a change to an environment, a device, or other operative means, health access has been defined belligerently as a contingency of medical space and not that of neighborly existence or civic infrastructure. Moreover, the prerequisite that clinical space is born from the profitability of illness and disease also indeterminately establishes the providence of the hospital as the pinnacle of mutual exclusivity. On the contrary, creating preventive measures establishes that wellness and well-being can exist without being necessitated by disease and that healthcare environments can persist outside the activities of clinical responsibilities alone.

The introduction of medical support to municipal centers represents a plausible means to address population health management in every community informally. Especially for those without the resources or immediate access to premium care, it is about redefining the spatial confines associated with resources for healthcare. The availability of healthcare is directly connected to the social agreement of appropriateness and, therefore, is contentious in built space. As such, the parameters of well-being are considered, at times, irrelevant in part due to the separation of work, leisure, and play in city planning. However, post-pandemic, the broader definition of modernist-building idealism with its persistent boundaries between the transitions of daily activity is now considered inconsequential compared to matters that benefit society. From this conception of domestic influence in health space to places immediate to each patient, the focus on in-home care and facilities necessary to fulfill these services equitably across the built environment brings into question the best strategies for integration.

In contrast, the argument that these resources already exist within the civic services of emergency response crews misses the critique on providing a more engaging consideration of health access, the potential for health space to exist as a landscape fitted toward the utility of improving wellness and well-being as much as it saves lives. As this claim would suggest, the spaces of communities and neighborhoods are more welcoming of a commonness between people if for no other reason than to accept and encourage the pursuit of well-being through neighborliness. Considering the benefits of intimacy, which are necessary for improving daily activities associated with bedside manners and enhancing the corresponding qualities of patient recovery, there are many cultural interpretations of intimacy in wellness, reflecting their preference in its crafting of the healthcare experience. Conversely, in urban areas, many private hospital facilities that once offered equitable services began to fall short of the capacity needed to achieve cost-based reimbursements for Medicare services. This diminished capacity was due to a variety of factors, ranging from outdated equipment and facilities to undertraining of staff, and this resulted in financial difficulties due to the reduction in Medicare reimbursements. States, primarily in the southeast, found themselves amid a perfect storm as policy changes, a decrease in hospital finances,

and a strained medical supply chain resulted in a surge of facility closings just before the onset of COVID-19 and the rise in patients needing hospital care.[13]

In light of disparities in healthcare provision for different populations, inclusive design applications addressing health as a focus of design also investigate the formal agency of spaces that encourage pedestrian movement to facilitate access across a networked public health infrastructure. The benefits of addressing these concepts include investing in various urban resources associated with mediating contrasting land use, civility in institutions such as medical dispensaries and pharmacies, and providing safe housing that reduces the likelihood of experiencing trauma related to street violence. These efforts to address urban problems contribute to an evolving prospectus on pedagogy that associates design with health. Conversations utilizing universal design principles enable collaborative critique around the health routines of a person living with a medical challenge and visiting a hospital with a transition area that encourages inclusive, independent, and interdependent activities before entering a facility.

In this reconceptualization of health and hospitals where services are informal, the architecture that corresponds with such an engagement does not need to be informal as much as it needs to be adaptable to flexible engagement in the space, allowing a diversity of provisions for health services without the necessity to segregate operation into a formal categorization for a hospital. The structured flexibility in services born from program flexibility defines how an informal conceptualization of clinical services might operate. These may exist as staged health centers working together across a region, a "row" of doctor's offices aligning services across an informal network, or a wellness center within a local business or franchise willing to provide space for health services and their clientele. Collectively, these informal spaces accommodate casual clinical activities, such as socializing with the patient in a culturally sensitive space, and offer numerous benefits for patients and healthcare providers. One of the primary benefits of informal spaces is their ability to create a more welcoming and comfortable environment for patient families, which can significantly improve the patient's overall well-being and acceptance of the clinical procedures. Transversely, by incorporating these spaces into hospital design, patients can feel more relaxed and at ease, which can help to reduce anxiety and stress levels, leading to better outcomes and faster recovery times.

In addition to improving population health outcomes by bringing services closer to the communities in need, informal spaces can benefit healthcare providers by reducing the density of populations they serve. These spaces can also provide a much-needed respite for staff, who often work long, demanding hours in high-stress environments. By offering a space for staff to take a break and recharge, hospitals can reduce burnout rates and improve job satisfaction, ultimately leading to better patient care. Furthermore, informal

spaces facilitate more informal interactions between staff and patients, which can help build stronger relationships and enhance the overall quality of care. By making the staff approachable, these informal spaces are also transitional, fostering a more relaxed and welcoming environment before entering a more formal medicalized space. Healthcare providers can create a more collaborative and supportive culture in these transitional spaces, improving patient outcomes and staff retention rates.

Another benefit of integrating contemporary models for engagement in health services is their ability to promote active living and encourage healthy behaviors among people tangential to patients and staff. By incorporating features such as walking paths, outdoor seating areas, and exercise equipment, the informal facilities can encourage the involvement of neighbors with patients and staff to engage in physical activity, which can improve the overall health and well-being by proxy as people tend to exercise more when seeing other already engaged in these activities. These spaces can also provide opportunities for staff to connect with the neighborhood, which has been shown to have numerous health benefits, including reduced stress levels and improved mental health when the staff and community see themselves as one community, combining outsider perceptions on behalf of either party.

Reparative Epistemologies

New facilities strive to address new hegemonies and conditions at the epicenter of urban health challenges and the fringes of medical care—as was the case with hospitals in the past, where significant importance was placed on the role of nature and its impact on health when living in overcrowded conditions. A straightforward design decision influenced past and current medical care provisions following the pendulum of civilization. A historical example of the importance of natural preserves as informal transition spaces in urban centers for hospital care, designed ahead of its time, is the Pennsylvania Hospital, founded in Philadelphia by Dr. Thomas Bond and Benjamin Franklin in 1751. Opening to patients in 1753, Pennsylvania Hospital reflected the founders' desire to neglect traditions of separating classes and races. Instead, it facilitated the needs of not only European-descended patients but also those of African origin and Native American populations, all in the same facility.[14] On its original site, the hospital structure remains operational today, with the portrait of colonial governor Richard Penn, who was in office when the hospital began operations. Unique to Pennsylvania Hospital is its scale and integration within the context of historic downtown Philadelphia. The grounds feature a garden promenade that serves as little more than a turnaround in the dense urban landscape. However, its tree-lined fence and the neighboring stone-façade rowhouses reflect the centuries-old belief in the value of nature for patients' recovery and long-term well-being.

While the histories of hospitals often present a narrative imbued with the best intentions, the challenges of urban escalation underscore the need to recharacterize hospitals that would allow them to maintain open spaces in an environment of continuing encroachment. Hospitals for treating the mentally ill are one example of a healthcare setting in which open spaces have widely recognized clinical value. A nurse and mental health activist, Dorothea Dix, encouraged those treating Civil War veterans to give patients access to open grounds to promote their recovery. Dix believed that hospice settings that had open space promoted emotional recovery from trauma, and she is credited with the founding of 30 hospitals for mental health. The influence of her approach—that open spaces benefit the patient in treatment—remains palpable today in the planning and programming space for hospitalization. Among her most notable legacies is Dix Hill, known as Dorothea Dix Hospital, at its closing in 2012.[15] Located in Raleigh, North Carolina, the facility and its grounds are now a national historic site occupying 400 acres south of downtown. Although its origins as a psychiatric facility sharply contrast the narratives surrounding the establishment of Pennsylvania Hospital, the Dorothea Dix Hospital foregrounds the value of open vistas and access to nature for patients' recovery.

Historically, the metrics for clinical services in non-medical spaces have been hygiene. Unique to this approach is the recognition of the financial ramifications on patient engagements as the measure of impact. The quantities of resources available to each activity primarily determine the daily activity level as a measure of capacity in providing services. For example, according to the United States Fire Association, tracking the amount of weight each Emergency Medical Technician can carry against the frequency of sprain and strains as the result of overexertion and bodily reactions directly impacts the feasible number of patients a mobile medical crew can see daily. Data like this would directly impact medical engagement away from a hospital floor. The number of steps employed in providing care in a transitional space could include the travel distances between activities when offering care options of walking between informal spaces to achieve daily goals in visiting a transition space near a neighboring community where a patient in care resides. Interventions such as these create various issues that impact caregiver availability, as the informal interaction may require additional time per patient. Lastly, working informally requires exposure to weather elements that disrupt the availability of services and resources. To ensure peak levels of services, it would be ideal for informal spaces to operate without the difficulties of climatic discomfort in completing tasks.

These metrics are incredibly valuable to each in determining the scope of engagement for personnel and defining the staff population's capacity to pursue an informal provider station of any capacity. In forming a spatial practice in architecture around the concepts of retrofitting community spaces to meet

these criteria, it is essential to incentivize criteria that would encourage local businesses to cooperate with these metrics while also working to improve the measure of success in addressing health access. As such, introducing a tax incentive policy for companies willing to provide service space to medical professionals to render public health support works similarly to state incentives used to establish aesthetic merits to achieve the goals for artwork in Philadelphia. Similar to the Percent for Art program created over 60 years ago in Philadelphia, the next chapter will examine the development of variances more closely as an incentive for stimulating improvement and represents a proven track record of commitment on behalf of the city and the constituent property owners participating.

In amplifying programming beyond the economic burden of profitability, the hypothesis of program spaces as accessible considers inclusive design practices in defining the character of a built environment, assisting instead of inhibiting these practices, as this is the most logical agenda for architects working on behalf of health access. Fundamental to this framework of dimensions for accessibility is the value of understanding how other professions engaged in addressing access issues translate the disciplinary findings of architecture on accessibility or whether there are inversions in the criteria that conflict for either field in prescribing access goals. For example, in determining a prescriptive versus a passive means to achieve any of the dimensions of accessibility, one must acknowledge that the role of these terms is different for the two professional practices, architecture and healthcare. Architects see passive systems as a goal for architecture and active prescriptive practices as systems for equipping and implementing intentions in the completion of projects. Clinical professionals, however, understand passive as someone or something doing the work for you and active as the work you achieve on your own.

These references are important to note as there are subtle differences across the discipline of clinical professionals. The differences in these terms and how they are applied to the end goals of aesthetics relating to activities have confused parties in creating a passive approach to architecture on more than one occasion. The inflection of these dichotomies lends to the importance of defining what architects deliver in terms of medical environments and the means for measuring the success of activity in architecture outside the hospital. In doing so, the research into programming flexibility examines the logistics for enabling formal and informal engagement spaces to address healthcare programming through several corresponding narratives. The first narrative involves the differences in agenda between rural and urban strategies for healthcare distribution. The second encompasses the influence of expenses as devices impacting the hospital's space characteristics. Last is the integral role of facilities costs per condition in facilitating sanitation, distribution, and engagement related to clinical and public

health criteria. Equally pertinent is describing the response to medical expenses as devices outside the hospital as an exploration of the execution of procedures, access, and enclosure. Understanding medical vocabulary outside of hospital contexts is informed by exploring perceptions of information. This involves crafting engaging spaces with patients to challenge preconceived notions of healthcare facility design. These initial conversations that span the various disciplinary backgrounds highlight the critical theory of medical space as a device, exploring how health and well-being can benefit from disruptions of current trends and models and how the atmosphere of a medical space can form based on spatial integrity that leads to new architectural concepts. These exercises in disruptive thinking about space as a device are dynamic ways of imagining wellness as part of architectural theory that seeks to do more than solving for adjacencies in healthcare facilities.

Notes

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5

A PERCENT FOR HEALTH

Ulysses Sean Vance

As architects and planners navigate the complexities of designing for modern urban life, there are a variety of unique approaches to creating a more equitable urban society. The artifacts of both architecture and planning entail more than just physical amenities and social infrastructure; they craft culture and define the interactions between people and places. Juhani Pallasmaa reckoned with this pairing of architecture and the articulation of time as the art form of space.[1] When brought to fruition, every architectural concept imagined carries a phenomenological orientation in that imagery is intertwined with architecture. Professional practice in either architecture or planning requires an understanding that the multifaceted cohesiveness of art exists beyond the framework of one's own academic discipline and project focus. Likewise, accepting these symbiotic relationships between art and culture as disciplinary practices necessitates understanding that both architects and planners are creating a past, present, and future that converge as human experience—that which goes beyond building, as the definition of architecture suggests.

Operating between the two disciplines of architecture and planning, the Percent for Health initiative is a policy-based feasibility study that focuses on creating urban architecture that expands medical facility coverage in areas of a city with mobility barriers or otherwise limited access to a hospital; the initiative would thus generate a more accessible city that promotes wellness and well-being. From an urban design perspective, a contradiction in coverage is created when new health service facilities open in remote areas of a city to service communities with limited transportation access. This pattern of building is antithetical to the desired evolution of neighborhood design *away* from a dependence on vehicular transportation as the sole response to rapid urbanization. This essay posits that the absence of pedestrian access to

DOI: 10.4324/9781003535768-6

immediate medical care in any community is a coverage gap that puts lives at risk, particularly those of vulnerable communities. The research behind this essay shows how the installation of satellite health clinics within the existing network of municipal recreation facilities can close the gaps in the network of health services.

The policy/architectural interventions proposed in the feasibility study described here delve into the unique aspects of the pedestrian city and how its form and structure can be designed to ensure immediate resource availability while addressing the critical needs of pedestrians. In creating the Percent for Health initiative, the research in these studies introduces a policy incentive, explored through architectural interventions, for addressing the disparities in maternal, pediatric, and palliative care in communities where space limitations and economic demographics challenge the introduction of a Federally Qualified Health Center. The intent of the initiative is not just to highlight ways and means for incentivizing existing property holders to add facilities but also to address health access deficiencies. By offering a diverse framework of inclusive design features, particularly for vulnerable populations, the initiative provides shelter for people making their way to healthcare service providers.

Context

Major medical centers often occupy a considerable footprint, and they can come across as intimidating and confusing to almost any patient or family, many of whom are already stressed due to their need for significant healthcare interventions. The overbearing nature of such medical facilities is a barrier to care and is among the reasons research studies have yielded calls for a significant amount of healthcare typically provided in larger clinical care settings to shift toward smaller, more approachable neighborhood venues.[2] The research proposition for this initiative involves a new model for supporting decentralized care within the neighborhoods of people in need. The research interventions outlined here argue for the placement of doctors, physician assistants, nurse practitioners, and technicians in municipal recreational facilities, where patients could conveniently access an expanded variety of healthcare services without having to travel to different locations. With even the slightest percent increase in healthcare programming, auxiliary providers in localized settings can foster better relationships with the community and garner a more direct means of care that supports and promotes overall well-being.

When considering architectural approaches for establishing outpatient care facilities in municipal recreation facilities, it is essential to look back at the impact of localized care efforts during the early part of the COVID-19 pandemic.[3] As healthcare networks and hospitals moved quickly to determine

strategies for providing care within the neighborhoods they served, it became evident that community centers, which are often attached to other institutions but with separate entrances, were an available resource for dealing with large numbers of persons for whom the overwhelmed medical facilities could not provide care. That stark reality has highlighted the urgency of bringing health services out of the hospital and back into neighborhoods, closer to people's homes, particularly in underserved areas.[4]

One of the critical lessons learned from observing urban-based medical professionals responding to the pandemic emergency was the need to proactively engage in community outreach and preventive care wherever the patients could meet providers. These direct engagements often involved providing medical assistance in places such as a street corner or a barbershop or in a mediating facility such as a community center. In many cases, medical professionals even resorted to home visits when patients were ill or unable to leave their residences due to intensifying concerns over transmission of the virus. The value of this level of engagement brought to light the numbers of persons who were previously uncared for due to their circumstances and registered again the difficulties vulnerable populations face when electing whether or not to seek medical attention.[5]

For many urban communities, this experience underscores the profound impact of policy neglect and economic divestment on population health, serving as a cautionary tale for urban health policy and facility management nationwide. The city chosen for the development of the initiative, Philadelphia, with its extensive healthcare history encompassing multiple institutions, represents a model for serving a diverse population and their evolving medical challenges. An examination of the background of healthcare in the city shows that while it continues to serve as a hub for medical innovation and education, there have been noticeable challenges to maintaining wellness for vulnerable populations as transformations in its healthcare landscape, particularly during the mid-20th century, created gaps in medical coverage.

As the social demographics in the city shifted, doctors who traditionally provided care to their immediate neighbors through residential offices began to transition into more extensive medical facilities due to shifts in insurance plans. These shifts away from pay-for-service models to work-related insurance policies created healthcare gaps as divestment in hospitals for marginalized communities lacking insurance closed, primarily in areas with corresponding concentrations of poverty in predominantly black/brown neighborhoods.[6] This period also saw the rise of medical insurance coverage programs, which led to the concentration of medical facilities in areas with higher concentrations of their constituency. The concentration of these facilities in insured markets led to the consolidation of medical services in areas with higher economic investment. Economic interests were critical in this transformation, often prioritizing profitability over community needs. This shift resulted in the

closure of numerous facilities in divested communities, exacerbating health disparities during the pandemic. With these underserved communities facing the pandemic without access to major medical centers, many doctors and their services shifted to providing care in community centers, which were located in areas with the greatest need and disparities in facilities.

In designing new approaches to healthcare, setting permanent service stations in recreational facilities challenges the dominance of insurance-based healthcare practice. Doing so is also challenging because recreational facilities are often seen as mere spaces for play. In reality, they are critical parts of a contemporary city's civic landscape. They constitute a modern agora—a place for gathering—thereby weaving together the multi-threaded social fabric of many neighborhoods and allowing individuals and families to find connection amid the anonymity of urban life. In particular, for cities like Philadelphia, where the disparity between affluence and poverty is stark, these centers provide support to the infrastructure of services that address food and childcare deserts. Beyond buildings and grounds, rec centers in many cases provide urban youth with the possibility of a life beyond the oppressions of poverty and prejudice by offering access to a variety of resources, including those that nurture ideas and hope.

By interrogating municipal recreation sites after the official end of the COVID public health emergency, this study found that many community centers are still actively working with local institutions to distribute medical services in limited capacities in response to the latest public health issues. In many urban neighborhoods, where the city's vibrancy abuts the pressing needs of many residents, municipal recreation sites are a significant cultural presence, combining recreation and community resources against the backdrop of an ever-changing landscape of need and circumstance. To fully grasp the significance of needing to continue services in these municipal recreation facilities post-pandemic requires delving into the shortfalls in neighborhood health and healthcare measures that define the challenges these communities face, shape their existence, and continue to underscore the rec center's value.[7]

Background and Rationale

As one of the oldest cities in the United States, Philadelphia has a rich history of public spaces and recreation venues.[8] The evolution of recreational activities taking place in these facilities has played a crucial role in influencing community wellness and well-being and contributing to the city's overall culture as a city of parks and pathways. However, the Philadelphia media have pointed out the negative impacts resulting from the closure of recreational facilities and the removal of public spaces to make way for new development in the economically challenged areas of the city.[9] While references to such

amenities such as Fairmount Park and Rittenhouse Square underscore the historical significance of these spaces as venues for recreation and leisure, the controversial closing of venues, including health centers in some neighborhoods, underscores the work needed to improve the availability of facilities strengthening the public and personal health of the city and its residents.[10]

The value of municipal parks and recreation centers in cities like Philadelphia can be traced back to their beginnings in the late 19th century, when rapid urbanization and industrialization created conditions increasingly dangerous to public health.[11] To address the challenges of maintaining personal hygiene in a city that was without residential plumbing until the early 20th century, municipalities established bathing centers.[12] In neighborhoods where economic hardship and social exclusion were rampant, amenities such as bathing facilities were conveniently located in recreational centers. By the middle of the 20th century, parks and recreational centers were viewed as a central figure in the lives of young children, as such facilities offered health benefits not often found in areas with dense concentrations of poverty and despair.[13] At these rec centers, children and their families could engage in a variety of constructive wellness activities, with different age groups in these communities thus being able to forge connections that would help them endure the challenges of cultural dissonance and transcend socioeconomic divides.[14] In many ways, recreational facilities became civic centers that acted as extensions of the home and as social incubators that could take on the vast transnational differences intersecting in these spaces and thus foster inclusivity, resilience, and empowerment.

In addition to providing many firsts in recreational opportunities, Philadelphia is also home to the first Percent for Art program, which has benefited the city's artistic development since the program's establishment in 1959.[15] Billed initially as a means for fostering cultural experiences in the city, the program required that 1 percent of the budget for the construction or renovation of city-owned buildings be allocated for the inclusion of public art. The program grew as it incentivized new developments by offering developers variances to planning restrictions for integrating public art into their site or building design. This initiative was a response to the growing recognition of the importance of art in public spaces, especially in urban environments. The program has significantly impacted Philadelphia communities, making art more accessible to the public, enriching the city's cultural landscape, and fostering a sense of civic pride.[16]

The presence of public art has transformed public spaces into vibrant centers for artistic expression, in addition to promoting community engagement and refining the character of Philadelphia as a city of neighborhoods and art. Notable examples of the program's impact include the creation of iconic public sculptures along the primary avenues that define the city's civic complexes and the Philadelphia Mural Arts Program, which has generated a network of

neighborhood murals and provides various cultural activities centered on the diverse artistic scenery of the city. Moreover, the Percent for Art program has played a crucial role in democratizing access to art. This aspect has directly influenced the conceptual theory for this research into the plausibility and promise of a Percent for Health initiative.

Methodology

The COVID pandemic emergency underscored the pivotal role of health services provided in municipal recreation centers. By examining the potential of these centers to serve as a space for medical personnel to continue offering health, wellness, and well-being support beyond the emergency event policy protocols, the research study supporting the Percent for Health initiative aimed to identify the optimal distribution of services and the best methods for integrating them into these facilities. The advantages of such a program would be significant, as it would include establishing satellite care facilities closer to or within densely populated areas, thereby bolstering the efforts of personnel working to bridge the medical services gap many vulnerable populations face due to lack of resources such as transportation or physical assistance.

Part policy study and part intervention prototype development, this research focuses on the initiative's potential impact on broader economic policies in workforce housing policy, neighborhood design, and community health planning for vulnerable populations through an existing network of municipal recreation centers. It aims to implement measures that improve pedestrian access to these facilities in conjunction with the proposed expansion of healthcare services via the adaptation of care approaches that are more convenient for area residents. This adaptation, which combines telemedicine and door-to-door patient engagement, is a key consideration in this study. This study also questions the appropriateness of interventions based on need alone and offers analyses of care capacity at a district health center in the city. It leverages the prevalence of recreational facilities in these municipal districts, which are centrally available and have a significant presence in each district, to help fill gaps in the distribution of services based on pedestrian access.

The recent development of chrono-urbanism as a planning concept offers a useful scaffold on which to begin reimagining the cultural significance and possibilities of municipal recreation facilities offering medical care. The Percent for Health initiative would add the provision of healthcare services to community culture, which is a critical element to consider when thinking about urbanism in the wake of the COVID pandemic crisis. Shifts in thinking about the best ways and places for a community to receive healthcare are echoes of the adoption of chrono-urbanist theories in the planning of other amenities, especially in relation to vulnerable populations. Planning a city around short distances that underscores the benefits of a walkable city

framework consisting of 10-, 15-, and 30-minute increments parallel the kinematic increments of effort and gait for pediatric, maternal, and geriatric patient mobility. This research study thus aligns directly with community planning that emphasizes decentralizing medical facilities and health resources but in a way that moves away from regional car-centric facility planning and instead aims to ensure that most day-to-day wellness needs are accessible via sidewalks, cycling, or public transportation. A goal of this research within these more significant agendas is to create compact, pedestrian-scale health centers, thereby prioritizing neighborhood models for administering care and reducing vehicular dependency for patient transportation.

This research not only addresses the lack of healthcare coverage for a neighborhood or region of a city after a hospital closes but also proposes to connecting underserved areas to a new network of municipal facilities through public art that points to public health services. The relationship between arts and culture is well documented in Philadelphia's Percent for Art program, which has often served as a landmark for community engagement.[17] This example of community engagement with the arts can also be viewed through the prism of healthcare, as engaging in the arts can alleviate stress, elevate mood, and boost cognitive abilities; it also promotes social interaction, reduces isolation, and strengthens community resilience. These advantages are particularly significant in areas with vulnerable populations, where social isolation and mental health challenges are more common due to higher levels of social and financial stress. Integrating arts and cultural activities into healthcare can take many forms. Community art projects, music therapy, and cultural festivals can be part of health promotion and disease prevention strategies.[18] These activities provide therapeutic benefits, enhance patient involvement, and improve the overall healthcare experience. Additionally, creating culturally relevant and inclusive art programs ensures that healthcare services are accessible and meaningful to diverse communities, thereby helping to address health inequalities.[19]

Study Design

The present research involves implementing two strategies for interrogating the initiative's validity: employing (1) situational mapping and (2) controlled condition analysis of a distributed outpatient network. While traditionally qualitative, situational mapping as an architectural site analysis involves combining the findings with the criteria from an analytical framework to query demographic studies related to programming and shelter intervals. The controlled condition analyses reference these qualitative goal sets when evaluating quantitative measures, such as how much shading from direct sunlight is needed and how much seating and how many orientating features are needed,

and they are used to determine the outcomes most suitable for meeting the needs of vulnerable populations.

In choosing municipal recreation facilities as the subject of a feasibility study for a proposed Percent for Health program, the present research proposition establishes the program's potential impact based on location and the capability to provide climate condition remediation at the place of intervention. The project analyses were based on integrating health services into recreation facilities serving vulnerable populations in underserved and disadvantaged urban communities. Vulnerable populations are defined quite broadly, and the population groups were therefore reduced to a subset with particular parameters that would direct architectural interventions based on the inability of these populations to traverse long distances by pedestrian travel, during which they would have to endure extended periods of exposure to extreme weather conditions.[20] As a result, families with early adolescent children, expecting mothers, families seeking neonatal care, and geriatric patients considering palliative care screenings were identified as the introductory audience for the preliminary intervention programming.

By selecting the subset vulnerable populations, the study sought to determine the broadest set of challenges and corresponding solutions for the patients, their families, extended families, facility staff, and medical staff within the proposed intervention. In addition to analyzing the primary services of each subset group—pediatric care for early adolescents, maternity care (including prenatal and neonatal care for expecting mothers), and palliative care screening resources (including mental health support for aging adults)—the preliminary screening of equipment yielded the limitations of examination rooms, imaging spaces, and diagnostic centers in providing equipment and spaces for adaptation to mobility challenges unique to each population. The research prototypes advancing the Percent for Health initiative included discussions with an interaction designer on a comprehensive approach to implementing inclusive design practices and going beyond accessibility criteria when adapting medical provisions to the specific recreational services offered at the selected centers. Accessibility audits of the recreation centers and the grounds around these facilities were randomly performed to determine the expected effectiveness of the existing spatial context in meeting inclusive design criteria. The audits also incorporated a digital pathway incline analysis for determining whether a step-less entry can be provided, as many of the facilities have an elevated interior floor, and participants with limited mobility would encounter problems when approaching the existing facilities on foot or with mobility aids such as canes, walkers, or wheelchairs.

At this point in the research, the goal shifted from the interrogation of these preliminary determinants to providing a concrete example of coverage by smaller facilities dispersed over a wide area in the absence of a regional model for hospital coverage. The information gleaned from the analytical

mapping determined where isolated populations were gathered, and in these areas base criteria were established for the selection of intervention locations extending outward from a facility, based on available space, level transitions along a path of travel, and adaptability to the criteria of incremental rest and orientating features placed at five-minute increments not exceeding 20 minutes of travel via pathways leading to versus departing from the same facility. In conjunction with analyzing the prevalence of obstacles and other negative features such as noise disruptions, traffic conflicts, and derelict conditions through situational mapping studies, this research also evaluated travel time mapping in defining the increment between architectural conceptualizations. Using web-based tools, these studies were then marked digitally in the archive site study map along a simulated walking path, developed using attractor points in the 3D studies and involving obstacles defined in situational mapping studies, to determine the constraints associated with rating the accessibility and ease of access for pedestrian guests. As situational mapping analysis, the study sought to understand the broader set of unique challenges each subset of vulnerable populations might encounter as obstacles to their arrival at a facility providing healthcare interventions. These analytical efforts include mapping the relationship between pedestrian activities such as walking with, carrying, and leading small children accompanying the family to a location and determining the situational elements that might improve their chances of completing the trip comfortably.

Additional research interrogated implementations focused on defining the arrangement of the program components and developing a set of architectural interventions to mitigate the impacts of climate change on the internal temperature of the new spaces providing medical services. These studies started with the personnel-to-population ratio to inform the size of the facility and continued through an assessment of solar-heat gain as the primary approach to reducing the impacts of extreme weather conditions in urban settings. The utilization of the Rhino 3D software add-on known as *ClimateStudio* enabled the quantification and visualization of solar radiation mapping on various design interventions to address the challenges posed by rising temperatures in urban environments. The solar radiation mapping informed variations in shape and material considerations, providing criteria regarding the characteristics of an overhang as it relates to seating, working, and storage in the on-site amenities intended to mediate the discomfort.

The design process focused on developing four controlled condition studies, which together would present a comprehensive analysis essential for determining the effectiveness of an intervention and assist in developing the means to bring the projects to fruition. The initial analyses involved (1) program sizing and (2) program placement, that is, determining the size and location of three critical components: an exam room with an imaging station, an assistance-accessible bathroom, and a storage room with refrigeration

capabilities. The program sizing analysis also involved determining the appropriate scale of building interventions based on a thorough evaluation of personnel-to-population criteria. This sizing and placement process ensures that the building's capacity aligns with the intent of the Percent for Health initiative by optimizing space utilization and enhancing operational efficiency.

The program placement analysis involved strategically locating new program interventions within an existing facility while adhering to inclusive design criteria. Utilizing the principles established at North Carolina State University's College of Design Center for Universal Design as a basis for these studies, the program placement analysis focused on the flexibility of the intervention, legibility of facilities orientation, evaluation of size and space for approach and use of the facilities, and increased tolerance for error in the activities of the allotted program in determining how the new interventions provide accessible and functional facilities for staffing personnel and patients. These processes of interrogating the program placement also involved considering the spatial relationships between different functions of the examination and screening processes for patients within the facility, optimizing workflow, and enhancing different user experiences.

A third controlled condition study, (3) the thermal impact analysis, evaluated the influence of the shape and the physical characteristics of building elements on reducing heat gain on the exterior surface of the facility. Interrogating the plausible means for introducing passive ventilation systems was based on the intervention's material and permeability with respect to mitigating solar radiation gain. The thermal impact analysis assessed the intervention's thermal influence on the new and existing facility, its solar exposure, and the existing enclosure design, which is crucial for understanding how the building's existing environments react to changing thermal conditions. These investigations focused in particular on assessing thermal gain, which refers to the increase in temperature within a space due to external and internal factors, by identifying and strategically placing new obstacles or elements to deflect solar impacts and mediate the challenges of inviting and relieving ventilation.

The thermal impact analysis contributed to the fourth investigation, (4) the permeability analysis. This involved assessing the complementary determination of the size of the aperture in these elements by screening the visual characteristics and performing a thermal impact analysis, by aperture, to examine how built elements affect the flow of light and air through the new obstacle. This process involves examining elements such as windows, walls, and roofs and determining how their orientation and the materials chosen for them can optimize their thermal performance. By analyzing the permeability of walls, partitions, and other built elements, the research proposes to create environments that balance privacy and openness, control airflow, and improve accessibility. Applying design strategies that reinforce effective

thermal management improves comfort and contributes to energy efficiency and sustainability. This assessment is particularly important for healthcare services provided in a recreational facility setting, where the impact of noise, humidity, and visual privacy can significantly impact user experience and safety.

Variable Descriptions

Analytical Mapping

The motivation for the study comes from the significant number of recreation centers across Philadelphia (a total of 156) juxtaposed against the relatively low number of Federally Qualified Health Centers (a total of 18) of which the City of Philadelphia directly manages eight. The purpose of this part of the feasibility study is to leverage the existing infrastructure of recreation centers to address the potential gap in access to health services, particularly in areas with limited availability of dedicated health services for the ascribed subset group previously identified.

Integrating the geographic and demographic considerations of chrono-urbanism was the focus of the first segment of this study. Utilizing travel time mapping to determine the walkable distance increments between recreation centers constituted the first objective; the next steps were interrogating all 156 recreation locations and determining an approximate network of healthcare programming distributions based on the corresponding framework of three subset population needs. Specifically, the study assessed which recreation centers were close enough to target populations to be included based on their connectivity with another recreation center no more distant than an unimpeded 30-minute walk (maximum) in a single direction. These connected locations were then evaluated for the pattern of neighborhood demographics, facilities available at the recreation center, and characteristics of the populations served by these facilities. These preliminary analyses were used to determine the potential impact and reach of newly introduced health services within facilities, based on pedestrian distances only, to determine in turn when secondary support could be provided at slightly longer distances, accessible along the same routes by public transportation.

Recreation centers were selected as the focus of these studies over other types of facilities managed by Philadelphia Parks and Recreation due to the presence of existing, in-use buildings that could be adapted and augmented to accommodate the provisional interventions. Utilizing these existing structures presents a practical and cost-effective approach to expanding coverage, defined as access to health services, within the local urban community. The initial mapping study identified which groups of facilities provided the more dynamic range of services and support based on an evaluation of

distances between facilities according to the defined perimeter, the physical infrastructure available on-site, and the suitability of the recreation center for integrating health services based on its ability to be expanded horizontally in one of the four cardinal directions without having to add any stairs for facility access.

Controlled Condition Analysis: Program Sizing

The study of program sizing for an intervention, particularly one designed to provide a healthcare setting, hinges on the primary variable of the personnel-to-population ratio, defined as one medical staff member per 10,000 residents. Given the selection of Philadelphia as the city for the study and the city's population of 1.6 million, the relevant personnel-to-population ratio is 160 medical staff members (1,600,000/10,000). From this ratio, the research establishes the staffing requirements, which subsequently influence the overall space and facility needs.

Another critical variable is how much space to allocate per staff member in order to determine the appropriate spatial requirements. For this study, it was established that each medical staff member requires 25 square feet of clear working area to attend to any service in the space. A clear working zone ensures that every attending staff member has sufficient space to perform their duties effectively, thus contributing to the overall functionality and efficiency of the healthcare facility. Based on this initial definition of a work zone minimum, the facility intervention variable is a minimally defined allocation of space determined by grouping staff, patients, assistants, and guests into the functional area of an intervention unit. With four persons per facility/intervention, the total number of intervention spaces needed can be calculated by multiplying the total number of spaces allocated to the staff person by the number of people in the space the member might be addressing per health service intervention. Each intervention would then provide a minimum work zone of 100 square feet (4×25) but not be limited to this amount, as this is considered the minimum allocation of new space relative to the proposition of an intervention. By aggregating these measurements, the research ensures that the design and program sizing of the building meet the minimum operational requirements for a single exam room, thus providing the minimum required working environment for the attending medical staff person.

Controlled Condition Analysis: Program Placement

In determining program placement, which establishes the formal agenda for allocating space to construct a built-into-place intervention with or within existing buildings, several key design variables were assessed to determine such interventions' functional, spatial, and aesthetic impacts. The primary

variable is the intervention space, defined under the Percent for Health initiative as either 1 percent of the facility's total square footage, including building and playgrounds, or a minimum of 100 square feet, whichever is greater. This variable is crucial, as it determines the size of the intervention relative to the overall building. Additionally, it ensures a consistent baseline for comparison across different solutions when developing these structures, regardless of their size.

Another critical variable is the location of the intervention, either externally within the setback side-lot or connected to the building's existing primary entrance. Where the intervention is placed significantly influences the intervention's effectiveness and integration into the existing structure. For instance, an intervention placed in a high-traffic area versus a secluded corner will likely yield different results regarding patient engagement and access to the services offered in a facility. The evaluation of this variable involves mapping the building's floor plan and identifying potential zones where the intervention could be most beneficial. Factors such as accessibility, visibility, and proximity to other essential building functions are critical in this assessment.

Controlled Condition Analysis: Thermal Impact Analysis

The primary variables for thermal impact analysis include solar radiation, ambient temperature, and the specific thermal properties of materials used in the intervention. To evaluate the effectiveness of passive cooling and passive ventilation, airflow and temperature differentials within and around the structure of the intervention were simulated using an add-on to a digital modeling software. Variables such as air velocity, measured in meters per second (m/s), and temperature differences between shaded and unshaded areas provide insight into the cooling capacity needed to provide a comfortable ambient interior temperature. Additionally, sound levels, measured in decibels (dB), were evaluated using "isovist" analysis within the add-on to assess the effectiveness of the intervention in providing sound control.

Defining the space and its thermal performance can be accomplished using base performance expectations to reduce thermal radiation levels and the corresponding surface temperature levels per a visual display. By integrating these variables into a comprehensive model, research predictions can offer a visualization of the intervention's effectiveness in enhancing cooling capacity and reducing thermal gain, ultimately contributing to more sustainable and comfortable building designs.

Controlled Condition Analysis: Permeability Analysis

Studying the exterior wall of the proposed intervention as an expansion of an existing recreational facility involves analyzing several research variables

to assess its effectiveness in providing shading, sound control, and thermal mediation. The primary variables include the size, shape, and distribution of apertures in the wall, the materials used, and the structure's orientation. Aperture size and shape are quantified using geometric measurements, with height, width, and overall surface area as variables in determining the success of an optimized shape and arrangement. The design aims to enhance passive cooling and ventilation by optimizing the apertures' configuration. By varying the size and shape of the openings, the research adjusted variable controls within a digital modeling software to evaluate the amount of sunlight entering the space through the wall, thereby reducing heat gain while allowing natural light into the space. These apertures also facilitate airflow, promoting passive ventilation and enhancing the cooling capacity of the new auxiliary space and the existing building. Sound control is achieved by carefully designing the apertures to block or attenuate external noise, measured in decibels (dB) and determined from the proposed attenuating properties of finish materials for the walls. The effectiveness of these design elements is evaluated through temperature differentials, airflow rates, and sound-level reductions, providing a comprehensive assessment of the intervention's performance.

Results

The concept of chrono-urbanism focuses on the relationship between time and urban spaces, particularly the impact of temporal factors on the accessibility of crucial services within the urban environment. The research presented here aims to investigate the quantitative aspects of chrono-urbanism in the satellite healthcare setting by employing online mapping resources to evaluate walkability and access to maternity care, pediatric care, and palliative care provided via outpatient walk-up services. The study areas examined increments from 5-minute to 30-minute walkability to determine the time-based variations in accessing care at dedicated health facilities versus recreation centers from corresponding areas where public housing is concentrated.

Utilizing the *Close.city* and *TravelTime* online mapping resources enables integrated geographical information systems (GIS) technology to accurately measure and visualize the spatial relationships and accessibility patterns within the urban environment. With these innovative mapping tools, the present research study can determine and delineate the catchment areas within specified walk radii and assess the temporal implications of accessing different types of care at various locations across the city. Through quantitative analysis of walkability and temporal accessibility, this study aims to provide valuable insights into how buildings currently serving one municipal function can be adaptively reused to provide health services to the community.

Integrating *ClimateStudio* into the research methodology allows for a rigorous assessment of the thermal performance of architectural interventions,

thereby providing insights into their effectiveness in reducing heat-related issues. Additionally, the research study applies the software's ability to simulate and analyze the line of sight relative to visual privacy and sound attenuation, thus facilitating a comprehensive means for optimizing variations in architectural concepts and, in the prototype studies, creating informed permutation development. By combining chrono-urbanism information obtained from mapping work with the evaluation of architectural interventions using *ClimateStudio*, this research aims to offer holistic insights into the complex interactions between urban and temporal dynamics, climate change, and architectural design. The findings from these different scales have the potential to inform sustainable adaptive reuse practices at scale and contribute to the health resilience of urban populations while fundamentally making primary resources such as recreational centers more robustly tied to the needs of the neighborhoods they serve.

In these adaptive redefinitions of space and utility, the chrono-urbanism and climate mediation studies identified four categories in which to address pedestrian connectivity, effort, and climate mediation. The *theoretical* framework categories are *territory*, *situation*, *thresholds*, and *facilities*, with each possessing some aspect of adaptation for an existing facility to meet medical expectations for healthcare accessibility. The *territory* (Percent of territory) category focuses on the geographic distribution of site services across one of two urban contexts: the facility location, as it relates to other centers within a neighborhood or district, and the immediate recreational facility grounds as centered within a district. The *territory* studies assess healthcare facilities' distribution among residential areas and housing typologies: single-family ownership, multi-family ownership, and multi-family housing, considering factors such as proximity, walkability, and accessibility. The design of the *territory* aims to reduce travel time and distance for patients seeking primary care assistance, aligning with the chrono-urbanism principle of 15-minute (30-minute maximum) walkability or less for creating a healthcare hub where a patient can be seen by medical personnel for routine examinations, imaging, or diagnosis.

The *situation* (Percent of a situation) category delves into the immediate context of each intervention along the path of a patient's travel to and arriving at the adapted recreational facilities and explores the environmental quality surrounding the adaptation of the facility into an open-air health services center. It considers factors such as shading devices along a public route that may serve as public infrastructure, incorporating passive climate mediation, and pedestrian-friendly infrastructure that also contributes to orienting the patient to a center through legibility and demarcation of informative next steps. The *situation* emphasizes the role of effort and the feasibility of incremental support conducive to pedestrian activities and improved accessibility. These features connect directly with the facilities as a third category,

thresholds, *aperture*, *and percent of slope*, working together to address the situational needs of a patient based on the context, offering an architectural response to the challenges patients face when walking into a situation managed by medical personnel, as determined by the facility's redesign.

The *facilities* (Percent of facilities) category focuses on the architectural design and functional aspects of programmatic components intended to provide inclusive and supportive health services in these multi-purpose locations. This category may include new or improved facilities such as bathrooms, seating, and air-conditioned interior spaces. Each of these interventions, for both the situational needs and the facility response, addresses how the layout, amenities, and services within the facility respond to the unique needs of vulnerable populations. By integrating features such as childcare facilities, waiting areas designed for children, and efficient patient flow management that corresponds to the overlapping public space amenities of the recreational facilities, the research propositions work to alleviate the temporal and logistical complications faced by patients seeking medical care adjacent to persons entering the community facility.

During the COVID-19 pandemic's public health emergency phase, doctors' use of common spaces to meet with patients represented a significant shift in healthcare delivery. The utilization of common spaces such as porches, barbershops, and even community spaces in schools for medical consultations exemplifies the historical significance and value of these public spaces in connecting with people, particularly those in disenfranchised neighborhoods where vulnerable members of the population may be concentrated. One notable example is the Liacouras Center at Temple University in Philadelphia, which was transformed from a sports and entertainment complex into an emergency medical space providing overnight accommodation and patient observations. While emergency transformations such as this are not ideal, they represent the repurposing of community space for healthcare delivery and its positive impact on the surrounding population and context. By examining social and public health circumstances and the utilization of shared spaces for associated components of medically related processes such as check-in, pre-examination, patient accommodation, and supplies, a comprehensive analysis of the role these spaces play in providing medical services informs the effort to resize such arrangements and apply them to smaller contextual mediums for similar interventions in smaller recreational facilities.

The potential of these facility interventions to improve the social, economic, functional, environmental, and material determinants of health, as well as the capability of these prototype propositions to rebuild the healthcare capacity of a city like Philadelphia, embodies the benefits of the Percent for Health initiative. The proposed effort to adapt space in municipal recreation facilities to serve as community health resource centers is not without challenges. One such challenge would be determining responsibility for facility

oversight and the role each facilitator in the project would play in providing care during and beyond the operation hours of the facilities, as determined by the type and scope of the healthcare component.

Philadelphia, with a population of approximately 1.6 million in 2023, currently faces significant healthcare access challenges, particularly among its vulnerable populations of low-income families, seniors, and those with chronic health conditions. The challenges they face in traveling to healthcare facilities at any distance from their communities include difficulty in walking to a facility, limited direct access to the facility by public transportation, or lack of a personal vehicle to support individual travel to a healthcare provider location. Because these vulnerable populations often must travel on foot or wait for public transportation in open areas, extreme weather conditions, worsened and made more frequent by climate change, negatively impact their travel for care.

As this study has shown, ongoing struggles to access healthcare have intensified with the historical shift in medical care facilities from neighborhood to central locations. The existing healthcare infrastructure in Philadelphia comprises eight municipal health centers, equating to one center per municipal district. Thirty-two other Federally Qualified Health Centers are spread out across the city. However, this distribution does not adequately serve the city's population. The World Health Organization's recommended healthcare personnel-to-population ratio of 1 to 10,000 indicates that 160 health centers, each staffed by 15 healthcare professionals, are necessary to meet local demand.[21] However, with only eight city-run centers, there is a significant shortfall in both personnel and facilities.

To address this gap, this research proposes increasing the number of health center facilities to 196 by introducing nano-sized clinical and health service interventions at the city's 156 neighborhood recreational centers. Each facility would be staffed with up to five new healthcare workers, an expansion that would result in the addition of 780 healthcare professionals, the equivalent of one medium-sized hospital, thereby significantly enhancing the city's capacity to provide medical services. This strategy ensures that healthcare is more readily accessible to residents, particularly in districts with limited hospital presence and where reliance on complex public transportation systems poses additional barriers.

The proposal to increase the number of health centers by adding 156 micro-clinics at existing recreational facilities addresses the critical need for health access. In contrast, Philadelphia's public transportation system, while relatively extensive compared to what many US cities have, often requires multiple transfers and long travel times, which are particularly burdensome for senior citizens and those with mobility issues. Therefore, the main impetus of the proposed Percent for Health initiative is to highlight the need for more localized health facilities to provide

coverage, to reduce these travel burdens, and to make healthcare services more accessible by foot or assisted means, such as wheelchairs or walkers. Moreover, the initiative aligns with broader urban planning and architectural goals to mitigate the impacts of climate change and enhance residents' overall quality of life.

This study interrogated public data from the City of Philadelphia's Health and Human Services website against Philadelphia's Parks & Recreation website, and it analyzed the walkability metrics via the three sources consulted: the *Close.city* web tool, the *TravelTime* web tool, and *ClimateStudio*, an add-on to Rhino3D software. The research study utilized these resources to interrogate the locations of the recreation centers relative to health centers and generate novel architectural concepts pertaining to the percentage of an existing facility that could be reconstituted to provide health services; the compilation of data from *Close.city*, *TravelTime*, and *ClimateStudio* provided a comprehensive understanding of the interaction between urban design and the environmental considerations of climate in architectural programming.

Close.city is an interactive travel time map designed to help users understand the proximity of various amenities, such as supermarkets, convenience stores, farmers' markets, libraries, public transit stops, public schools, and playgrounds. Users of the web tool can select different amenities and travel modes (walking, biking, public transit) to visualize travel to these locations. The tool emphasizes the accessibility of neighborhoods based on the farthest important amenity, providing an overview of urban connectivity as a component for determining the degree of access.[22]

Gathering data from these web tools was critical to using the principles of chrono-urbanism as a framework for determining what degree of health access a population has; this data acquisition and analysis effort focuses on the temporal aspects of urban life and examines how time and urban space interact to influence human behavior and movement. By varying the time-of-travel interval between resources based on shifts in attention and correlating these data variables with travel distance, the proposal determined how frequently a reminder feature should pop up to keep pedestrians on track to their goal. Similar to the repetitive signage found when traveling along a highway, the increment between interventions keeps pedestrian patients informed of the time to their destination while offering incremental rest and weather relief. In place of signage as a reminder feature, this research proposes an increment of public art related to the destination and serving as a distance marker to the recreational facility with on-site healthcare services. The research study posits that using interventions such as these while identifying community shops and locations along the route supports the services associated with that recreation center, such as local shops with family bathrooms or seating freely available for seniors, without any expectation that they would purchase goods or services in that location.

Each conceptualization described here redefines the amount of healthcare/medical coverage available to residents through a spatial prompt to guide residents toward access to essential services regardless of socioeconomic status. Since vulnerable populations have varying levels of ease or difficulty in accessing healthcare services, the temporal dimension of accessibility should be highlighted to ensure that underserved demographic groups in particular are aware that quicker, easier access to healthcare can be made available via decentralized, neighborhood facilities they may already know. In addition, details gleaned from inclusive design approaches about the importance of the temporal aspects of healthcare accessibility can inform changes to policies aimed at boosting all types of public infrastructure, from improving transit options to enhancing public pedestrian pathways, to ensuring equitable access for pedestrians.

Inclusive design metrics ensure that healthcare facilities are accessible and supportive regardless of patients' age, gender, or physical ability. For children and expecting mothers, this means creating environments that are physically accessible, supportive, and welcoming. Given these studies and their corresponding calculations, the analysis considered the personnel capacity and geographic distribution of facilities to ensure the widespread availability and accessibility of comprehensive medical services, including primary care examinations, imaging, diagnosis, and specialist consultations. Exterior arrival and interior areas of facilities where care is dispensed must be able to accommodate strollers, wheelchairs, and other mobility aids. Accessibility criteria for meeting patient needs include wide doorways, ramps, and legible signage that reflect the city's diverse cultures and languages. Pediatric clinics must have child-friendly waiting areas, examination spaces, and play spaces able to reduce anxiety and create a positive experience for young patients and their siblings. These areas are even more important in these smaller interventions where services blend outwardly into the existing facility and may include comfortable seating, engaging activities, and a calming décor informing guests of the prioritization of these spaces for health services operating separately within the recreational facilities.

Maternity clinics within recreational facilities should prioritize not only prenatal care but also postnatal care, which would mean adding extra sound attenuation. Programming to meet the needs of children and their families/caregivers includes private consultation rooms, comfortable waiting areas, and spaces for childbirth education classes and support groups to meet in a nurturing environment. Since recreational centers are often community focal points, offering prenatal classes in these facilities fosters community support and encourages residents to make regular visits to these centers, thus promoting the overall mother-child well-being.

Conclusion

The COVID pandemic that reached the United States in 2020 led medical providers to offer care in new ways and places. For those people who face exclusion from medical systems due to lack of insurance, transportation, money, or time and are thus prone to dealing with illness by shutting themselves inside their home until the condition subsides, a doctor who engages them on their own turf represented a stark change in a system that typically requires patients to navigate their way into the sterilized conditions of a healthcare facility. Oddly enough, there was something quite comforting about this pandemic-born shift to healthcare delivery in new environments, where "air hugs" might be more expected than medical procedures. Even the magnitude of the situation—an event upending the hegemony of medical institutions—was almost unfathomable until it happened. When it did, questions roiled every dimension of life. Still, with grassroots-level healthcare distributed among the people being the prime effort to fight the virus's impact, it seemed as if the pandemic had finally made public health relevant after years of policy and procedures dominated by proprietary concerns.

In an effort to open up the environments of healthcare facilities—both spatially in terms of infrastructure and socially by improving access to underserved communities—policy research pursued in these interrogations combined with systems-based investigations, like those described here, can transform challenges into innovative ideas for future medical and non-medical settings. When researching space planning and programming for healthcare facilities, it is crucial to determine whether patients and providers agree that the proposed solutions have value. This research offers holistic insights into the intricate interactions between urban dynamics, time constraints, climate change, and architectural design. Translating a controlled environment into an open and inclusive atmosphere requires a thorough understanding of the capacity and capability of a facility to provide service. The improvisations witnessed during the pandemic when healthcare was provided in open spaces in many ways helped patients feel at ease, highlighting the importance of designing openness into healthcare settings to enhance civic wellness. Therefore, the architecture of healthcare environments based on these experiences should incorporate this openness to foster better overall community health.

Programs like the Percent for Health initiative interrogate healthcare by integrating it into existing public infrastructure, thus transforming old facilities into new places of wellness. Percent for Health makes it possible to introduce non-invasive clinical infrastructures into a community while allowing that community to remain culturally distinct and achieve greater social cohesion. With the Percent for Health concept, a new discourse on implementing updated criteria for serving the community's medical needs can proceed with planning and designing satellite healthcare venues. These efforts to address

urban challenges contribute to an evolving prospectus on pedagogy that associates design with health, redefining the research agenda from a medical service focus to one that gives physical space and phenomenological form equal weight in the design of a facility and its approaches.

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6

ENVIRONMENTAL JUSTICE

Katera Y. Moore

Introduction to Environmental Justice

Environmental justice is place-based; it encompasses everything that impacts someone's lived experience. It can include things like access to quality education, access to economic opportunities, access to nutritious food, access to primary care, and access to recreational opportunities (Office of Disease Prevention and Health Promotion, n.d.). The correlation between place and outcomes is well documented; this includes zip code and life expectancy, as well as residential security maps (commonly known as redlining), exposure to gun violence, and exposure to environmental burdens such as air pollution and the siting of noxious land uses. The obstacle is that each of these life spheres is addressed by a different system. We must function outside of silos and use an interdisciplinary systems approach to strengthen climate resilience for the most vulnerable of society—which is all of us.

Environmental justice is where civil rights and environmentalism intersect. It is a social movement that centers poor and marginalized communities. Its origins trace back to Warren County, NC, when in 1982 the state government decided to store toxic soil in a poor, rural, and predominantly black community.[1] Since that time, there have been thousands of documented examples of the disparate impact of environmental burdens on these populations, with the most egregious being in "Cancer Alley," Louisiana, an 85-mile region along the Mississippi where communities suffer from the effects of extreme pollution, the result of living beside 200 fossil fuel and petrochemical operations.[2]

There is no federal environmental justice law; environmental justice communities generally attempt to use Title VI of the Civil Rights Act of 1964 to seek equitable outcomes.

DOI: 10.4324/9781003535768-7

Executive Order (EO) 12898 brought the term environmental justice into the federal lexicon and introduced meaningful participation guidance during the Clinton Administration in 1994. EO 12898 was issued to focus federal attention on the environmental and human health conditions in minority and low-income communities; to promote nondiscrimination in federal programs substantially affecting human health and the environment; and to provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.[3] This EO largely focused on ensuring that the impacted community can meaningfully engage in the environmental permitting and land use decision-making processes. This EO did little to stem the tide of siting noxious land uses in marginal communities.

Subsequently, the Biden Administration used funding caveats to promote environmental justice. In 2023, EO 14096 was introduced to provide additional guidance and expectations to better protect historically disenfranchised communities by acknowledging the environmental impact of historical racist practices. EO 14096 aimed to deepen the whole-of-government commitment to environmental justice and better protect overburdened communities from pollution and environmental harms.[4] The idea was to strengthen engagement with communities and mobilize federal agencies to confront existing and legacy barriers and injustices. An unprecedented amount of funding was made available for community groups and municipalities to tackle environmental justice issues with a focus on partnerships. There was also an ongoing effort to develop data-driven approaches to identify cumulative impacts and other risks. The most significant outcome was the Justice 40 initiative that required that 40 percent of the benefits of federal investments go to marginalized communities.[5] The Climate and Economic Justice Screening Tool was developed to identify disadvantaged communities that are saddled with climate, environmental, health, or socioeconomic burdens. The Trump administration rescinded both EOs and terminated the Justice 40 Initiatiave, the EJ Scorecard, and the Climate & Economic Justice Screening Tool by also rescinding EO 14008.[6] While the Biden administration's goal was laudable, particularly because these efforts were accompanied by dollars, the realized impact on overburdened communities remains to be seen. In March 2025, the Trump administration closed the Environmental Protection Agency's (EPA) environmental justice offices and canceled $2 billion in grants. In many ways the Biden era efforts only bolstered the non-profit industrial complex, the result of decades of outsourcing necessary goods and services to private entities using temporary funding allocated as a part of disparate policy strategies. This complex results in privatized inclusion and marginalized communities losing by a smaller margin rather than realizing real gains.[7]

While environmentalism centers nature, environmental justice centers people. Environmental justice looks beyond river restoration for the sake of fisheries, forestry for the sake of native landscape restoration, and other efforts to save endangered species in the plant and animal kingdom. Environmental justice considers human-nature interconnectivity through a social justice lens. Environmental justice acknowledges why some populations are saddled with environmental burdens while other populations can benefit from ecological services. Additionally, environmental justice cocreates solutions with impacted communities rather than imposing interventions that potentially displace those populations.

There are a range of health disparities that emerge from environmental justice issues. The disparities vary by population: cancer clusters in areas saddled with noxious land uses, respiratory issues in communities sandwiched between highways, water-borne illness in communities lacking proper water infrastructure, cardiovascular and other diseases in areas lacking access to food, recreation, and primary care.[8, 9, 10] Public health seeks to move toward health equity by considering the range of structural factors that impact health outcomes, particularly as communities are exposed to lead, air pollution, hazardous waste, and extreme heat. This requires examining both the built environment and social systems to mitigate burdens and create true pathways toward health equity at the neighborhood scale, when considering facility design, services, hours of operation, funding mechanisms, wraparound services, and policies.

Vulnerability in the Landscape

In 2015, the United Nations introduced 17 goals for sustainability to be achieved by 2030. These goals link people and the planet, acknowledging that prosperity for all is a key component of sustainability. Planning for climate change requires looking beyond infrastructure investments; people must be included. Landslides, flooding, crop failures, and other disasters are occurring more frequently at the global scale. In 2024, ten houses collapsed into the Atlantic Ocean on North Carolina's Outer Banks; Delaware Bay communities are faced with regular sunny day flooding because of tidal activity; and low-lying post-industrial cities on combined sewer systems must contend with the stress of wet basements from heavy rain events.

Climate resilience is a key component of environmental justice that in addition to strengthening the built environment requires a focus on strengthening communities through engagement and the co-creation of solutions by mitigating some of the social stressors affecting them.

While flooding makes headlines, there are a plethora of place-based environmental stressors that impact rural and urban health outcomes. Air pollution, water pollution, food insecurity, and other hazards can be exacerbated

by climate change. Coupling these stressors with factors such as economic stability, education access and quality, healthcare access and quality, the built environment, and the social context provides insight into the marginality that is built into the landscape. Groups that are politically and economically marginal are inherently less resilient to the impacts of climate change. Ad hoc disaster relief-driven interventions do nothing to bolster social networks and strengthen communities to weather the storms.

When we think about a place, we must consider the opportunities (or lack thereof) associated with that place. And ask ourselves how wealth and health are interrelated and if we are moving toward an equity framework rather than the false narrative of equality. Marginality is embedded in the landscape, and groups that are politically and economically marginal are frequently disconnected from the land use decisions that impact their everyday life. Additionally, the morphology of the landscape plays a significant role—whether it be the built environment, or changes caused by biogeochemical processes.

Environmental justice and health equity are frequently thought of as urban issues. The fact is urban and rural economic processes are complementary due to primary and secondary economic activities. The stressors may appear different; however, the impact is the same, particularly when considering air, water, hazardous waste, and access to resources. For example, mining operations and refineries create the same respiratory health hazards, agricultural runoff and combined sewer overflows negatively impact water quality, workplace hazards on farms and in factories impact lower-wage workers, and gaps in primary care, food insecurity, and health disparities are persistent in both communities.

In Delaware, the entire state is either medically underserved or has primary care shortages; these gaps align with the CDC's Environmental Justice Index and other indicators that map demographic health disparities, such as chronic diseases, across the landscape. Of these, chronic health issues across the state include obesity, diabetes, cancer, and inactivity.[11, 12] Broad climate change impacts have also introduced increased temperatures, rising sea levels, and heavier rainfalls and greater flooding across Delaware, the lowest lying state in the nation.[13] Delaware also lies within a sea-level rise hotspot where sea levels rise faster and higher as land sinks. Bowers Beach, DE, is experiencing this at a faster rate than any other place on the Atlantic Coast.[14]

Throughout the state we find a range of environmental justice issues. Delaware commonly experiences natural hazards such as flooding, heat waves, and severe storms, which can expose faults in planning, resources, and infrastructure.[15] Severe hazards and disasters such as hurricanes and droughts could cascade and multiply in areas that are considered vulnerable in "times of peace," creating more issues for communities already in distress from underlying and accumulated issues.

Delaware contains three counties: New Castle County in the north, Kent County in the central part of the state, and Sussex County in the south. In

Delaware, the population center is in the north in New Castle County. There we find legacy contamination, industrial activity, flooding in communities on combined sewer systems, inundation from the Christina River, heat islands in communities with a lack of access to green space, higher rates of respiratory issues, and other health disparities. As the county in Delaware with the highest population density, public-private redevelopment initiatives often unintentionally exclude existing residents, such as the transformation of the Wilmington Riverfront from a blighted polluted site into a "hotspot with… high end apartments and hip restaurants."[16]

In Kent County, there are pockets of communities dealing with legacy contamination as well as bay communities experiencing sunny day flooding from the tidal activity of the Delaware Bay, storm surges, flooding associated with king tides, a lack of resources and funding to maintain beach widths, beach erosion from Nor'easters, saltwater intrusion into marsh areas, and limited access roads. Bay communities are often under resourced and unable to continue to maintain the wide shorelines necessary to protect them from coastal flooding. Storm surges can often overwhelm these communities due to their low topography and dated stormwater infrastructure. Marshes also can be easily inundated, which can cause inland flooding. These communities have an aging population and may have greater needs for their health in terms of their safety and quality of life.

In Sussex County, the eastern part of the county is bordered by the Atlantic Ocean and the western portion houses the bulk of the communities that have been identified as Underserved Communities by the Delaware Clean Water Initiative, which seeks to provide infrastructure in communities with demonstrated public health and clean water challenges.[17] Many of these communities are also surrounded by concentrated animal feeding operations and spray irrigation fields. Public health and environmental justice concerns related to air pollutants, nutrient runoff, and continuous impact on vulnerable communities impact this half of Sussex County.[18]

These issues pose unique challenges to strengthening communities against climate-related disasters. The State of Delaware Climate Action Plan identifies sea-level rise, increasing temperatures, changes in rain patterns, and greenhouse gas impacts as climate-related issues that will affect Delaware.[19] Integrating public health into emergency management readiness plans is crucial; prior to the Trump administration's issuance of EO 14239,[20] the Federal Emergency Management Agency (FEMA) offered guidance and funding through the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, and the Building Resilient Infrastructure and Communities grant. The Delaware Emergency Management Agency has recently updated their Strategic Plan to include stakeholder input to achieve readiness goals.[21] There are satellite health campuses appearing throughout the state as populations grow; however, these campuses frequently serve new housing development

communities such as Bayhealth Milford, Christiana Care Middletown, and Beebe Healthcare in Sussex County. Rural communities continue to have gaps due to ongoing transportation route cuts, bus bunching, and a lack of funding in areas which require greater considerations in planning due to traffic volumes and lack of alternatives.[22, 23]

Fortunately, Delaware's equity analysis mapping can allow agencies to quickly identify gaps. For example, the Delaware Department of Transportation (DelDOT)'s Equity Focus Areas provides key demographic information and classifications to areas based on household medians, composition of races and minorities, poverty percentages, and language isolation percentages in the census blocks. The Delaware Department of Natural Resources and Environmental Control (DNREC) has consolidated this data within DNREC's EJ Area Viewer, which provides data from a variety of sources on a state and federal level regarding health, pollution, linguistic compositions, and vulnerability indicators. However, this is subject to change as there is a prohibition on equity programs ushered in by the Trump administration's EO 14151.[24]

Place-based risks can be identified with tools that utilize data related to vulnerability, pollution, and population health. The Social Vulnerability Index is a mapping tool produced by the Centers for Disease Control and Prevention (CDC) used to identify communities that require support during emergencies, helping prevent adverse effects such as sickness, loss of property, and physical and emotional harm. EJ Screen is a tool produced by the EPA to highlight environmental burdens and vulnerable populations in a consistent manner, combining both socioeconomic and environmental indicators. The Climate and Economic Justice Screening Tool was created after EO 14008 was enacted to identify economically disadvantaged and overburdened communities which have suffered from pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and healthcare. Disadvantaged communities are identified by exceeding one environmental or climate indicator. Communities must also exceed the threshold for socioeconomic indicators to be considered overburdened alongside at least one indicator exceeding its threshold.

There are additional tools and indices that are specific to health. The Air Quality Index is a map designed to report air quality daily and the associated health effects with breathing air several hours or days after breathing polluted air. Air pollutants measured are ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. Air quality is measured from good to hazardous. The CDC and Robert Wood Johnson Foundation life expectancy tools are interactive annual reports that identify how many more years a group of people who are at any age can expect to live if mortality patterns within a single year remain the same until the rest of their lives. The CDC Heat Risk tool provides a heat risk forecast and recommendations to protect the health of those in the area. The tool is designed to promote

safety from heat-related illnesses and bodily damage such as heat stroke, heat exhaustion, and fainting.

Flooding and the Built Environment

Hurricane response and recovery varies by location and population as indicated by the prolonged recovery post Hurricane Katrina in 2005 in Louisiana and Hurricane Maria in 2017 in Puerto Rico. This differs significantly from the Hurricane Sandy response in 2012 on the East Coast of the United States. Despite the existence of the Stafford Disaster Relief and Emergency Assistance Act (1988), FEMA has been criticized for systemic inequities in disaster response. These inequities correlate to race, class, and other social vulnerabilities. Underserved and marginalized communities are less likely to recover after a disaster, and subsequently inequality grows.[25]

Atlantic hurricanes bring torrential rains, storm surges, and water infrastructure damage. Hurricanes significantly impact coastal areas with flooding and extreme winds—with Hurricane Helene in 2024, Hurricane/Tropical Storm Ida in 2021, and Hurricane/Tropical Storm Isaias in 2020 being the most significant since Hurricane Sandy in 2017. These extreme weather events caused significant damage along the eastern seaboard. However, the damage in western North Carolina caused by Hurricane Helene has demonstrated that inland areas are now at risk for hurricane damage because of climate change.

The communities along Delaware's east coast are at particular climate risk as storms of increasing severity and sea-level rise become more frequent, and the natural buffers between human infrastructure and the sea will be compromised by storm surges, tides, high rainfall, and other events. This will only worsen as sea-level rise quickens due to climate change.[26]

In more extreme flooding events, such as the 100-year storm, FEMA's FIRM maps identify base flood elevations (BFEs), which correspond to the total height in feet of flooding that is expected to occur in a 24-hour period. Beach towns in Delaware have estimates that are as high as 12 feet and even more in places with lower land and less protective measures against flooding. On the note of protective measures, many bay communities and towns do not have the resources, funding, or social capital to advocate for and have assistance in developing and implementing measures to expand beach widths to previous conditions and have solutions in place to prevent daily and extreme erosion to their beachfronts. When flooding occurs, these marshes can be easily overwhelmed, and natural life and private wells can be affected by saltwater intrusion. The topography of these communities is not equipped to handle extreme events, and these issues are made worse given many beachfront communities have few ways in and out.

Projections, historical patterns, and known issues within beach communities and towns demonstrate that climate change and sea-level rise will only

further test their resilience. The future of these communities largely depends on what they do and what organizations do within their capacity to think through the past and present.

Public Health and Flooding

Living with the threat of flooding is not only stressful (Tapsell & Tunstall, 2007) but vulnerability is increased if residents are unable to activate the safety nets typically available to those of higher means such as flood insurance, municipal support, and response and even financing to mitigate the problem or relocate.[27, 28, 29] Flooding also perpetuates health concerns related to the toxins found within landfills and Superfund sites, especially in areas within floodplains.[30]

Delaware is the state with the lowest mean elevation in the United States, thus flooding and future scenarios of sea-level rise are inevitable. The low-lying landscape and existing concerns such as dated stormwater infrastructure, contamination and pollutants, and outdated structures contribute to flooding concerns, particularly in areas housing vulnerable populations.[31] In Delaware, places like Wilmington rely on combined sewer systems which were not built to handle the intensity of flooding brought on by current day and future storm surges and flooding amidst climate change. Less obvious are the long-term impacts of cleanup efforts and the physical and mental toll flooding can have on people's health.

The most apparent concerns for human health are the vectors of transmission flooding can cause for contaminants. Hazards such as viruses, bacteria such as *E. Coli*, parasites such as protozoans, and worms can all cause effects as extreme as damage to the body in core organs and diseases through pathogens.[32] In addition to the risk of polluted water, the risk of mold growing in homes can cause sickness, allergies, congestion, internal soreness and irritation, respiratory infections, and difficulty breathing (Division of Public Health, n.d.-b).[33] These are issues to consider after the flooding has occurred, but what about the immediate impacts? One commonly overlooked aspect of flooding is the impact on mental health. After a flooding event, it may be difficult to access and navigate resources. This is why it is crucial to strengthen communities, both in the built and social realms.

The Role of Community Planning in Countering Climate Vulnerabilities through Inclusion of Community Groups and Inclusive Design

Resilience hubs are one community-based strategy to mitigate the impacts of flooding if people are unable to evacuate. These hubs can provide shelter, electricity, access to recovery resources, and other wraparound services

to help residents navigate the aftermath. Unlike a cooling center, which is established during heatwaves and frequently underutilized, a resilience hub is embedded into the fabric of the community.[34]

Stacey Henry is a lifelong Wilmington resident who was inspired to create Delaware's 1st Resilience Hub after September 2021 when Hurricane Ida left many residents without homes and in need due to remnant flooding.[35] Her philanthropic work included organizing relief efforts, providing supplies, and housing. She made and distributed meals, kept records of the displaced, organized the distribution of resources, and advocated for state funds to aid residents. The essence of this effort was pivotal to quickly address immediate recovery needs post-disaster. As a resident, she was a trusted voice and had knowledge of the social landscape. This enabled her to connect with those directly impacted. This community-centric, bottom-up approach is a perfect example of local champions using indigenous knowledge and community connections to advocate for resources. State agencies and organizations are often unable to determine community needs quickly and efficiently because of the difficultly of connecting with the impacted community and the coordination required for siloed agencies to provide aid. Henry's nonprofit continues to host gatherings to support and empower Delawareans. Her work is one example of successful efforts to advocate for people at a scale that requires relationships and connections that can only be established by being embedded in a community.

Opportunities also exist within the National Oceanic and Atmospheric Administration (NOAA)'s Environmental Literacy Program to build climate literacy to build resilience to hazards such as climate change and extreme weather. Although the program is administered through a competitive grant, NOAA provides hazard preparedness resources on their resilience hub page. The EPA operates a similar program known as the Community, Equity, and Resiliency Initiative to provide materials, resources, and technical assistance toward overcoming environmental justice, pollution, and climate change challenges. However, in April 2025, the Trump administration announced a plan to defund NOAA's climate research office.

Resilience hubs can act as conduits to allow people access to a range of supports without worrying about cost or implications of getting help. Since resilience hubs are designed to provide resources to a specific scale of people, meaningful connections can often grow and provide people who seek resources or services with more opportunities to do so. These hubs have the benefit of providing help in a variety of ways much more efficiently than state or even local agencies due to their streamlined goal and targeted approach.

The hub model can be expanded to healthcare, particularly in communities that lack healthcare infrastructure, for example, expanding Federally Qualified Health Centers to a more comprehensive approach such as PHMC Cedar in Philadelphia. The campus occupies a shuttered hospital and is a

coordination of care collaboration among Penn Medicine, the Children's Hospital of Philadelphia (CHOP), and the Public Health Management Corporation (PHMC) to alleviate some of the health disparities in the community that put stress on the emergency departments in the area.[36] There are walk-in primary care, easy referral to specialists at the campus, pediatric care, behavioral health, wellness initiatives, and other social supports; integrating climate resilience is a natural fit.

Healing and wellness gardens are becoming a familiar sight at suburban hospital campuses; architects should begin to consider integrating these features into retrofit designs in cities and rural areas, particularly when considering the National Climate Resilience Framework. Green infrastructure best management practices have multifaceted benefits in public spaces such as reducing impervious surface, increasing stormwater infiltration, supporting biodiversity in man-made environments, providing shade, improving air quality, and creating community-centric spaces.[37]

Conclusion

Environmental justice is ultimately about the power relations related to sociopolitical processes and struggles. The scale of these issues spans across the entire United States, and so environmental injustice does too. Pursuing a just environment frequently requires social capital that marginal populations do not possess. From advocating from a local, community level to the county, state, and even national level, these hurdles are impassible without support from people who are in positions to advocate and create change. Environmental justice struggles are frequently a commentary of how populations function in the broader political economy. Struggles over land uses that potentially adversely impact locals but benefit the municipality will defer to economic development interests.[38]

Flooding vulnerability is clearly an environmental justice issue because flood-prone land is economically marginal due to underlying environmental hazards. That, coupled with the marginal social and political status of the residents, renders them unable to mitigate hazards because they are excluded from the kind of civic environmentalism that would enable them to influence development in the area.

Not only does flooding undermine foundations but floodwaters carry bacteria, which leads to illness, infectious diseases, dermatologic infections, and acute respiratory illness in addition to post-traumatic stress disorder.[39] Obviously, homes in flood zones decrease in value, but the implications are far-reaching.[40] Houses are most Americans' primary capital investment; when flooding undermines home values, this destroys capital accumulation.

This creates vulnerability; marginalized communities exist in a risky landscape, plagued by biophysical hazards, and are denied access to information,

resources, and political power.[41] The potential for disaster due to this dual vulnerability was revealed in the aftermath of Hurricane Katrina and continues to this day.[42] If a community is disadvantaged, disasters only exacerbate issues and expose the hardships of those suffering and the lack of action through support and helpful policies. Architects must consider comprehensive interventions that integrate social supports into the built environment rather than waiting for disasters to catalyze innovation.

To build civic capacity in communities embedded with structural inequalities, it is necessary to not only build external social capital but to also engage in contestation. This can be accomplished using a variety of tactics to fight against the existing power structure such as lobbying, petitions, voter drives, and actions. The most important aspects of this effort build on existing assets and develop leadership within the community.[43] We need inclusive policies that consider the social fabric, public health, and climate resilience in designs for the built environment. Comprehensive plans and building code updates must include all voices so community needs can be met in a way that strengthens all of us against the impacts of climate-related disasters.

Collective action and shared agendas will catapult communities into the democratic process and perhaps force planners, policymakers, architects, and public health experts to speak a shared language that authentically involves communities in the process. We must begin to support people living through the ever-changing environmental movement to include civic components in addition to ecosystem preservation and green infrastructure investments.[44] Truly sustainable communities build social, economic, and political capacity in addition to managing ecological integrity.[45] Sustainable communities cannot solely focus on ecosystems and green infrastructure investment; they also require support politically and organizationally to build their social, economic, and political capacity. While planners consider environmental protection, economic development, and equity, the "Three E's," environmental protection and economic development continue to take precedence over equity. The municipalities that are considering social justice and equity initiatives as part of their sustainability programs have not thoroughly addressed environmental justice issues.[46]

Planning for sustainability can help municipalities adapt to climate change by increasing their resiliency. However, mitigation that is focused on recovery rather than prevention is costly.[47] As Americans save an average of four dollars in natural disaster damage and recovery costs for every dollar spent on preparedness, it would stand to reason that democratizing the process would be beneficial.[48] Areas more prone to damage from disasters need the kind of investment that would offset the amount lost in the event of a disaster. More importantly, increased investment can prevent harm to more vulnerable communities and allow them to better equip themselves to deal with extreme

events. Greater investments where vulnerable populations exist have multifaceted benefits, so long as the support is done with proper planning, care, and attention to specific needs.

After hurricanes, flood losses are the largest of all natural hazards in the United States. It is likely that global warming will increase extreme precipitation and intensify flooding (Platt, 2006); however, the risks are not equally distributed.[49] Urbanization further increases flood risk and the uncertainty of what is to come makes it prudent to reduce the vulnerability of potential victims. The tragic aftermath of Hurricane Katrina in 2005 illustrates the devastating impacts of inadequate planning and response for vulnerable populations.[50] More recently, communities throughout the continental United States have struggled to rebound from destruction caused by various extreme weather events. These weather events highlight the need to have disaster plans in place that consider socioeconomic factors. The change in the landscape coupled with the actual and potential results of global climate change has increased the number of marginal communities at risk for natural hazards, particularly those related to flooding. It is imperative to consider the social aspect of disaster response planning.

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7

INCLUSIVE DESIGN OF BREAST CENTERS

Donna-Marie Manasseh and Lucille M. Booker

The authors of this chapter explore four themes to catalyze and cogitate on discussions about inclusive design and to inform how we envision breast centers: *purpose*, *intimacy*, *liminal spaces*, *and holistic care*.[1] Inclusive design is understood in this chapter as a strategy or approach to build, create, and imagine spaces that are people-friendly and people-centered and that the diversity of the people and the range of their experiences are factored into the form and function of those spaces. This chapter delves into the experiences of patients who are women and of practitioners who specialize in oncology.[2] The authors examine complex interactions between patients and practitioners to offer insights into "the range of experiences" that need to be considered when designing for breast care.

The first author, Dr. Donna-Marie Manasseh, a breast surgeon with 20 years of expertise, advocates for select best practices in breast care that she examines in her practice. She also brings pressure to bear on specific spatial constraints that may hinder the delivery of high-quality, holistic breast care. The second author, Dr. Lucille M. Booker, a corporate consultant in the healthcare segment with 20 years of professional experience, expands on the breast surgeon's salient points. Moreover, Dr. Booker sheds light on the importance of community partnerships and offers solutioning ideas to advance the manner and the mode in which breast care is optimized and delivered. The illustrative examples cited in this work about patients and practitioners and their complex interactions during breast care journeys are drawn from fictitious characters and famous figures.[3] Together, the authors establish that the design of spaces dedicated to breast care calls for an increased awareness around the people and practices that occupy and define those spaces, and that inclusive

DOI: 10.4324/9781003535768-8

design has the capacity to contribute to holistic care and to enliven breast centers across neighborhoods and communities.

Designing for Purpose

The purpose of breast centers starts with the obvious. Breast centers center breasts. More specifically, breast centers are single-purpose buildings or dedicated floors of hospitals or clinics, where patients exclusively access medical services for breast care, breast cancer, and other high-risk and benign breast conditions. These specialized medical services are also available in virtual breast centers that include disparate practice locations for the various disciplines required for breast diseases and treatments. These virtual breast centers are more flexible, are more affordable, and allow for already existing hospitals and clinics to be optimized for the practice of breast care.

The first recognized "breast center" concept in the United States is the Van Nuys Breast Center, built in California in 1979.[4] The goal of this breast center was to reduce fragmented care for women with breast disease, thereby decreasing delays in diagnosis and treatment that often happen when patients go between offices in different locations. It was a freestanding center with multidisciplinary specialties under one roof to coordinate care with ease. Since that time, what defines a breast center has expanded to include a variety of models from all-inclusive under one roof, multidisciplinary free standing centers, to hospital based programs, to private practice subspecialties forming a virtual center. What comes through with all of these models is ensuring coordinated quality clinical care for the breast patient with disease. According to the National Accreditation Program for Breast Centers (NAPBC), there is no difference in the ability to be accredited or meet accreditation standards for different types of breast centers.[5] The patients get quality care in all models as long as the NAPBC standards are met. The question of importance to this work is whether there is more that needs to be considered in the patient experience beyond the standard level of care. In other words, how to ensure the holistic care of patients with breast cancer and other breast diseases, and how such considerations influence the design of breast centers.

The design of a breast center significantly impacts the patients receiving care as well as the professionals treating them. Every aspect of the breast center's layout, atmosphere, and functionality can influence how healthcare providers perform their duties and engage with their patients. In breast cancer treatment, collaboration of the clinical staff is critical in ensuring the best outcome results. A well-designed space fosters an environment that promotes collaboration, efficiency, and emotional well-being, all of which are critical to providing high-quality care and achieving the best outcomes for patients. In contrast, a poorly designed space can increase stress, lead to inefficiencies,

burn out, and negatively affect both patient outcomes and the morale of the medical team.

One of the most important aspects of a breast center (i.e., freestanding, hospital based, or virtual) is its ability to bring together a wide range of specialists to work cohesively. The physical design of the spaces in these varied centers plays a key role in facilitating collaboration. Spaces that are laid out to encourage easy communication between departments, such as shared workspaces or meeting rooms for case discussions, allow professionals to consult with one another seamlessly and minimize the extra work and tension created by tracking down team members adding unnecessarily to task lists. An integrated environment improves decision-making, reduces delays in treatment planning, and ensures that every member of the care team is on the same page, which is critical for delivering comprehensive, timely, patient-centered care.

The design of a breast center can also have a profound impact on the efficiency with which healthcare professionals can provide care. A well-planned layout that minimizes travel time between diagnostic areas, examination rooms, and surgical suites helps staff move through their tasks more fluidly. For example, radiologists and surgeons working in close proximity can expedite diagnostic interpretations and make real-time decisions about biopsies or treatment adjustments. This kind of efficiency not only reduces the physical and cognitive load on professionals but also improves the patient experience by minimizing wait times and reducing anxiety. In contrast, a disorganized or poorly designed space can lead to logistical challenges, such as staff needing to navigate long distances or overcrowded areas, which increases fatigue and lowers productivity.

Healthcare providers working in a breast center are frequently faced with emotionally charged situations, particularly when delivering difficult diagnoses or discussing treatment options with patients and their families. The design of the center can either exacerbate or alleviate the emotional toll on these professionals. Thoughtful design elements, such as natural lighting, quiet workspaces, and access to outdoor areas or relaxation rooms, can create a more calming and restorative environment. This is crucial for professionals who need to maintain emotional resilience and focus while caring for patients who are often dealing with fear, stress, and grief. A soothing environment helps reduce burnout and enhances the overall well-being of healthcare providers, allowing them to engage more compassionately with their patients.

Breast centers are equipped with advanced technologies, such as digital mammography, 3D imaging, and minimally invasive biopsy techniques. A well-designed space accounts for the need to seamlessly integrate this technology into the care workflow. For example, having imaging suites adjacent to consultation rooms allows radiologists and surgeons to discuss findings with patients in real time, which fosters a more dynamic and responsive approach

to care. A layout that supports quick access to medical data and imaging results reduces downtime and allows professionals to focus on the clinical aspects of their work rather than the logistics of technology. When technology is integrated smoothly into the center's design, it also enhances the ability of professionals to stay at the forefront of innovation, through quick access to clinical trial data, thereby improving outcomes for their patients.

Stress management is a key consideration in the design of a breast center, as healthcare professionals are often under immense pressure to provide accurate diagnoses and effective treatments in a time-sensitive manner. A well-organized space with clear signage, logical pathways, and intuitive room arrangements can reduce confusion and streamline workflows. Nurses, surgeons, and administrative staff can more easily manage their responsibilities when they can move through the space efficiently and with minimal disruptions. This leads to greater job satisfaction, lower levels of stress, and a more positive work environment overall.

The design of a breast center can also influence the quality of interactions between healthcare providers and patients. Comfortable, private consultation rooms allow professionals to have meaningful and empathetic conversations with their patients in a confidential setting. These spaces are vital for discussing sensitive information, such as treatment options, prognosis, and surgery plans, without distractions or time pressures. A welcoming, aesthetically pleasing environment fosters a sense of trust and connection between professionals and their patients, which is essential for building strong therapeutic relationships. When professionals feel comfortable and supported by their environment, they are more likely to engage with patients in a calm, focused, and compassionate manner.

Ultimately, the design of breast centers profoundly impacts the professionals who work within its walls. From fostering collaboration and efficiency to reducing stress and supporting technological innovation, a well-designed breast center creates an environment that enhances the quality of care and the well-being of both patients and healthcare providers. Thoughtful space design ensures that professionals can perform at their best, delivering care that is not only clinically excellent but also compassionate and emotionally supportive.

Designing for Intimacy

In this work, intimacy is defined as that which is of a personal or private matter. Breasts are considered private body parts. By extension, caring for breasts within the context of oncology involves intimacy. Breast centers are dedicated to breast health and breast care. The specialized work performed in breast centers and the centrality of that work on breasts are shaped by the complexity of intimacy experienced by the patients and the practitioners. This section explores intimacy in breast care, the experiences of patients

undergoing breast care, the realities facing practitioners, and the importance of intimacy in the inclusive design of breast centers.

Within the context of breast centers, that which is between patients and practitioners are breasts. Breasts occupy the physical space directly between patients and practitioners during a physical examination. Breasts are more than physical glandular organs. Breasts mark and symbolize numerous phases of women's lives including, but not limited to, puberty, sexual exploration, sexual intercourse, pregnancy, breast feeding, and changes to shape and form throughout women's aging process. Each of those phases and moments are markedly intimate. In short, the moment women enter breast centers, they are having an intimate moment.

For each intimate moment patients experience in breast centers, there are intimate topics that are discussed between patients and practitioners. Such intimate topics are largely associated with the cancer diagnosis and cancer treatment. The intimate conversations stemming from a cancer diagnosis often includes the trauma that patients carry long before the cancer diagnosis. For example, Tig Notaro, stand-up comedian, describes in her Netflix documentary how gutted she felt when she learned from her doctor that she likely had breast cancer:

> "The doctor came in an she said: 'We saw the lump. We found another one.'"
>
> "And I said, 'Wait a minute. Are you saying that I have cancer?'"
>
> "She said, 'It is very likely that you do.'"
>
> "And I was like… Immediately in my head, I was like, 'Wait a minute. My mother just died. How could this happen? Like, I've already been through all this.'"
>
> "Like, I wanted to pull out these calling cards. Like, 'No, look, I just went through all of this stuff, and I can't have cancer.'" [6]

For Tig, the diagnosis was traumatic. When her doctor delivered the news, there was nothing funny there. There was no comfort. The spaces in which cancer diagnosis conversations are happening need to account for the levels of trauma and anxiety that will unfold in those spaces. As Tig's doctor expected, she did have breast cancer and required a double mastectomy to treat her breast cancer.[7]

In cancer care, there are phases of discussion as there are phases of treatment. In the beginning the discussion centers around the hope that derives from treatments that are known to work in this scenario and then progresses to discussions on side effects and consequences of these treatments on quality of life after providing quantity.

Once patients undergo cancer treatment, there are common side effects that include changes to their physical appearances that adversely affect

patients' psychological well-being. These side effects include hair loss, skin discoloration, brittle nails, and loss of appetite, among others. At times, patients are unable to recognize themselves and struggle to communicate their feelings with their practitioners. Among optimal settings for such conversations are the private offices of practitioners where possible. When the space is conducive to safety and privacy, and the design aligns with such a use, patients feel safe to share their most intimate thoughts and observations about the painful changes happening to their bodies. Take for example the conversation between cancer patient, Millie, and her renowned oncologist Dr. Helen Sharpe in the fictitious "New Amsterdam" television series:

Dr. Sharpe: "So, Millie, I've read your file."
Millie: "Not so good, huh?"
Dr. Sharpe: "Well, your chemotherapy hasn't been as effective as everyone hoped.

Starting tomorrow, I'd like to put you on a different regimen. I wish I could offer better news."
Millie: "No. It's okay. Well at least I go to meet you.… If I had known I was gonna meet the real Dr. Helen today, I would have done my nails. [chuckles]"
Dr. Sharpe: "Your nails look fine, Millie."
Millie: "No. None of me looks fine. I look like a cue ball. Like a little, shrunken, nubby-nailed cue ball. Hell, I tried to wear a wig. It just kept falling off. That was…embarrassing. Even my kids made fun of me… which I let them, because it blows off steam, and…I figured if they were laughing, they wouldn't be thinking about me keeling over dead."[8]

This intimate conversation occurs in Dr. Sharpe's office and Dr. Sharpe is seated behind her desk. We see the many essentials and keepsakes that we would expect on a desk: stacks of folders, sheets of paper, a framed photo, a desktop computer, and small trinkets. However, there is nothing that obstructs the view between the patient and practitioner. We also see the things that make the office feel cozy and intimate. Behind Dr. Sharpe are her personal photos that face outward so Millie can see them. The personal photos sit on a windowsill of a large window with the blinds open enough to allow light in but not fully and intentionally obscures the view outside so others are not able to see inside. Behind the photos are plants, which evoke life and growth. Lamps are used for mood lighting as opposed to large imposing overhead lights. The setting is welcoming, intimate, and private. Designing for intimacy is not complicated, but it is intentional, functional, usable, and well curated.

The intimate topics discussed between patients and practitioners go far beyond the physical side effects of cancer treatment. Consider the patient

referred to as Olivia who has successfully undergone intensive therapies to treat and in fact cure her breast cancer. She and her family are joyful for the quantity of life that has resulted. However, she may not be comfortable with the quality of her life after some of the cancer treatments she has received. Grateful for the quantity, she may not be willing to discuss the issues around quality, especially the side effects that have altered her self-image and sexual health. Imagine the severity and the weight of such conversations and the need for privacy to talk about what may be deemed as taboo, painful, or just downright confusing.

Practitioners are aware that patients' comfort with their practitioner and the clinical setting are directly linked to how well they communicate their concerns. A thoughtfully designed clinical space helps practitioners approach these sensitive topics with the necessary empathy and time, allowing for a more comprehensive dialogue about both physical and emotional health after breast cancer treatment. Ultimately, a supportive and private clinical space enhances the quality of care practitioners can provide, allowing patients to feel heard and understood on all aspects of their recovery, and particularly with respect to sexual well-being.

Although effective, cancer treatments can also be brutal with the effects they leave patients with immediately and long after the cancer has been treated. The effects that disrupt sexual function and sexual intimacy are particularly difficult for practitioners to discuss with patients. There are many factors that surround this difficulty. The nature of the topics, the privacy, and time needed to discuss these topics are often difficult to have in a busy clinical space. Increased volume demands on the practitioners and emphasis on minimizing waiting times have made it difficult for practitioners to spend the time to allow patients to open up about difficult topics or struggles concerning the effects of their cancer care. Rooms are often cold and sterile and typically designed for a clinical interaction and not an intimate one. Practitioners commonly struggle with trying to make patients feel at ease or comfortable enough to talk about the effects they may be having. Despite, using calming and encouraging words and body language, patients may still have the perception that the setting is not the place to freely discuss intimacy and their quality of life. Practitioners focused on providing holistic care are set up for greater success when the space contributes to that holistic care as opposed to working against it.

Take for example another patient, Beth, with stage 3 breast cancer who requires chemotherapy, surgery, and subsequent endocrine therapy. These therapies in their own right have a variety of side effects such as fatigue, grief, and depression. Other side effects include difficulties with sexual intercourse and sexual intimacy including vaginal dryness, diminished sex drive, and lack of sexual desire. The priority for practitioners in this example is to ensure they review the imaging studies and exams searching for recurrence or new

occurrences. Finding none, there is a sense of relief and continued hope. The fast follow-up includes practitioners asking general questions to discern how the patient is doing in all aspects of her life outside of the cancer treatment. Practitioners usually get the "I'm fine" response. Unpacking the "I'm fine" response further is difficult for both practitioners and patients. A space that allows the patient to feel safe through temperature, natural elements, lighting, soft/warm colors, and comfortable furniture also gives the perception of the freedom to discuss sensitive issues. Many times, many patients may feel they should be grateful for the longevity they have been gifted through therapies and that such a gift just comes with suffering side effects that alter physical appearances, diminish sexual intimacy, and forcibly change sexual health. Such perceptions complicate practitioners' capacity to provide holistic care that is concerned with the whole patient, including her psychological and sexual health. Compounding the patients' perceptions around intimacy is when the setting is working against practitioners' intent to foster discussing side effects and intimacy. Being in spaces that are sterile, cold, and with harsh temperatures often sends the message that there is no time or concern for these side effects. A warm inviting environment gives the perception of time, space, and the safety to open up about these effects. The design elements are critical to adding quality of life to quantity of life.

Designing Liminal Spaces

Liminal spaces in architecture facilitate our ability to transition from one location to another and may themselves be waiting spaces or in-between spaces that serve as connectors to destinations (e.g., lobbies, hallways, elevators, waiting rooms). By contrast, liminal spaces in psychology refer to how we experience and feel during the transitions between one stage to the next stage in life and may involve multiple stages before arriving at a targeted stage in life. Such liminal spaces are future facing and may be associated with uncertainty, discomfort, anxiety, and fear of the unknown (e.g., the days before getting mammogram results, being transported to the operating room, healing after a double mastectomy). Patients traversing the physical liminal spaces of breast centers are also affected by the psychological liminal spaces they experience in their own healthcare journey. There is an interconnection between the physical and psychological liminal spaces and changes (or lack thereof) to the former influence the magnitude of the latter.

The moment patients arrive at the doors of breast centers, there is an opportunity to visually, verbally, and olfactorily shape the breast care experience in direct and subtle ways. In breast centers that optimize the first point of entry to its buildings, there are replicable best practices that evoke pleasant and warm feelings. Bright lighting that engulfs the space improves how patients feel. Outside noises can be met with soothing soft music (e.g., jazz,

classical, instrumental). Well-trained staff who greet patients upon entry are more effective when their interpersonal skills are matched with measured tones, eye contact, and smiles. Such staff are to avoid yelling directives at patients about getting identification cards ready and the purpose of each line. Expediting registration lines are made possible with user-friendly registration kiosks. All lobbies need to be clean with appropriate numbers of waste receptacles that are emptied regularly to avoid odors and unsightly trash. Also, lobbies filled with informative signage help guide patients appropriately and ideally include the broadest range across spoken languages of the populations being served.

As patients traverse liminal spaces enroute to examination rooms, stress on patients may increase with each step and each transition to and through the breast center. Such stress-induced transitions may include, but are not limited to, hunting for parking for over 20 minutes, navigating crowds in public transportation, long walks from and to parking spaces or transportation stops, and any physical and emotional discomforts associated with the reason for the visit. While these stress-induced transitions may be deemed or accepted as mundanities associated with medical visits, they cannot be dismissed or ignored within the context of designing breast centers. The design of the point of entry for breast centers provides an opportunity to transform, influence, or re-imagine how patients should feel upon arrival, even when the circumstances prior to arrival are outside of the control of breast centers.

The waiting rooms in breast centers provide opportunities to purposefully differentiate the patients' experiences. Patients seeking mammograms for screening may experience discomfort if seated in the same waiting room as patients having diagnostic imaging or image-guided biopsy procedures. The former may likely comprise women in need of annual mammograms who deem themselves healthy and invested in their preventative care. Patients there for additional image work-up or procedures may have a different mindset and a different and slightly opposing reality. While there is overlap between the patient groups, there are clear distinctions between these patient groups that should be considered when designing waiting rooms. Similarly, patients with gowns should not have to share a waiting room with clothed patients in public waiting rooms. Waiting for breast care is stressful for all of the reasons addressed in this chapter. Waiting rooms should be designed to mitigate stress and calm patients when waiting is required. Where patients wait and who else shares the waiting room are as important as the space in which waiting happens. The inclusive design of breast centers includes differentiated spaces that address the importance of differentiated steps in the breast care journey.

As patients move through the halls, the walls along those halls shape how they feel. Patients may enter breast centers with mixed emotions from feeling cautious, fearful, shameful, and anxious to scared, hopeful, denial, and discomfort. The halls are blank canvases. We understand that breast centers have

more walls along halls than budgets to decorate them. However, the absence of generous art budgets is just one roadblock and not the end of the road. The choice of paint colors can do wonders for brightening halls. Take one step further to fill this immense canvas and decorate those walls with words. Words are among the most affordable forms of art. Motivational phrases that adorn these halls provide a form of encouragement while warming the space in cost-effective ways. Bare halls are missed opportunities to communicate thoughtful messaging. Words have power. Words are low cost. Words can be artfully displayed. Words are essential gestures that enliven and decorate liminal spaces.

The most welcoming liminal spaces are adorned with art (e.g., hallways, waiting rooms, examination rooms, and lobbies). Displaying art in liminal spaces transforms such spaces into art galleries when done well. Art in liminal spaces is intended to beautify the space. Art in liminal spaces of breast centers should also connect and cue patients toward healing. By contrast, poorly selected art may have an adverse affect on patients. For a humorous example, the movie *Sitting in Bars with Cake* blasts the unsightly art in the hall of the hospital where the main character, Corinne, gets her cancer treatment. The scene opens with Corinne, her parents (Ruth and Frank), and her best friend (Jane) preparing to leave the hospital room. As her Dad wheels her out of the room, the following dialogue takes place:

Ruth: "After weeks in the hospital, you must be ready for my lasagna."
(Corinne groans)
Corinne: "Goodbye room."
Fred: "That is some ugly-ass art on the wall!"
Corinne: "That's exactly what I said!"[9]

The art surrounding Corinne during her weeks at the hospital dampened her already depressed mood. Luckily, she and her Dad can pivot and find the humor in their pain. But surely, we can expect more from art in breast centers. This scene reminds us that the call to action is more than just hanging "any kind of art" in liminal spaces. Mirroring art galleries may be the north star for breast centers, but there are more impactful ways to decorate liminal spaces that inspire health and healing.

There are low-cost options for creating art galleries in liminal spaces that include inviting practitioners and staff to donate their own works of art that they have created including paintings and photography. The challenge with this approach is that there are more liminal spaces than there are practitioners that are skilled with the brush or the camera. The good news is that the numbers of patients compared to practitioners are limitless.

Artworks created by patients can be a more sustainable low-cost option. The simple act of providing patients with art supplies facilitates forms of

expression that change how they feel about their healing journey. Suleika Jaouad, *New York Times* bestselling author and TED Speaker, was diagnosed with cancer in 2011 at age 22.[10] Painting became her medium for healing. The patient turned painter describes her cancer journey as follows:

> Creativity is my way of making sense of the world, especially during difficult moments… [O]ne of the medications caused my vision to blur, and instead of being able to reach for the things I love most, writing and words, I realized I was going to have to find a different mode of expression. That became painting.[11]

Jaouad adorned her hospital room with her "Suleika originals."[12] She turned her own hospital room into her personal gallery. She describes surviving chemotherapy as "its own kind of creative process."[13] Her husband and musician, Jon Batiste, interprets Jaouad's relationship with painting as an act of survival that allowed her to paint her way through cancer treatment.[14] Jaouad is one example of how patients create art as acts of survival and healing. This "patient's originals" approach starts with the simple step of providing patients with art supplies, which subtly encourages them to lean into creativity as they undergo treatment.

The art supplies are but one option that can be provided to patients such as low-cost as blank paper and crayons or as special as gift bags with a drawing pad and colored pencils. Staging art supplies in waiting rooms or at the bedside of recovery rooms send a message that art and care and art and healing exude throughout the breast center. Another step for breast centers to take is to designate art walls for select originals by patients to be featured in select liminal spaces. The "patient's originals" approach is a more sustainable, budget-friendly way to beautify liminal spaces and to create an artful environment that suggests healing happens here.

The "art gallery" approach is the optimal approach, which involves an array of works of art that may be purchased directly from artists and art galleries or that are commissioned. The "art gallery" approach may also include some donated works of art, but this approach is more geared to facilities with art budgets. In other words, breast centers would need to have their own art budgets to buy and own works of art that are professionally curated throughout the building. The "art gallery" approach must be funded in order to be sustainable and impactful. That is, when done well, the art gallery approach has a long-lasting effect on how luminal spaces are experienced and how those works of art augment, shape, and contribute to those experiences.

Liminal spaces serve as re-occurring settings in the fictitious "New Amsterdam" television series that follows the life of the hospital's medical director, Dr. Max Goodwin, who has been diagnosed with cancer. The series showcases scene after scene of liminal spaces as art galleries. For example, in one

hallway scene between oncologist Dr. Helen Sharpe and Dr. Max Goodwin (casually referred to as "Max" through the series), Dr. Sharpe has to share the harsh truth with Max about how he is dealing with his own cancer diagnosis. Max is a workaholic who has failed to find time for his cancer treatments. Dr. Sharpe firmly states: "You better find the time before you run out of it."[15] Stunned by her directive, Max stands in the hallway frozen in thought. Behind him is a huge black and white photo that takes up most of the wall and features approximately 12 early period nurses lined up for a staff photo. This artwork is purposeful to the scene and suggests that women are practitioners, women work here, and women have been here for the lifetime of care. That message resonates in those halls even after the firm exchange between practitioner and patient, with the latter also being a practitioner and both represent opposite genders. This scene suggests that the purpose of the art is indeed to decorate the space, and also to send a message, to empower women, and to signal female representation in the workspace. Each time patients, practitioners, and everyone else walk through such halls, the art gallery approach shapes their interactions and communicates intentional and suggestive messages related to and in support of care and healing.

Designing for Holistic Care

The space within which patients experience their diagnosis and treatment is critical to their healing process. The experience of space and what patients see, hear, and feel directly influence their emotional well-being, physical comfort, and overall experience throughout treatment. The design and physical space of a breast center need to support the medical needs of patients as much as it fosters a healing environment that addresses their psychological and emotional challenges of a diagnosis or possibility of one. The details of this space—the layout, aesthetics, and functionality of the space—play a critical role in creating a calming and supportive atmosphere, which is essential for the healing and holistic care of breast cancer patients.

Breast cancer treatment often involves multiple visits for diagnostic imaging, biopsies, surgeries, drug therapies, and radiation therapies with subsequent follow-ups. The design of the center must consider and prioritize patient comfort and privacy to reduce anxiety and stress during these repeated interactions. Thoughtful attention to waiting areas, private consultation rooms, and peaceful recovery spaces is essential for healing spaces that make patients feel safe and supported by the space as much as their team. A well-designed space ensures that patients feel respected and secure throughout every stage of their care, from diagnosis to recovery.

The physical environment of a breast center can significantly impact healing as much as the emotional state of patients. Warm, soothing colors, natural lighting, and access to nature or outdoor views have been shown to

reduce anxiety and promote a sense of calm, well-being. Incorporating these elements into the design of a breast center helps to create a space that feels less cold, sterile, and clinical. Instead, such design elements suggest more nurturing, easing the burden of a cancer diagnosis and contributing to an overall sense of tranquility.

Breast centers should be designed with efficiency in mind to ensure a smooth patient journey. A well-organized layout that allows easy access to different areas—such as imaging, examination rooms, and surgical suites—minimizes unnecessary delays and confusion. This efficiency is particularly important in breast cancer care, where timely diagnosis and treatment are critical to outcomes. A streamlined flow between departments reduces the need for patients to travel to different locations for different services, enhancing convenience and reducing the physical and emotional toll of treatment.

Breast centers that are designed to include areas for support groups, counseling, and patient education improve the communicative capacity for the team in these environments. These communal spaces foster a sense of belonging and provide opportunities for patients to connect with others, which is crucial for emotional healing. Offering quiet rooms for meditation or reflection can also provide patients with a space to process their emotions privately and find peace in difficult moments. By creating a calming, private, and efficient environment that supports holistic care and fosters a sense of community, breast centers can play a crucial role in the healing journey of every patient who walks through their doors.

Conclusion

The purpose of the breast center concept was specifically designed to minimize the stressors associated with breast disease. The original goal of these centers was to decrease the time between appointments with various specialties and treatments. When there are delays, the result is a poorer prognosis. Many centers hit the target when it comes to ensuring multiple disciplines are available to patients in one location. When such a preference is not feasible, nearby locations of two disciplines suffice: surgery with radiology, or medical oncology with radiation oncology. Beyond the purpose of breast centers, this chapter also emphasizes the importance of designing for intimacy, the usability of liminal spaces, and the value of holistic care. This combination emphasizes our claim that is often overshadowed: patients and clinical staff engage in breast centers more than designers, architects, and administrators. The input and experiences of patients and practitioners are essential to the inclusive design of breast centers.

Some explorations and recommendations considered in this chapter may be deemed obvious by architects and designers: access to natural light, appropriate climatization, private spaces, and well-curated art throughout

the building, among others. What may not be as obvious is the extent to which design choices of and within the space positively and adversely affect patients seeking breast care and breast treatment. Consideration to budgets, space constraints, and available staffing must be given as not all administrations have the resources to invest in a freestanding breast center. In these instances, even small changes to existing breast care floors can make a difference, such as warm paint colors, access to registration kiosks, artwork created by patients, and soothing music in the lobby. All small steps and major milestones toward sustainable, accessible, and inclusive elements in the design of breast centers enhance the experiences of patients and improve practitioners' capacity to implement and stay true to best practices in breast centers.

Notes

1 The views expressed by the authors are their own and do not represent the views of any of their respective employers, past or present.
2 In this chapter, the term "women" is defined as cisgender and/or transgender people with developed breasts.
3 The Health Insurance Portability and Accountability Act (HIPAA) of 1996, Public Law 104-191, enacted on August 21, 1996, Privacy Rule protects all "individually identifiable health information." The authors use fictitious characters from movies and medical drama television series, anonymous fictitious personas, celebrity interviews, and documentaries to provide examples of patients' stories and experiences to remain in compliance with the HIPPA Privacy Rule. https://en.wikipedia.org/wiki/Health_Insurance_Portability_and_Accountability_Act
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8

RETHINKING ARCHITECTURE

Building Equity through Advocacy in Healthcare Design

Roderic Walton

Introduction

Let us begin this chapter on rethinking architecture: building equity through design by evaluating a scenario. Imagine a healthcare architect starting a project's mission and vision kick-off meeting. The architect poses a question to the project's leadership team:

> What is the demographic of our patient stakeholders, and what are the primary challenges this project must address to respond to the community's needs?

The leadership team's response goes something like this:

> Our patient demographics should not impact our design strategy. We strive to embrace universal design by providing the same tools and resources to all, regardless of who they are or how they identify.

This seemingly benign and politically correct answer underscores a core shortcoming within healthcare practice. There is a difference between *equality* for all (the position advocated by leadership in the example) and *equity* for all (providing targeted solutions based on where patients started their healthcare journey, the history that undergirds that journey, and where they are today). This variation should be acknowledged and understood by those specializing in healthcare design. There should be advocacy-based tools to help healthcare stakeholders analyze, assess, and act on data from our patients, especially those in vulnerable communities. Moreover, architects should

DOI: 10.4324/9781003535768-9

frame these tactics through the lens of agency to translate these data into a project-specific design ethos that responds to specific patient needs.

This example reveals why the healthcare design profession stands at a complex crossroads. We are facing a profound disconnect between practice, advocacy, and agency. The fingerprint evidence of this challenge is a healthcare design philosophy that looks away from our collective history, systematically denying representation to countless communities. Today's healthcare practice is based on tools that compromise the legibility of our design process. Our collective design ethos prioritizes immediate results and devalues the impact of our sustained presence. In doing so, today's prevailing architectural methodology deprives all stakeholders of the transformative potential of engaging active agents to advance our craft. It is time to *re-think architecture* from the ground up.

Together in the following pages, our expedition will embark upon a journey that will prompt us to contemplate active agency. We will follow an industry-recognized methodology developed by the Center for Health Design (CHD). This professional organization has established itself as the leader in advancing the use of evidence-based tools to enhance outcomes utilizing the following steps:

- *Step One: Define evidence-based goals and objectives.*
- *Step Two: Find sources for relevant evidence.*
- *Step Three: Critically interpret relevant evidence.*
- *Step Four: Create and innovate evidence-based design concepts.*
- *Step Five: Develop a hypothesis.*
- *Step Six: Collect baseline performance measures.*
- *Step Seven: Monitor implementation.*
- *Step Eight: Measure performance results (1).*

Healthcare architects typically utilize this organizational workflow as a structured process to support design solutions for our clients. However, this chapter reframes this toolset to guide our equity-based approach, where solutions are centered on process and advocacy rather than building design. This reframing is essential, as designing for equity may seem overwhelming. In reality, it simply requires that the architect use the familiar tools already in our possession in new and innovative ways.

The first step in the CHD process necessitates beginning our conversation by defining evidence-based goals and objectives. As we explore this framework in this chapter, we will discover evidence of the inherent value of a new design philosophy: one that is more fine-tuned to the history, journey, and lived experiences of the most vulnerable patient communities we serve. We will critically explore educational methodology, professional practice, and success metrics for healthcare design. Further, we will challenge the concept

of architecture as a service-oriented profession, disassociated from the social determinants that drive health outcomes. Instead, we will position our craft as an essential extension of holistic care with far-reaching consequences for our collective health. This chapter's ultimate goal is to offer healthcare architects objective evidence of our immense potential as agents of positive change. By rethinking our role and embracing an active agency posture, we can dramatically evolve how we program and design healthcare spaces for vulnerable populations.

Addressing Representation in Academic Institutions

It is important to position this work within the journey that inspired it. Therefore, contrary to the prevailing standards of academic writing, this chapter must, at times, get personal. Sharing personal stories is a powerful tool for communicating lived experiences that shape design values, especially the values of those who identify with nondominant cultures. This is the first of those stories: In 1993, I relocated from Akron, Ohio, to pursue an undergraduate degree in environmental design at a predominantly white institution (PWI) in the state's Midwestern region. The university campus was isolated from its surroundings, bordered by two-lane county roads and expansive cornfields. It took seven hours for my parents and me to drive there, and I remember listening to my favorite R&B album on repeat on my CD player to calm my nervousness. I knew from my college tours earlier that I would be one of only a handful of people of color in my architecture program. This journey was the first time I would be so culturally isolated, having navigated a primary school system that was racially and culturally blended. I could sense my parents' anxiety regarding my new environment during the drive, especially my mom's. Since I come from a family where secondary education is prioritized, I had to make this transition work, so the pressure was on.

When I arrived on campus, I anticipated that my race and cultural identity would drive most of my social interactions with my fellow students at this PWI. However, what I did not yet appreciate were the pedagogical implications of race and cultural isolation on a midwestern campus. Almost immediately, I was confronted with the inadequacy of the curriculum in representing individuals from marginalized backgrounds, such as myself (an African American male transitioning from a heterosexual to an openly gay identity). The historical accounts in my textbooks purported to be comprehensive, yet they conspicuously omitted substantial contributions from vulnerable communities with which I closely identified. The absence of minority groups in general, and people of color and gender fluidity specifically, in these narratives conveyed a clear message: our contributions to the body of architectural design were either non-existent or unworthy of documentation in an academic context.

I quickly learned one of my core responsibilities in this undergraduate journey was to focus my colleagues' collective attention on the inherent value of broader representation in architectural pedagogy. I challenged color theory each time the color white was used in a fellow student's work to represent those things that were "light, good, and optimistic" versus black, which most of them presented as "dark and ominous." I called out a professor who consistently objectified black skin in her lecture series by referring to it as exotic. I redirected history assignments that did not consider race or ethnicity by reframing conversations to do so, resulting in a grade of "C" on one of my assignments. When I asked the professor why she marked me down, she stated confidently that my task was simply to do what she assigned, not to challenge the status quo. My "revolution," as she phrased it, would not get me anywhere.

When I surfaced issues of representation, my fellow students and professors typically characterized them as disparate phenomena. They thus relegated my concerns to tangent fields of study such as sociology. In this manner, the educational community continuously absolved itself of any responsibility to address the implications of representation on how architecture is taught. I was struggling with the ubiquitous desire to serve my race through my work in a manner that seldom seemed to be an obstacle for my White colleagues. My efforts mainly fell on deaf ears. I spent the next four years doing what I could to leverage this responsibility by exposing bias in processes and outcomes associated with my degree program, advocating instead for the tenets of cultural pluralism.

Steps two and three of the CHD process entail finding sources for relevant evidence and critically interpreting that evidence. Recognizing the limitations of the Eurocentric narratives prevalent in architectural education, I embarked on a journey to source the evidence I needed during my master's program. This journey of exploration culminated in 2003 with a thesis entitled "The Implications of a Eurocentric Curriculum on Architectural Design." Through extensive research and analysis, I sought to challenge the dominant discourse and illuminate America's rich and diverse tapestry of architectural heritage. Through my independent study, I learned that other architects of color had similar experiences to mine: David Hughes, Professor of Architecture at Kent State University, notes:

> While Africa has made extraordinary contributions to architecture, from the beginnings of monumentality to the advent of Modernism, little has been acknowledged because of the social implications and political ramifications of a Eurocentric hegemony that limited honest intellectual review. *(3)*

Carl Anthony, an architect and social justice advocate, traveled to Africa to document the architectural history there. His findings corroborate those of

Hughes. Anthony portrays Africa as a center for advancements in both design and construction techniques. His work is also critical because it provides the framework that bridges these early African paradigms with the development of American architecture. Anthony states in his work that he finds it untenable *that millions of Africans would leave no trace of their architectural heritage on the New World they helped colonize.* (4) His work reveals that slaves preserved the legacy of distinction established by Africa's early designers and craftsmen. In the tradition of their ancestors, these people of color played a significant role in advancing design in this country. With regard to the contributions of Blacks during slavery, Anthony is amazed by:

> …the number of modest eighteenth-century outbuildings behind the main house and its dependencies that seemed genuinely African in proportion, siting, or construction and…
>
> several groups of outbuildings with their modest dimensions and pyramidal roofs [that] create the visual effect of a piece of an African village with its multiplicity of dwelling units and granaries …undoubtedly the outbuildings … were often constructed by slaves and may have been their own design.
>
> *(4)*

The findings of various minority authors and historians, such as Hughes and Anthony, in the above examples, catalyzed my thesis. Their groundbreaking works illuminated that America's architectural heritage extends far beyond the narrow confines of Anglo-American exceptionalism and genius. I finally had the evidence that I needed. My search for relevant evidence revealed that our collective design heritage in the United States is, in fact, an amalgamation of multiple traditions and aesthetics from cultures spanning the globe.

To see this evidence firsthand, I visited the Laura plantation in Louisiana to study the architectural contributions of enslaved craftsmen. Thirty columns supported by pyramidal brick foundations provide structural support to the dwelling. Enslaved master craftsmen manufactured these bricks using burlap for separation and firing. Cypress beams were prepared after the brick foundations were completed. Trees were felled early and submerged underwater for preservation. Beams were retrieved, dried, and numbered sequentially before arrival at Laura. African builders efficiently framed the mansion in just over a week. By designing and implementing the construction techniques that created Laura, these craftsmen established one of the nation's earliest documented examples of prefabricated housing.

In my critical assessment of these and similar examples, I concluded that our nation's architectural heritage is a testament to the ingenuity and creativity of diverse cultures, each leaving its unique mark on the built environment. I posited that the privileging of Western European architectural traditions has

resulted in a limited and incomplete understanding of the field by students and design practitioners. Emphasizing the importance of inclusivity and diversity in architectural education can foster a more nuanced and comprehensive understanding of the built environment. Why, then, was all this history omitted from the textbooks I received? My thesis concluded with a call for my institution to respond to this question through a transformative approach to architectural education that amplifies cultural pluralism and representation.

Evaluating the Legibility of Our Process

Step four of the CHD process entails creating and innovating evidence-based design concepts. Just as representation is a defining component of advocacy, the principle of legibility also assumes a pivotal role, serving as an integral component of a distinct and relatable evidence-based design ideology. Traditionally, the concept of legibility in architecture is framed around concepts related to the clarity and ease of end-user navigation after a building has been occupied. This is the service-oriented approach that architectural designers have, in the opinion of the author, wrongly embraced. For this text, legibility is reframed as "clear stakeholder navigation of process and outcomes during *programming and design*." Instead of prioritizing end-user experience post-occupancy, this reframing prioritizes advocacy and active agency in service to community and client stakeholders during pre-design and programming. In this refined context, legibility becomes inextricably linked to the agency through the use of bias interrupters at the start of the project. The architect employs these tools and tactics to directly interrupt the effects of decades of biased and discriminatory social policy. Employing legibility through bias interrupters ensures that the team's design ethos is stakeholder-informed at the project's inception and that a direct through-line is centered on this ethos throughout the project.

As healthcare architects, our primary challenge in designing legible solutions for vulnerable communities is cultivating an environment of trust. Earning this trust requires the architect to develop a community profile at the project's onset. This technique builds on our concept of accurate historical representation and acknowledges the work of community leaders who have lived and worked in the project area for decades. The community profile acknowledges past attempts to engage stakeholders that may have resulted in broken promises and a lack of follow-through. It further acknowledges that there is justifiable mistrust due to a long history of fascination and experimentation with Black bodies combined with a bias regarding pain thresholds. Examples of processes that should commence at the pre-design and programming stage of the project to construct the community profile include:

- Meeting with established community leaders and the leaders of faith-based organizations to request that they share their data sets concerning the community profile and the impact of historical marginalization.

- Benchmarking churches, schools, and similar community anchor buildings to gain insights into how their physical implementation and tectonic composition can inform design strategies for new projects in the community by tying them into the existing vernacular fabric.
- Facilitating active listening sessions that ask the stakeholders to experience photographs, diagrams, colors, and textures from their culture and rank them as good, better, or best suited to the project currently under consideration.

After establishing trust through the community profile process, the strategic organization and structuring of early programming and design solutions through active listening are critical. Data-rich visual hierarchy tools, such as avatars, personas, and patient journey maps, facilitate this process by creating a detailed set of questions that community stakeholders can respond to.

Another essential component of legibility entails establishing and utilizing a clear and concise lexicon when engaging stakeholders. This component is particularly crucial when communicating design concepts to community members and clients who already have a lexicon that resonates with them. By adopting the community's language and connecting solutions to recognizable cultural themes, we can foster active listening engagement by ensuring the accurate conveyance and understanding of our design intentions.

In addition to active listening tools and community lexicon components, architects can augment legibility by creating a series of themed community and client stakeholder engagement sessions. Examples of themes include evaluating the general health of the neighborhood, centering positive aspects of the community that should be celebrated, evaluating the efficacy of the local community health system and how it can improve, and moving beyond one specific building to establish a comprehensive community equity zone. The stakeholder responses from these sessions should be compiled into the project's design ethos and mission/vision statement. Architects can then establish a design methodology that aesthetically integrates stakeholder input into design solutions.

Case Study Example: Sankofa Village Wellness Center

Chicago, Illinois

One exemplary case study that utilized the principles of legibility to advance design is the Sankofa Village Wellness Center in Chicago, Illinois. This project aims to tackle a significant 16-year life expectancy disparity between wealthy and vulnerable communities. This gap is primarily attributed to decades of racism manifested by housing instability, food insecurity, and developer disinvestment. The design process comprehensively engaged residents throughout the pre-design planning process to ensure that the project effectively addressed the community's needs and expectations.

The project strategically implemented bias interrupters to build a comprehensive stakeholder immersion strategy centered on legibility. For example, data-rich visual hierarchy tools were employed during the community stakeholder meetings to convey cultural images that community members could rank regarding their effectiveness at engagement. These tools extended beyond mere representation; they served as a bridge between the cultural heritage and the fidelity of the design process. Central to this approach was the recognition that effective design guidelines should be rooted in the community's cultural identity. To achieve this, the architect employed visual hierarchy tools to organize and prioritize cultural images based on their significance and relevance to the community. This approach ensured the design guidelines would reflect the community's unique values, aspirations, and traditions.

To establish a concise lexicon, the design philosophy was deeply rooted in "the spirit of Sankofa," a Ghanaian proverb encouraging us to look back to our past to move forward. This concept resonated with the project's stakeholders, as it acknowledged the importance of their history and culture in shaping their present and future. The theme of Black culture wellness was also utilized to express the uninhibited expression of Black culture as a tool to facilitate spiritual healing and healthy behavior.

Transformational change can result when healthcare architects embrace the concept of legibility as part of a more equitable process and foster trust with established community leaders. Design solutions developed in this way have the potential to illuminate our minds and induce a transformative evolution in our approach. This pivotal juncture can bridge the community, designer, and client, paving the way for meaningful engagement and collaboration.

It is important to expect community feedback during this process to extend beyond the immediate project's framework, revealing a broader range of needs and expectations. For instance, residents of the Sankofa project expressed the need for comprehensive "wrap-around" services beyond regular medical check-ups during the engagement process. These services include childcare support, financial literacy programs, enhanced employment opportunities, and more. This response is evidence that the social determinants of health encompass a holistic approach to well-being, recognizing that a comprehensive set of services is essential for communities to thrive.

Let us also note common challenges regarding legibility. Some clients may not perceive the value in engaging the community, believing they can independently make superior decisions. Other clients may restrict community input to superficial matters such as the selection of interior paint colors. This limited engagement can result in a programming and design process that fails to reflect the substantive needs and expectations of the community. This failure leads to dissatisfaction with the outcome and conflict between stakeholders.

Architectural professionals often desire to engage more deeply with the communities they serve. However, a lack of knowledge or resources can

hinder their ability to do so effectively. This situation can result in a disconnect between architects and neighborhood stakeholders, whose outcomes are determined by a process in which they have traditionally had minimal influence. Compounding the issue, architects may underestimate the ability of neighborhood residents to critically interpret their needs and articulate their desires in meaningful ways. This underestimation is likely attributable to architects being trained as problem-solvers and often approaching design challenges with solutions generated in isolation early in the design process. Reframing the process to avoid these pitfalls is critical to ensure successful outcomes.

Considering the Implications of Our Sustained Presence

Step five of the CHD process entails developing a hypothesis to predict the impact of the architect's problem-solving methodology. The advocate healthcare architect can predict that sustained presence centered around representation and legibility will transform the industry in the following ways: expanded professional network, increased membership from vulnerable communities, historical perspective, and elevated stakeholder trust. Statistical data demonstrates that Black or African American men and women are among the most underrepresented groups in architecture, making up approximately 1 percent of the architect population each (5). Therefore, our attention should transcend building design to encompass building a professional network that prioritizes inclusivity and facilitates the advancement of all members. This step requires leveraging the bias interrupters we discussed to halt decades of discrimination. Every individual designer should adopt quantitative metrics to measure progress in cultural representation to build the pipeline of future staff and, eventually, leaders. These metrics should reflect the individual's commitment to increasing cultural diversity year after year until the composition of the industry reflects that of the communities we serve.

Healthcare architects should advocate for developing the next generation of designers to address increased membership from vulnerable communities. This commitment involves inspiring students of color at primary and secondary institutions to select healthcare architecture as a career path early in their educational journey. Architects can facilitate this by providing office tours, mock design competitions, and mentorship opportunities. Additionally, we can advocate for enhanced diversity in media and public forums to enhance awareness of the field and its significance. To measure and monitor such a strategy, it is imperative that we consistently reference measurement tools that benchmark diversity in the profession. An example is the National Council of Architectural Registration Board (NCARB) "By the Numbers." This tool enables us to track our collective progress and identify areas for improvement by designing solutions and hypothesizing enhanced outcomes.

In addition to an expanded network with a diverse membership, healthcare architects should redefine the success metrics for design awards to include historical metrics. Traditionally, these awards have focused on current individual or firm achievements. While valorizing these achievements is essential, they should not be the sole criteria for judging design excellence. Instead, award juries should prioritize retrospective awards that apply a historical lens to past achievements. The design industry should clearly articulate what we value the most by celebrating solutions posthumously from members of society who, through no fault of their own, were not recognized during their lifetime. Investing in research to identify these figures and recognize their achievements should be a strategic mission of the profession's national and local leadership.

A diverse team of healthcare architects who elevate stakeholder trust through their work contributes many viewpoints, experiences, and concepts, resulting in enhanced problem-solving capabilities and effective decision-making. Establishing the sustained presence of a diverse talent pipeline that is trained to achieve this goal is not a natural process; it requires thoughtful consideration and intentional action by architectural stakeholders.

Case Study Example: Expanding the Healthcare Design Community through HBCU Engagement

For example, with the support of The Academy of Architecture for Health, a national healthcare organization, my colleagues and I assembled to establish an engagement program entitled "Expanding the Healthcare Design Community: Making Healthcare Design More Inclusive through Engagement Initiatives." The goal of the program is as follows:

- To establish sustainable partnerships and develop trust between Historically Black Colleges and Universities (HBCUs) and healthcare stakeholders.
- To empower HBCU students and faculty to contribute their unique knowledge and perspectives to the healthcare design process and outcomes.
- To advocate for and elevate the significance of diversity, equity, and inclusion (DEI) in healthcare design, disrupting structural barriers and promoting and supporting equitable access to quality care for all communities.
- To share research and best practices demonstrating the tangible benefits of integrating DEI principles into healthcare design, catalyzing transformative change.
- To cultivate a trusted pipeline of diverse design professionals from HBCUs, fostering a new generation of leaders who prioritize inclusivity and social justice in the built environment.

This HBCU engagement initiative amplifies the concepts of representation, legibility, and sustained presence by harnessing the prowess of diversity,

cultivating equity in access and utilization, and mirroring the lived experiences of all communities. Through fostering inclusivity in healthcare, this initiative guarantees that healthcare design reflects physical necessities and the cultural fabric of the communities it serves, leaving a lasting legacy of well-being and inclusion for generations to come.

Architecture is a potent instrument that extends its advantages to all members of society. Through equitable architectural design, we can conceptualize educational institutions that foster a stimulating learning environment and healthcare facilities that administer impartial treatment. Furthermore, we can craft public spaces that encourage social engagement, foster economic opportunities, and promote responsible environmental management. Through thoughtful and intentional design, we can create vibrant, resilient cities prioritizing equity and justice for all inhabitants.

Defining the Active Agents of Our Craft

Step six of the CHD process requires us to collect baseline performance measures. In architecture, active agents are traditionally defined as the decision-making processes of residents, businesses, and organizations within a community. These agents consider economic conditions, social dynamics, and cultural preferences. In this chapter, we are reframing the concept of active agency to refer to tools and tactics that advance the architect's concept as a community advocate. When evaluated in this new context, active agents serve as powerful tools for architects seeking to evaluate the performance of community-focused methodologies. Active agents become dynamic and interactive tools designed to assist architects in comprehensively evaluating the performance of community-focused methodologies. When architects incorporate active agents into our design arsenal, we can gain valuable insights into how various factors and variables influence the outcomes of our proposed designs. By considering the interactions and behaviors of real-world stakeholders, active agents provide architects with valuable insights into the potential long-term outcomes of our solutions, helping us to create more measurable outcomes. The following active agents are examples of this reframed approach based on the core tenets of this chapter.

Example #01: Enhanced representation through historical context. Establish partnerships with community stakeholders to accurately represent their contributions to the cultural fabric of their neighborhood. Collect data from community resources regarding barriers to entry to the healthcare system. Use these data to establish baseline performance metrics for the project that act as bias interrupters.

*Example #02: Legibility through elevated stakeholder engagement***.** Establish collaborative partnerships with community members, healthcare providers,

and local organizations. Partner to align efforts and ensure that the designs respond to the community's specific needs. Establish performance metrics to evaluate the engagement process's effectiveness at the project's end.

*Example #03: Design for empowerment through sustained presence***.** Move beyond designing physical structures and create spaces that empower individuals and communities. Consider how the design can promote self-care, education, and sustained community-building initiatives. Establish metrics to measure the broader impact of the project over an extended period post-competition.

Architects can also employ the advocate architecture equity toolkit below, designed by the author, to help navigate these challenges. Action items for advocacy and practice can be useful tools to help us engage with equity at the forefront of our process (Figure 8.1).

In addition, we can learn to reframe existing tools we are already using, such as the CHD toolkit reframed to guide this chapter, to push in with a familiar set of tactics with proven effectiveness. Together, these components reveal that our active agents are a robust set of stakeholder-specific design guidelines that are historically grounded, community-driven, data-rich, and proactive. By embracing this paradigm shift and actively engaging in these steps, healthcare architects can make a meaningful difference in addressing the healthcare challenges faced by vulnerable communities. It is not just about designing buildings but also about transforming lives and creating a more just and equitable healthcare landscape for all.

This shift necessitates recognizing that our role must comprehend the historical context in which our patient stakeholders find themselves. The demographic and socioeconomic status of vulnerable communities in major

FIGURE 8.1 Advocate Architecture Equity Toolkit

Source: Roderic Walton.

metropolitan cities nationwide are not a result of happenstance. Rather, this status at the lower end of the economic and social strata was actively designed through biased policy decisions that empowered some and marginalized others. This is why healthcare outcomes can be predicted by the zip codes in which our patient stakeholders reside.

Once we ascertain why our patient stakeholders reside in the communities that they do, we bear the responsibility of engaging with them to better comprehend their needs and align our design process accordingly to create positive impacts that address the social determinants of health. This necessitates an advocacy toolkit that incorporates active in-person engagement. When combined with data collection, evidence-based interpretation of these data, and translation of the data into project-specific design drivers, the results are transformative. They create a compendium of work that serves as the "north star," guiding the healthcare architect's decisions throughout the design and programming process.

Let us examine the final two CHD steps to position our active agents into a measurable framework. Steps seven and eight require a framework to monitor the implementation of our process proposal and define metrics to measure the performance results. A core method to monitor progress and measure the success of our work is to assess the degree to which the project's physical manifestation aligns with the core values of the community. The foundational question is: has the project addressed community-scale aspirations as defined by its members at the onset of the process? The American Institute of Architect's Framework for Design Excellence: Design for Equitable Communities is instructive here. Success metrics could include:

- *"What is the project's greater reach? How could this project contribute to creating a diverse, accessible, walkable, just, and human-scaled community?*
- *Who might this project be forgetting? How can the design process and outcome remove barriers and promote inclusion and social equity, particularly with respect to vulnerable communities?*
- *What opportunities exist in this project to include, engage, and promote human connection?*
- *How can the design support health and resilience for the community during times of need or during emergencies?" (6)*

Integrating community metrics into infrastructure projects is crucial to ensuring that project success can be measured and monitored. For example, one frequently requested metric at the onset of a healthcare-focused project is increased workforce development and training. This metric is significant for local residents as it directly interrupts biased social and environmental policies by addressing the social determinants of health. Incorporating this metric

into the project process involves defining and measuring it throughout the design and construction phases. The implementation of workforce development programs would be outlined, and key performance indicators (KPIs) would be established to track progress. These KPIs could include the number of individuals trained, job placement rates, and participant wage increases. Upon project completion, the impact of the workforce development program would be assessed against its goals to measure its success. This evaluation would involve comparing the actual outcomes with the predefined targets. It would be considered a success if the program met or exceeded its goals. If not, lessons learned would be identified to inform future initiatives.

The same approach can be applied to other community-defined metrics, such as shrinking life expectancy gaps. Addressing life expectancy requires understanding the factors contributing to health disparities in the community. This could involve analyzing access to healthcare, nutrition, and environmental conditions. Based on this analysis, targeted interventions, such as community health centers, nutrition programs, and community farms, could be developed and implemented. Measuring the impact of these interventions would involve tracking changes in life expectancy rates over time. A reduction in life expectancy gaps would indicate the program's success.

Similarly, increasing developer interest could be measured by tracking the number of development proposals, investment commitments, and new projects in the area. An increase in these metrics would suggest that the project positively influenced developer confidence and stimulated economic growth. By incorporating community metrics into our process at the beginning, healthcare architects can partner with our clients to ensure regular monitoring, evaluation, and reporting of these metrics as the project concludes and over its lifespan. This sustained engagement is essential to demonstrating the value of these projects and building public trust through an active agency position.

Conclusion

As stated at this chapter's onset, the ultimate goal of this writing is to offer healthcare architects objective evidence of our immense potential as agents of positive change. Embarking on the transformative journey toward a more equitable and inclusive architecture profession requires profoundly reevaluating our values, priorities, and practices. This approach calls for a shift in perspective, where we prioritize equity over equality. This refined position entails embracing inclusivity, diversity, and social responsibility as the core principles guiding our work. Instead of service-oriented practice, we reframed existing frameworks such as the CHD framework, representation, legibility, and active agency to advocate instead for a community-centered approach.

This chapter has provided a framework for comprehending this paradigm shift's ethical and practical implications, offering tangible strategies for a more robust approach to design. We have explored methods for adopting a more active and engaged role in shaping a more equitable future, addressing long-standing biased policies, mitigating life expectancy disparities, and fostering trust. We established a hypothesis that the successful path forward, where architects embrace our role as agents of change, using our skills and expertise to advocate, will enhance inclusivity and amplify social justice. The result will be the widespread use of bias interrupters to actively engage in problem-solving some of our generation's most complex social challenges.

The extensive implications of the paradigm shift advocated in this chapter are multifaceted. Once we define our personal active agents, each of us has the potential to emerge as influential agents of change beyond individual projects. This transformation can be facilitated through pedagogical endeavors, nurturing a new generation of architects adept at addressing social, economic, and environmental challenges via data collection and critical design thinking. Additionally, it can be manifested through advocacy initiatives, involving collaborative efforts with policymakers, community organizations, and other stakeholders to shape policies and practices that foster more equitable and just built environments. Ultimately, it can be codified into a comprehensive design toolkit, serving as a minimum standard within the written healthcare guidelines we rely upon to standardize our nationwide design approach.

A brighter future lies ahead of us: one where architecture curricula embrace social consciousness, and practitioners teach each other how to design with empathy and a deep understanding of social and cultural contexts. This journey from here to there is not without its challenges, but we have a moral imperative to lay the groundwork to get there, starting today.

What Is at Stake If We Do Nothing?

It is essential that we pause and reflect on the implications of inaction. Our collective memory of the COVID-19 crisis stands in stark relief as evidence of the challenges ahead. Many of us lost loved ones; most of us know someone dear to us whose healthcare journey was impacted in some way. When agency and advocacy are not fundamental components of our craft, the painful inadequacy of the status quo becomes apparent during times of crisis.

There are implications to inaction to consider. First, our healthcare system in the United States is structured around treating acute conditions in a purpose-built care environment, such as an examination room, a treatment room, or an operating room. Most of us have been in rooms like this: they are sterile by design, typically have harsh lighting and hard surfaces, and can make patients feel more like specimens for study than human beings seeking

professional care. This industry standard approach to design forces architects to prioritize monetization through standardization over preventative healthcare and healthy lifestyle environments through holistic design strategies. The financial incentives are clear, so healthcare "best practice" incentivizes purely clinical and reimbursable spaces at the federal level. This prioritization reinforces the status quo, which is change averse.

Second, trauma-informed design, in which the past harm inflicted on patient populations is considered so as not to repeat and revictimize, is not a consistent complement to our minimum standard of care. The lack of commitment to trauma-informed design has left most healthcare architects ill-equipped to modify their design approach in the post-pandemic era. Designing community-specific solutions for stakeholders disproportionately affected by the pandemic, who have pre-existing and comorbid conditions, is often beyond a universal design expert's collective skillset and comfort level. To make matters worse, some healthcare architects incorrectly believe this design approach is beyond our mandate as service-oriented practitioners. The result is that the connection between trauma and design is often overlooked.

Third, excluding vulnerable populations from the design process perpetuates a cycle of inequity. By denying them a voice in decisions that affect their lives, we reinforce the message that their concerns are of lesser importance. This undermines their sense of agency and self-determination, making it more difficult for them to advocate for their needs and improve their health outcomes.

The COVID-19 crisis unmasked the inherent shortcomings within the healthcare design process, underscoring the urgent necessity for transformative change. It is paramount that we adopt an active agency stance. This entails proactively addressing and confronting the systemic inequities deeply embedded within our core processes. We should elect to undertake a comprehensive reevaluation of these processes, prioritizing equitable access as a fundamental patient right at all critical junctures throughout our workflow. By embracing active agency, healthcare architects can transcend the boundaries of traditional practice, becoming catalysts for positive change within our communities.

By rethinking architecture through the lens of active agency, we can transform the profession into one that is truly representative and impactful, leaving a lasting legacy for future generations. This transformative adventure requires us to challenge traditional notions of design and practice, embracing an approach that prioritizes inclusivity, equity, and social justice. Healthcare architects should endeavor to recognize that architecture is not merely about creating physical structures but also about shaping our communities' social and cultural fabric. By actively engaging with stakeholders, specifically the most vulnerable, we can ensure that our designs are responsive to the diverse needs and aspirations of the people who will inhabit them. This approach

necessitates acknowledging history and moving away from universal design principles. It requires challenging the status quo and advocating for policies and practices that support equitable design. It means working to dismantle systemic barriers that prevent underrepresented groups from entering the field of architecture.

Embarking on this transformative adventure requires commitment, collaboration, and a willingness to challenge the status quo. But by rethinking architecture through active agency, we have the power to create a truly representative and impactful profession, leaving a lasting legacy for future generations. Let us come together and work toward a more equitable and inclusive architectural landscape that reflects our communities' diversity and empowers all people to shape their built environment.

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A statement disclosing the use of Artificial Intelligence (AI): The author acknowledges using Gemini, a large language model developed by Google AI, to aid in preparing this chapter. Gemini analyzed the author's text, offering suggestions to improve clarity, grammatical accuracy, and tone.

9

INFORMAL HEALTH SYMPOSIUM PROCEEDINGS

Ulysses Sean Vance

In October 2020, a panel of representatives convened from across the fields of architecture and urban planning to discuss informal health access as part of the Design Philadelphia Festival. The discussion formed around their collective interests in an architectural solution to the challenges in providing health services in the early days of the pandemic. The introductory address to the panel sets the stage for a critical examination of informal health access in architecture. Moderated by Ulysses Sean Vance, the panel discussion framed two central questions: "What is the task of Informal Health Access?" and "Why are these modalities between the formal and informal an issue in health?" Vance did not pose these questions directly for a response; instead, they served as thematic guideposts for the dialogue. The discussion examined how informal strategies—those extending beyond regulatory frameworks like the Facility Guidelines Institute, WELL Certification, and LEED (Leadership in Energy and Environmental Design)—play a role in healthcare design. The panelists selected for their expertise in architectural theory, healthcare design practice, and inclusive methodologies included LaToya Kamdang, Fernando Luiz Lara, Steven Lewis, Mitra Memari, Korydon Smith, and Roderic Walton. Their varied approach to health-related design contributed to a robust discourse on how informal approaches to health access influence architectural production. This conversation is included in this book to extend the discourse on inclusionary practices in healthcare design and the role of informality as a critical component in designing equitable healthcare environments.

Access is about a great many things. Therefore, an architectural discussion of health access should be equally expansive. Yet, for the simplest of reasons, the architectural production of healthcare is primarily rooted in processes

DOI: 10.4324/9781003535768-10

that provide a deeper insight into inclusive matters. While the reasoning is soundly based on the transfer of knowledge between processes of building design, medical procedure, and human-centered design primarily associated with the articulation of patient care, the evident factors taken into consideration across each of these individual disciplinary theaters are considerably different. Yes, it is fairly obvious that the process of conceiving a building related to healthcare involves the traditional scope of planning, programming, and constructing a hospital or other structures in the built environment. How to achieve a spatial sensibility of the relative design criteria to improve the conditions for staff, professionals, patients, and their families, establish multiple layers of questions, criteria, and how they work together to establish value toward a goal are continually up for debate. While the current discourse for any building, existing or new, is focused on the significance of sustainability and climate change, which are taking precedence over other concerns, the relevance of human factors in healthcare ensures that accessibility and urbanity are still pertinent and that defining a response to these issues in the context of inclusive design is related to the efforts toward improving the ecology of the built environment.

Informal Health Access

In establishing a narrative approach to unilaterally frame the issues of health access in terms of inclusive design, there are both informal approaches and formal guidelines to lead architects through the challenges of improving the ecology of buildings. Quite notably is the work of the Facility Guidelines Institute, which sets the criteria for programming and planning of hospitals as well as the WELL Certification Guidelines, along with its predecessor the Leadership in Energy and Environmental Design Certificate apply named LEED certification, that each address health in the context of climate and the ecology of the built environment. Each of these guidelines provides clear criteria for architects to navigate the issue and meet a standard for caring about factors consistent with working in the architectural production of healthcare buildings that in certain ways reduce the environmental impact on the environment and the people who inhabit the resulting building. However, as guidelines, these certificates do not offer a pathway to addressing the informal strategies applying knowledge from outside an inherent understanding framed in practices addressing healthcare design as calculations, percentages, and material goals. Instead, the role of a design team interested in informal health access is to think outside of the boxes of efficiency when navigating the possibilities beyond the criteria and apply some interpretation of them to the relative project, whether building or other structures.

In talking across the panel prior to today's discussion, the conceptualization of informality was something commonly shared across the range of their

practices in architecture. Therefore, it is important that this symposia question what is the most challenging of considerations for their practices in defining informal health access toward their own studio projects. The value of these discussions in this book is to present their interpretations of the terminology as an extended resource to the discussion agency operating beyond health capacity.

Question 1: What Is the Task of Informal Health to Access?

Informality, while not significantly focused on buildings, encompasses a vast field of cross-disciplinary references that are expanding the reasoning of how architects engage in designing the built environment. Within the expanse of competing ideas that constitute informal space, the architectural focus on producing material resolutions of the term has led to this primary interrogation on the role of informal drawing and construction in resolving the critical impasses of more formal agendas like wellness and well-being as they relate to the built environment. These pursuits are evident in the history and resolution of architectural concepts, as critiques in architecture often assail that the problem of architects is not of buildings but rather of drawings (Robin Evans). Linking the challenges of the architect in the built environment to a simplified truth based in the expression of ideas and conveyance to others in the production of a building. Informality challenges this framing of the grand narrative in architecture, as architectural production has no purpose when framed by a drawing alone, as it is the intent of conveying constructible practices that is equally purposeful and limiting for these productions. While it is true that architects draw, the formal intent of the drawing is to flow through or across responsibilities, interests, curiosities, and possibilities. Inherently, the movement of these in the drawing of ideas from creativity to the most evident reasoning of needs and ultimately the archiving in succession of resolution and critique are informal and meant to be part of the framework defining architecture in the least as both formal and informal. Therefore, it is necessary in stating that the work of this book also considers the world as both formal and informal as framed by the drawing as an active participant in defining architectural production.

Question 2: Why Are These Modalities between the Formal and Informal an Issue in Health? People Engage in Informal Healthcare All the Time. What Issues Does It Pose in Addressing Wellness or Well-Being?

The second challenge of the discussion supported the eventual production of this book, and is the interest in determining if informality in health access, framed by criteria from the formal distinction of the disciplines affecting is

still present in their pursuit of inclusive design, and to what extent is the production of informality in health access framed by criteria from the formal distinction of the disciplines affecting healthcare architecture when transitioning to formal mediums such as building-information-modeling in a post-digital era of design and construction. And while the most obvious answer amongst professionally minded architects is often a "yes, and" approach, it is important to dig deeper into the "either/or" as a way of unearthing a relevance to informal processes in the architectural production of health.

The selected responses from panelists represent the fielded discussion of the panel for the "Informal Health Access" event of the Design Philadelphia Festival, Philadelphia, PA, on October 12, 2020. Ulysses Sean Vance contributed to the conversation as moderator, with LaToya Kamdang, Fernando Luiz Lara, Steven Lewis, Mitra Memari, Korydon Smith, and Roderic Walton presenting as panelists. The conversation occurred remotely over Zoom as all cities were amid a travel lockdown and restricted from gathering publicly for the festival. Despite the complications of meeting remotely, the panel was joined by an exuberant audience as the panelists worked through their perspectives on restructuring research agendas related to COVID-19 and the relevance of the pandemic in their consideration of Informal Health Access. The following has been streamlined and edited for brevity and clarity of content while capturing the spirit of the conversation.

Ulysses Sean Vance: The field of architecture is an instrument for looking more closely into built environments, urban infrastructures, and, most recently, how we deliver health and healthcare. The current state of things is reformatting how we, as architects and designers, deliver on the promises of healthfulness, building on ideas of equity in a city and implementing strategies for recovering in the days ahead through the disciplines we represent across architecture. For me, the informal context reframes access as a model of empowerment and the decentralization of structure that inherently creates bias and disparity. I am interested in how informal conditions could better inform medical institutions on new practices to serve our communities. Communities that have historically been labeled as minority. As much as I am working in Philadelphia and see this as a prevalent issue for Philadelphia's Black and Brown communities [within a pandemic], I don't think

it is a problem that is unique to Philadelphia or its minority communities. It is a challenge across all major cities and minority groups to critically examine how informal practices as health practices make wellness resources more accessible.

Roderic Walton: As an African-American Architect working in the most prominent African American Architecture firm [Moody Nolan] established in the eighties, I find that we are positioning uniquely in the marketplace as African Americans to identify and address issues of disparity related to COVID-19, specifically, and address the spectrum of other [health] disparities impacted by architecture. Working in our healthcare studio, exclusively in our Chicago office, for about ten years, I have focused on our local healthcare, particularly community-based healthcare. Most of the work we do is for black and Brown communities who have been disenfranchised because Chicago was one of the most segregated cities in the country. I have spent a lot of time thinking about why that is. What are the root causes of that segregation? What are the direct implications for healthcare? Specifically, why are we seeing such disparity in this epoch of COVID-19, in terms of who was impacted by the virus and what makes the outcomes for Black and Brown communities so much worse?

Fernando Luiz-Lara: I came to this country from Brazil. I came as a Latin-American youth. I came talking about and writing about modern architecture in Latin America, where I worked on informality. It comes from walking in the favelas of Brazil, as there are many opportunities to improve the infrastructure in the favelas. I worked in these areas and changed the scholarship through participatory processes in informal areas. Nowadays, I see myself as an American, and we, as Brazilians, share a lot in common with the [whole of the] Americas that we have

not yet explored, mainly how we utilize our understanding of Colonial Theory from the last 30 years to understand the spaces that shaped the Americas. By Americas, I mean the land from Alaska to Chile and what we share across our borders, from the Amerindian Holocaust to the extermination of our native populations and, most significantly, slavery. These major tragedies and significant events frame everything we face nowadays in our built environment.

Mitra Memari: I, too, work on the healthcare of things as part of the leadership at ZGF in Los Angeles, specifically on social justice, where we developed a diversity and inclusion task force as it is a passion of mine, as an immigrant from Iran, to have my experiences translate into a way forward improving the company and how we approach healthcare design. Community engagement is one of the biggest things to consider moving forward, especially in defining community. It is across all our different projects and represents something we have been dwelling on lately, as the needs for diversity and inclusion are becoming more significant in COVID-19.

LaToya Nelson-Kamdang: My interest in informality started with my thesis in graduate school at Penn, where I looked at informal settlements in Ghana. I expanded on that interest and spent 2018 and 2019 in Taiwan, looking at indigenous settlements and indigenous architecture against military settlements. Throughout Taiwan, there are various sites ranging in era, dating back over 400 years. All of these represent the indigenous architecture of the Taiwanese communities generally located within Taipei or outside of the city. In this context, it is essential to recognize the intersection of informality and how we start to look beyond practice to acknowledge the great injustices done to the indigenous populations of the country and what their President is doing to right that wrong.

When you examine that they are doing right in the form of universal healthcare, meaning everyone has access to healthcare, regardless of income, you can see this country as one of the healthiest with one of the best healthcare systems. Then, juxtapose that regarding COVID-19, you can see that the policy and acknowledgment and giving people access, formally or informally, benefit all people. There is a direct correlation to how a country helps its people across economic lines, the people who are most impacted by this virus. The most important aspect is knowing that some people do not have primary universal access to something critical for our society to function.

If we do not provide healthcare access equally to all, how can you know we are still functioning as a society? We must relearn how we collectively face the challenges of a global pandemic. It is research and practice for me to work with some of the most vulnerable populations in New York City. One of the most severely impacted neighborhoods I have encountered during the trials of COVID-19 is the people of East Flatbush, Brooklyn. Here, you can see how decimating not having access to healthcare can be across multiple generations, where the impact is more intensely felt. In East Brooklyn, Black and Brown people are the indigenous population now, and what you find is that they are the most marginalized economically compared to where persons in other neighborhoods do have access to something as basic as universal healthcare. Then, the impacts of COVID-19 are not detrimental.

Policy and leadership are part of this conversation because, as designers, we can bring idealness to spaces, but more importantly, we get there through community involvement.

Korydon Smith: So, as Roderic was pointing out about Chicago, I am in Buffalo, one of the most segregated cities in the country. Buffalo has a long-standing high poverty rate among our communities of color. Like many have talked about in terms of the impacts of the pandemic, those health disparities have played out here as they have in many other places. Issues such as these are essential in my area of work as I am the co-founder of the Community of Excellence in Global Health Center at the University of Buffalo, where I also serve as chair of the Architecture Department. The community is over 200 faculty-wide across 60 departments on campus as we are trying to draw on the expertise, not only from the health sciences but also from the study of the built environment in urban planning, architecture, and engineering and aligning those with the social sciences and

humanities, given the complicated challenges in the world of global health.

What we face in terms of the intersection of poverty, race, politics, and cultural factors, among others, happens across the globe, and we are working in several different geographies, both in rural informal settlements and in more dense informal settlements in cities. The bulk of my work has recently been in Central and Eastern Africa, Rwanda, Uganda, and the Democratic Republic of Congo and reflects the increasing urbanization across many African countries. Many of the same issues we encounter in the Southern United States and South and Central America are also playing out across Africa. So again, working with a variety of different vulnerable populations, including people with disabilities, women, and children, obviously poverty cuts through all of these. However, there is an added need to address refugee populations, which is happening internationally and in Buffalo. An aspect commonly overlooked for Buffalo is that the city is the largest Refugee Resettlement area in New York State. Usually, you think of the major metropolitan cities as the focus for resettlement. Still, in New York state, people are moving here, which then creates even more complexity in terms of challenges for our communities of color and the challenge of meeting health needs that are diverse and inclusive.

Steven Lewis: It is great that we are having this conversation as architects working and holding the mantle of Justice, Equity, Diversity, and Inclusion (JEDI), which we are all trying to get out in front of as a result of the pandemic, but that existed before the pandemic as well. The issues are pronged: the good, the bad, and the ugly. The good is the work being done and recognized as having traction for a broader spectrum of people in need, but then there is the bad coming to light as the 50-plus years of lacking representation in the discipline that affects the built environment the most. As Black Architects, we are hovering at 2% of the profession that is shaping and making the decisions on equity in our communities, and it is not just limited to these numbers, but there are similar deficiencies in the medical professions and community engagement. The demands are on a few to address the incredible number of challenges at issue right now, so this period we are in, which dominates our media and our lives, should be about making the big decisions and

big moves toward stimulating a pipeline of people willing to integrate into the profession, capable of addressing the disparities in health for the built environment. The need for creating vital projects like the one we are working on at ZGF for Portland, where the I5 freeway erased a thriving black community, and now, all these years later, the Oregon Department of Transportation is trying to make amends. A big part of restorative justice is providing community-appropriate healthcare in these bridging projects that can be places for informal healthcare. The project revolves around formal and informal strategies appropriate to how Black people congregate in new spaces. It's another dimension of a conversation that probably wouldn't have happened or been listened to without the conflicts created by the pandemic. It is making organizations listen more closely to the call for resolving these discontinuities in our cities and how we care for one another.

Ulysses Sean Vance: Informal also represents the ability to rethink how we look at health in the city beyond the immediate role of providing tactical health solutions. Reimagining the discussion of informal settlements in the city around intelligent urbanism and considering these as the role of a healthful city in place of the "functional city." I am proposing these ideas relative to an observation of the work by the Black Doctor's Consortium working in Philadelphia to provide COVID-19 testing to persons showing symptoms, but due to restrictions to vehicular traffic only at testing sites across the city, which led to pedestrian traffic denied service and asked to leave the premises, therein creating a void in services. These choices in queuing traffic flow through a parking lot to access a testing site represent the most obvious definition of urban and architectural planning approaches and actively create a service disparity.

An undocumented reality was provided by the doctors themselves, who, upon realization of these issues, elected to visit the people, who were primarily Black/African Americans and Hispanic/Latino people.

Efforts to reach patients who cannot access healthcare due to transportation issues, lack of testing facilities in their areas, or denial of entry into designated wellness zones are being made in unconventional locations. Covid testing is now being conducted in church parking lots, at barbershop storefronts, and even on the porches and stoops of people's homes. It is a one-on-one service, which reframes the discussion of informal spaces from settlement to service and even informal facilities, as many of these mobile street teams work out of a car or van.

These approaches are trending more nationally but with limited media coverage. However, more importantly, are the parallel building disciplines taking notice and utilizing the strategy to make it more relevant to the pop-up approach?

My concern is that as the pandemic drags on, as so many are predicting, and we reach the summer months, are these methods for testing and treatment outside still viable for patients but more importantly caregivers as temperatures rise? Given the challenge of the pandemic, mixed with the issues from climate change, can these systems remain effective measures for distribution without further intervention from architecture and urban planning to improve the conditions of care that are transitioning to outdoor environments?

How can we more clearly define the community? As informal settlement and healthcare bridge together, a result of transitioning the hospital from inpatient to outpatient or even curbside engagements, what is pertinent to address first? Should these quasi-separate but equal approaches remain based on the socioeconomic status of the audience? Might there be a disposition by the property or the spaces, even more specifically, a lack of facility access that can be inverted to encourage people against visiting a hospital due to these encounters?

Roderic Walton: You raise a good point about needing to define terms like community. I would add defining "the community" and some other key terms we use in our approach to unpack the terminology, which is so important to connect with an audience.

Fernando Luiz-Lara: To unpack the idea of formality and how it relates to building informality to each challenge in formality.

Ulysses Sean Vance: Personal experience is driving a new awareness related to COVID-19. The personal experience of being turned away from care based on appearance or lack of identification is jarring, and the trauma from the stress of those moments exists beyond the patient through to family and colleagues. The realization that there are layers to experiencing bias. There is the encounter, but there is also the perception

of powerlessness, and both of these become tied to the space of the encounter. Therein, the bias is framed within the architecture, and rightfully so. How the anxiety begins depends on the encounter, whether arriving at a facility and being met by the outwardly reflective multistory glass wall or placing security guards at the entry searching with critical eyes your belongings. Neither happens at the scale a patient with family can feel confidently assured that their socioeconomic status will not negatively impact their admittance into these premises. There is an externalization of fear for pedestrian traffic that they are unwelcome based on the approach to facilities, which has trended more recently with newer flagship hospitals and care-facility design models. These oppose the scale and familiar conditions people from Black and Brown communities encounter daily, whether in their daily routines or circumstances related to their health. Adding to the offputting characteristics of the setting, what they encounter regarding them being personally analyzed for who they are, where they get their money, why they don't have insurance, or the facts of their relationships and why they might be single with multiple children are all very distancing personal inquiries that are both damaging and damning for them in supposedly a safe-space environment. The hospital needs to be a place reflecting informal values, carefully navigating the patient check-in process to eliminate bias based on perception, which will knowingly relay unnecessary signaling and lead to conflict and tensions that should not be there.

People are looking for assurances in these spaces that focus on their wellness and well-being. They want to see healthcare beyond the instruments and medication that are already stressful, through to the care and potential for recovery and rehabilitation of whatever plagues them.

*Korydon Smith***:** These thoughts are directly related to three different contexts and types of informal settlement issues. The first is refugee resettlement, the second is rural informal village life, and the third is rapid urbanization. In each of these, the concept of emplacement, as in the

opposite of displacement, is informed by presence in a space and directly relates to how those persons identify in these new environments. Cultural identity, spatial identity through the built environment, personal identity, and dignity play out differently and in exciting ways, specifically in northern Uganda, among South Sudanese refugees. So, first, the introduction of this concept of the emplacement impacting identity, and then in the second case, building upon the ethics of working with potentially vulnerable or at-risk communities and approaching it from a standpoint, not as an expert but from a perspective that Fernando was pointing out on working through a participatory approach where you acknowledge that there is great wisdom in the community that when applied benefits the patient and the caregiver. The third is a notion that is working both in Rwanda and Buffalo with refugee communities and communities of color in the city where there is a certain degree of skepticism about the formal healthcare system.

In these discussions, it is important to reflect on how we view healthcare as a cultural artifact. It is no longer just food, music, architecture, and art that are cultural artifacts; the healthcare system has a culture when you go from place to place. In moving around, you see just how much the culture changes. If we think of it as a cultural artifact, we might design it differently.

Steven Lewis: There's something about the intersection of traditional healthcare as self-care within communities and the need to integrate new technologies in medicine distribution to displaced communities. I can't remember the exact YouTube video, but it showcased the use of a catapulted drone to deliver medicine to remote areas in Haiti within so many minutes of an emergency alert and how the doctors and engineers are working together to supply medical resources and track data on outbreaks of different viruses and disease. I see this as a grand narrative in Architecture of working on the remoteness of healthcare distribution and a good way to talk about how the past and this technological present inform the future, improving outcomes while respecting culture and landscape.

Fernando Luiz-Lara: In discussing informal health, I want to share my previous work on informality in architecture. We're talking about a concept resulting from the modern colonial organization of the world after European descendants arrived here in the Americas. The arrival of European settlers in the Americas, and the continued occupation of the Americas, is a sparked revolution representing how the world works. It was not a very positive revolution. It was positive for very few people, as we know, and it was hostile, repressive, and brutal to a large majority population that is not a white European male. So, modernity associated with the colonialist way of understanding the world created these concepts of formality and informality in the design disciplines of the built environment. We often equate formal design or formality with orthogonality. We equate the idea that because a settlement or place is not orthogonal, it has no form and is informal. I want to introduce this aspect of the problem as it ties into these colonial logics. I want to start here because it is not that informal concepts do not have a thought process, nor does it mean informal concepts do not have form. It doesn't mean informal concepts have no organization or ordering principles that allow people to live informally as an ecology.

A person who builds their own house in the favelas of Brazil, creating this environment, also built the rest of an entire city that is the favelas. These are the same people who work eight to four on a regular construction job and build in the favelas on the weekends or late at night. In talking to and interviewing them, I started working on disseminating architectural elements in the favelas. While there were also a lot of government funds to improve the life of the favelas at the height of governmental intervention from 2003 to 2011, during those eight years, Brazil made tremendous investments into improving sanitation, mainly in the construction of sewage infrastructure and accessibility improvements for walking there.

During this time, I started theorizing about what this construction represents. What is this built environment? How does it work? This theoretical work about informal construction was a very formal idea because when I examined these works, I saw the workings of Le Corbusier's domino building, which we all know from our Eurocentric architectural training. Three slabs and six columns are the DNA that created the entire favela, and in trying to

understand the favelas and the beauty in these environments, I interrogated these places of habitation and began to conceptualize their differences. For instance, in the formal part of the city, to use terminology that is problematic but instrumental nonetheless, we see that established property ownership is the first priority. First, people own the land. Then, produce a design. And then construction and finally inhabitation.

In the favelas, you have the precise opposite. First, you have the habitation. You have to be there to claim that land or buy that right from somebody. It is also highly capitalistic, and people buy, sell, and rent all the time. After inhabitation, you have construction. After decades of struggle, you have a property title, wherein you have some ownership, in which many gray areas exist. The many degrees of ownership and these inverted processes have to be considered and acknowledged when discussing the favela as an environment and an informal place. It is very formal. However, it has to be grassroots. It has to be built from the bottom up on that logic. It isn't easy within the traditional architectural approach of operating with a Cartesian Eurocentric rationalist abstract logic in this environment where life is relational. It is not abstract. It is about engaging your neighbor's individual environment. In this relational urbanism, engagement possibilities are very different from how most architects are trained professionally to engage in policy and intervention.

So, my work is to develop a means to understand the good in these environments and how the ecology of the favela is created. How is it built? What are the materials? What are the problems? What are the advantages? It was very important to my work, especially when COVID arrived in the parts of Brazil where I worked. Places with tremendously high density and where you have extended families with grandparents, cousins, or any mix of relatives living in cramped areas within buildings between 700 and 1,200 square feet at most. Where you have seven or eight people living there, the children sharing a room with grandpa, within really tough living conditions, and a population that has no choice or privilege of working from home or being safely in their homes. These are the struggles of the people there. They must take the bus. They must go to work; otherwise, they won't have enough money to buy groceries at the end of the week. I became very concerned about how they would survive, but it turns out they manage these challenges really well because, in these communities, you have the support of people around you. The people of the community have become the informal health network, supporting the people who need to quarantine.

It is important because Brazil's public health system, which could be better, is supportive and works well in many aspects, not for others. There is a network of social workers to support programs that intervene in the favelas, inspired by the Cuban model in which nurses knock on the doors of everybody twice a year. Take the blood pressure of people. Make sure they are taking their medicine. Inquire if they are in pain or are gaining unwanted

weight. And these services already existed before COVID-19. What made these systems work is that the government was able to reallocate funds from social infrastructure toward the hiring of more people to provide these informal health checks. The available people to do this work, many of whom had recently lost jobs in hotels and restaurants because these places closed immediately, could continue working by doing the contact tracing and testing support. The system was very valuable in assisting single mothers and the elderly, and they could revamp the system to provide the same assistance for families living under quarantine. Through these communal support efforts, they were able to enforce quarantine using grassroots efforts instead of policing, which kept their COVID-19 numbers low. The sad side of this is their mortality rate was higher because of the inability to prevent transmission due to the density of the favelas, the number of people in these communities who were experiencing other health complications, and the accumulated inequalities in healthcare at the time of contracting the virus.

LaToya Nelson Kamdang:

My expansion on informality in architecture, what the idea of the informal is, and what it means. In each of the places I have visited, this idea of informality is always associated with unintentionality. Everywhere I visit, there is an extreme intentionality. The big difference is that these areas are not sanctioned by a larger municipality, government, or architect who has planned the entire site from a dictated top-down perspective. Instead, the idea is that the inhabitants have input based on that ecology, the environment, the spaces they occupy, and the deep context within them to create the necessary architecture.

Along with this idea of informal, I wanted to define this idea of health, recognizing that 80 percent of health outcomes are determined before you enter any clinical facility. These are largely predetermined by where you were born, your access to a hospital, and your access to recreational space. It is also determined by whether or not you live close to or near an area that has some environmental detrimental impacts on your water supply or your food supply, your access to healthy food supply, and the level of stress you encounter

in your daily life. When we think about informal and health, I also want us to think about access. Accessibility is important, regardless of the location of vulnerable populations worldwide; if you give them access to healthcare, the outcomes of situations and negative situations become different.

I agree with Fernando on the relatedness of connecting indigenous people to indigenous architecture, as it parallels my research on indigenous populations in Taiwan. A significant part of what made my work possible was the acknowledgment from President Tsai of Taiwan. In 2016, when she became president, she apologized to the indigenous community and acknowledged the bad history. In her quote, she said, "Unless we deny that we are a country of justice, we must face up to this history; we must tell the truth. Most importantly, the government must genuinely reflect on this past."

Furthermore, to be in Taiwan, to engage the indigenous population there, to reflect and understand the architecture that dates back 600 years to the Rukai Tribe, with its stacked slate walls and other architectural embellishments, represents a critical history being brought alongside a present country, and the importance of this connection with the indigenous and vulnerable populations having been acknowledged and also invested in by the government to ensure access within the places they have built for themselves to instrumental places of healthcare. In addition to issuing an apology, the government would address any historical abuses by investing back into the indigenous population, allowing anyone wanting to become a medical doctor of indigenous descent to receive that education for free. These reparations, along with the cultural conservation of the spaces they held, and acknowledging their culture their language, and ensuring that their heritage survives, are important to the processing and telling authentic and truthful stories around embracing the culture into a larger Taiwanese culture.

There is an actual reduction in stress and a feeling of being included in society, which in and of itself is rehabilitative. Having access to feeling a part of something does have implications for health outcomes. These connect to a broader healthcare and health equity issue, especially in a country like Taiwan, which has held a universal national healthcare system since 1995, a system accessible by their entire population before you are detrimentally ill. It is a system that allows for contact tracing early in the COVID-19 event, helping to prevent infecting neighbors based on how the virus is transmitted. The commonality of wearing masks reinforced these efforts, as they were already a part of their culture. It represents a cultural certainty that has impacted the way health and wellness are distributed and impacts even indigenous communities, who are more vulnerable populations.

I also think their architectural ideas around the COVID response were better prepared in creating pop-ups because their systems were impacted as heavily as ours. However, they were more thoughtful and immediate in terms of applying these architectural concepts to collaborative accommodations

between the government and the Fujian Catholic University Hospital, which allowed the medical doctors to produce spaces that had what they needed to address the challenge within the circumstances they encountered. Multiple agencies worked to immediately convert facilities and utilize recycled materials to reduce viral transfer and spread while adapting flexible methods to adjust to increases or decreasing population flow. Teams could reposition the modules anywhere as they were modular and adaptable enough to be moved from community to community.

These collaborative thinking processes inform my workings as an architect, where I initiate community engagement and pursue projects that connect some of our most vulnerable communities with needed resources. I think a lot about the interdisciplinary dialogue with physicians, stakeholders, and the community and how they inform our production as architects, engineers, and lighting designers in a room to develop the most suitable solutions within a non-egotistical process. It is a safe space to think about the community's assets alongside their needs, working from there to develop solutions. These represent the possible ways to think about wellness and health as a more holistic idea across the cultures and neighborhoods that most desperately need it.

Mitra Memari: I was born in Iran. When I was eight years old, the revolution took place. I was one of the people who went to these protests in Azadi Square, the freedom square in Teheran. I saw firsthand myself fighting for equity at a young age with my friends and family. How that turned out is a whole other conversation, but it was the goal of that moment. When I was nine, Iran and Iraq went to war, and I witnessed fighting for life, be it in my elementary school when they would bombard the cities or family members who were teenagers at that time were sent to the front line. These experiences brought me this life-changing experience of deep-rooted passion for seeking justice and equity as a resilience that I carry with me. I bring it into practice and how I approach healthcare in architectural design. In practice, we focus on patient-centered care, and one consideration that I've seen benefit equity in our design is the way we approach team building for a project. We don't have studios in our office, so when we make up a team for a healthcare project, an individual might have worked prior on a Higher Education campus project for a Research Building.

> We will bring those individuals onto a team for how and what they contribute from that experience to diversify the process of healthcare design—allowing the team to look at things differently and inform the process differently than if you were constantly working on healthcare.

The benefits of diversifying the team relate to the design goals prevalent in our projects and how these decisions inform experience. The application of these ideas is prevalent in a project with the University of Arizona Cancer Center to provide an outpatient cancer center designed and built in downtown Phoenix. The university wanted to expand from its Tuscan campus into Phoenix, so they teamed up with Dignity Health, which is running the facility, and the city of Phoenix, seeking redevelopment partners, joined the project. Adhering to different agendas was necessary with these three different partners, which can always be challenging. We wanted to create a warm environment through hospitality, and a lot of care was given to providing architectural elements that welcomed views into the building while preventing heat gain and adverse glare.

A nutrition program that has been successful within the project includes a demonstration kitchen that is part of the design. A goal for the project was for everyone to learn how to choose the food they pick in grocery stores. The program would accompany people to grocery stores and help them select the right foods, read the labels, bring the food back to the counter, and share how to make healthy food.

Another component is the area of respite—a garden area where patients and families could go and take a break in nature. The demographics in this area are mostly Hispanic families, and we knew from the beginning what it meant for our design to accommodate those patients who come with a lot of family members to a doctor's visit—sometimes bringing ten to fifteen people with them. So we had to make sure we accommodated that in the design of our waiting areas.

Another point I want to make through a project relates to an organization I learned last year through my cousin. As part of the ongoing border crisis, a group of doctors and nurses got together and crossed the border into Tijuana to establish a makeshift clinic and provide care for the migrants who ended up staying there for extended periods of time. My cousin and the others established a grassroots fundraising effort to gather the money for supplies. They drove to Tijuana to buy all the essentials needed at Costco and fill in the missing supplies at Clinics with what they could afford.

So, we did this through the One Plus program, a national program that challenges architects and design firms to pledge 1 percent of their annual billing to pro bono services. We designed the second clinic location that

they could use to provide services, working specifically with what could be purchased at Home Depot or would be easily accessible in Tijuana. All of these projects together help us to define community in a very unique way through our design process. With the events of COVID-19 and the social justice movement, in our next projects, we will focus on how the community is defined more globally and in a broader cultural manner.

Roderic Walton: I began my architectural journey in the early 1990s and realized immediately that I would have to advocate for myself and others like me. The reason was that the architectural curriculum I encountered when I started my undergraduate work became very clear to me early on. The structured and sanctioned curriculum was not designed for people who looked like me. I started receiving a very Eurocentric education. The university presented the history of architecture to me from a Eurocentric perspective, and all my classes focused on that aspect of architectural history and design.

I started advocating at a very early age for architecture to be more inclusive from a historical lens, and I got some of those programs at the university to change to focus more on other cultures, some of the cultures talked about today. I encouraged the university to be more broadly inclusive in its tone and scope. Continuing that dialogue would require a lifelong commitment to advocacy through practice. I am interested in studying architecture from a critical lens and working to unpack the challenges related to the cultural significance of health that we are discussing today. I often note this quote from James Baldwin: "Not everything that is faced can be changed, but nothing can be changed until it is faced."

To start, let's talk about the disproportionate mortality rate of COVID-19, specifically in the United States, and establish some of the ties to the healthcare community specifically by focusing on communities of color. I have heard from some of the other panelists that they have encountered governments and institutions that have taken accountability and responsibility for their constituency's healthcare. I think we all know that we are living in a political climate right now where, in the United States, there is not necessarily consensus about the severity of COVID-19 and no consensus that it is an actual pandemic targeting people disproportionately. It is vital to the overall discussion that we take a sober look at the facts and understand that Black people in the United States are dying at a rate 2.5 times higher than their white counterparts (The Covid Racial Data Tracker, August 2020).

I want to understand why these disparities exist and the root cause. Specifically, tying back to advocacy and practice, what are some of the tools that architects can use to diagnose the problem and address it in our daily practice? First, we need to recognize the history of segregation that there are straightforward ties to housing and how we experience care. LaToya spoke earlier about the fact that by the time you engage the healthcare system, a large percentage of your outcomes are predetermined and that are predetermined by several factors that we call the social determinants of health. These are predetermined outcomes based on your living circumstances, your housing circumstances, and your community and how it is structured.

We can talk about this from various perspectives that center around segregation. Going back to the 1920s, we can examine the US government's decisions regarding housing policies and establish a direct correlation between those policies and the disparities currently experienced concerning COVID-19. From the Great Depression in the late 1920s through World War I and World War II, there was a housing shortage in the United States, and the government here decided they had to get into the housing business. They had to become housing authorities to address the housing crisis. They developed a series of institutions to achieve these goals. The Federal Housing Administration was formed in 1934, and the Housing Act of 1937 was instituted to formalize the relationship in distributing housing throughout the United States. These were federally sanctioned housing, and because they were federally sanctioned, they were also segregated. We can look back through the history of the Presidents operating during that time, their cabinets, and the people they were selecting to enforce and develop these policies, and we can see that there was a correlation between the policies and segregated communities being distributed throughout the United States.

When we talk about the social determinants of health, and we talk about the social and economic factors, the healthy behaviors, the quality of care, and the access to care, there is a direct correlation between living in a community that is segregated and having these barriers. The socioeconomic factors might be clear to us, but healthy behaviors are a critical issue that I want to take a moment to address. Right now, I live on the south side of Chicago in the middle of a food desert. There aren't very many healthy options here, and this is a heavily segregated part of Chicago. In this community, there has been a lot of disinvestment on the part of developers and folks coming into the neighborhood to revitalize it from the city because it is so impoverished. The options to be healthy and to engage in robust and self-sustaining healthcare systems are extremely limited here. It becomes pretty apparent why people here have pre-existing conditions, co-morbid conditions, limited engagements with the healthcare system, meaning you are not getting your regular check-ups, you're not able to engage the system as quickly when you do feel

sick, and you're certainly not getting access to preventative healthcare. As a result, COVID-19 is far more pervasive in these communities on the south side of Chicago.

People with underlying conditions that are pre-existing are co-morbid, meaning that you have more than one pre-existing condition that is undiagnosed or diagnosed too late. So when you start to look at some of these factors in tandem with the other issues, you can see very clearly why an entire segment of the community that has been disenfranchised through segregation that doesn't have access to healthy food options, and that doesn't have access to robust healthcare systems would have the types of pre-existing conditions that made COVID-19 much more deadly.

To discuss the social determinants of health and how they impact communities of color, specifically in Chicago, we can examine Chicago as a case study on the level of disparity and focus on the issues of segregation currently impacting daily life.

Looking at two communities that are close together, Lincoln Park and Inglewood are about 12 miles apart. Geographically, they are not far apart, but demographically, Lincoln Park is 79 percent white, and Inglewood is 91 percent African American. The median household value in Lincoln Park is $600,000; for Inglewood, it is $100,000. The median household income in Lincoln Park is $115,000 compared to $27,000 in Inglewood. Living in Inglewood translates into living right above the poverty line, and that is challenging for the frontline workers whom I know live here, working through the pandemic and working to survive based on these numbers. The harsh reality is that many were already at the poverty line before the pandemic hit.

The segregation in Chicago also impacts the lack of educational opportunities. Comparatively, Lincoln Park has a population of 38 percent with a master's degree or higher, unlike Inglewood, which has only 3 percent with the equivalent. The statistics tell us that an educational gap increases the challenging outcomes for people living in disenfranchised areas. These numbers translate into real-world issues that people are living through in their daily lives. For example, returning to my earlier point on how the area in which I live, in Inglewood, is a health desert, and what that describes is the distribution of primary healthcare systems across the city and the absence of those resources in this community. Specifically, it lacks a major level-one trauma center on the south side of Chicago.

Level One Trauma Centers are designed to address the most severe healthcare needs. These involve traumas such as car crashes, bus accidents, and gunshot victims. These institutions are expressly set up to operate 24 hours a day, seven days a week, to deal with the most extreme of injuries, stabilize those patients, and prepare them for surgery. If you do not have access to that type of facility in your neighborhood, you must travel to a neighboring

community with those resources. Because Chicago was so heavily redlined, there was an active decision to disinvest in those types of facilities on the south side of Chicago.

When we talk about issues of informality against the formal system of healthcare in this region, across a system specifically designed to exclude people of color in these communities, you can see why there is a very informal groundswell of support at the local level, the state level, and the city level to make some institutional changes in a way that the city perceived healthcare and the way that they prioritized care in this specific community. Moody Nolan, where I work, was hired to fill that void and design a new Level-1 Adult Emergency Department System specifically geared toward Inglewood, where I live, to help fill that void.

We are slowly turning the corner in terms of meeting the community's needs. Still, we have had to advocate and fight for equality regarding how our history is represented regarding our access to care and against being in a geographical area that is completely cut off from the rest of society regarding how healthcare is perceived and delivered.

> Change will not come if we wait for some other person or some other time. We are the one's we've been waiting for. We are the change that we seek.
>
> *–Barack Obama*

How can we engage these issues and make effective, meaningful, and substantive change? Based on my own experiences early on in my education, I recommend studying and acknowledging the entire history of segregation, explicitly housing segregation in America. I also advocate for forums like this one, where we can discuss healthcare applications more broadly with our colleagues, clients, and friends so that we are all operating from the same baseline of data and information. I would also like to advocate for an accurate portrayal of the data as history in primary and secondary institutions and advocate for diversity training within the organizations based on more inclusion of people of color at the leadership level of organizations so that they can start to shape policy and strategy for that organization with their unique perspectives, their histories, their stories, and their hopes in mind.

Youth programs are another area that I would like to see greater emphasis on, as it is important to the development of young Black and Brown People of Color pre-college high school students to see Black and Brown people practicing the craft of architecture and working across healthcare disciplines. They need to find the field accessible to see themselves rising and continuing the work we are starting. I would also like to advocate for a change to the zoning policies in Chicago, particularly the practices in areas like Lincoln Park, where they maintain high home values, by creating policies that

exclude multi-family housing from being built in those areas. Also, restricting that at the legislative level ensures that no low or moderate-income people can move into their neighborhoods. So, in this arena, I want to advocate against those policies.

From a practice perspective, we can approach these challenges in some active ways. As architects, we use many robust tools, including standards and guidelines, to define the parameters of healthcare design. As part of the Facility Guidelines Institute (FGI) Codes and Standards committee, I think about healthcare and reference standards that architects incorporate into practice. One of my criticisms of the standards I have seen and been exposed to is that they don't consider communities and disenfranchisement. The standards start from a baseline that everyone perceives care institutions the same and has equal access to care. Our design tools need to be fine-tuned to focus on disparity.

One of the things that I have been advocating for in the space of standards for healthcare design is a more robust set of tools for the architectural community to reference that teaches us how to think and apply culturally sensitive, culturally aware practices and act with empathy and compassion when dealing with disenfranchised communities. Consider the real-world implications of the potential OCVID-19 solutions actively being utilized today. I have had clients contact me to ask if they should eliminate their waiting rooms and have all the patients wait in the car. My immediate reaction is what about the people who do not have a car to drive to their appointments? What about those who arrived by Uber or public transportation and were left outside the facility?

When we develop new solutions in the era post-COVID-19, we need to be aware of the impacts of what we recommend, consider the real-world implications for the people we are designing for, and encourage clients to incorporate and empower established community leaders. We can influence our clients; they often see us as thought leaders and people who can counsel them. One way to connect with the community is to advise and counsel our clients, invite community leaders to the table, and set up a community advisory board for a project they will engage in at every step. These practices are proven effective, especially when taken through to the later stages, like the post-occupancy inspection, ensuring the vested stake in the project remains and is presented as a bond between stakeholders in parity with the client. By advocating for these structural changes, we can counsel our clients to embrace population health tools that help access marginalized people when necessary.

Lastly, we need a level of sensitivity to recognize that we all come from different cultures with specialized expectations when we walk into a healthcare environment. As architects, we need to be sensitive and culturally aware of these expectations and the perceptions that drive them depending on the

community they serve. It is important to ensure that the client is also aware of these cultural sensitivities earlier in the design process to inform how we can apply them to healthcare in the age of COVID-19.

*Korydon Smith***:** I describe access in four ways to establish a philosophical entry into access and four different types at various scales. The first is to be able to provide access to decision-making. People are affected by policy decisions, design decisions, and decisions about where something will or won't be located. How do you provide people with a voice and access to the power to make those decisions, as those policy decisions drive healthcare? Access to the healthcare system, especially in the United States, is particularly complicated, and understanding and comprehending every piece of the system is one of the primary barriers to health equity. A third element is an access to space, physical design space. Whether interior or exterior, it is not just about the design of hospitals and clinics; it matters greatly and can impact people's health and wellbeing. It also provides access to transportation systems and recreational environments that all interconnect with health equity. Forward from these is access to self-actualization or access to positively influence one's health and wellbeing. Based on individual choices and considering how we design across the neurodiversity of the decision-making approach to physical space, self-actualization becomes more pertinent.

Promoting Emplacement

The first place I want to discuss is the Bidi Bidi Refugee Settlement in Uganda, which, as a little-known fact, is the world's largest refugee resettlement area. Within six months, Bidi Bidi went from a population of around 100 in rural Uganda to a city of over 250,000 people, the equivalent of becoming a city the size of the immediate downtown in Buffalo, New York. There are many lessons to be learned from Bidi Bidi, as South Sudanese refugees primarily populate it due to the conflicts in the region. It is also located close to the South Sudan border in a largely rural area, but unlike many other refugee settlements, it is not a refugee camp. It is a place where freedom of movement, access to healthcare and education, employment, and other culturally specific elements are allowed. Many of these freedoms are extended by the host country of Uganda.

It is also interesting because it brings together both the host and immigrant communities to increase the services provided. Therefore, the construction of schools and health clinics is meant to serve both communities. Another part of the intriguing synergies and the lesson learned here is how people are resettled and allowed to do self-built construction for their homes. The communities are given tools, not materials, to build traditional structures rather than some Western or Asian imports like you may encounter in other refugee areas. There is also a process of reconstruction, encouraging the concept of "in-placement" as opposed to displacement.

It is about reconstructing the sense of belonging for people who have been forcibly displaced. Through forced migration, people in the region lose not only their homes and the physical structure but also social networks, families, and several other things. The process of "in-placement" is re-establishing the sense of self-identity, of societal references, and both relative to the new space as a place in terms of the built environment.

Next, I would like to explore the informality represented by the traditional rural village of Lake Kivu/Idjwi Island, which sits between Rwanda and the Democratic Republic of Congo. There is a very low density of people due to the difficulty in accessing the island from the mainland. But again, this is a philosophical approach for us because anytime we are working with communities that are different from us and bring different cultural sensibilities, politics, and economics to the situation, how we approach collective problem-solving is critical to advancing outreach and engagement within research. I frequently consider this to be revealing the existing intelligence and elevating its capacity. Learning from the culture of the community, their approaches to life and daily circumstances, and how we pull out elements that provide a voice to a specific aspect in revealing the challenges of addressing rapid urbanization.

These factors can be particularly challenging in very dense urban informal settlements, especially when located on historic lands with heritage laws like those in Rwanda. In these places, because so little of the land is titled, the amount of internal migration to the country is just common practice, but because of population growth and the density of migration from surrounding countries, there is the reality of increased conflicts. New approaches must be considered, specifically regarding healthcare culture in these areas.

So often, when we think of the identifying factors of culture, we think about language, food, music, art forms, and others. I urge you to think about healthcare as a cultural artifact. Suppose we approach healthcare as a cultural artifact. In that case, we can appreciate the differences from one health system to the next, from one design for health to the next, and the differences in clinics that play out differently across cultural practices.

Steven Lewis: In my career, I've become a disaster chaser. I went to New Orleans after Katrina and to Birmingham,

> Alabama, after the tornado ripped from Tuscaloosa up, and I offered services to friends there. I went with George Miller to Haiti, who was AIA president at the time, and I was NOMA present. We went to Haiti after the earthquake. All of these places have something in common: the primary topic that we're discussing is access to healthcare, particularly the informal.

People who are in greatest need, who are adversely affected by demographics, and how these formal structures of health care favor the privileged, particularly here in the States.

It leaves us wondering and trying to understand how people without access to Western medicine infrastructure manage and what they do when that type of facility is introduced to give them that access. I think we have to unpack this on both sides of the equation, on the user side and the public side.

First, there's an issue of trust that goes to a dark history of the Carolina Eugenics programs, where Black women were being sterilized without their knowledge, or the Tuskegee syphilis experiments where people were being allowed to have syphilis so that government officials could measure the health outcomes without their knowledge. All of these are baked into the mind state of Black and Brown communities today, of underrepresented groups, and their unwillingness to accept or trust in a benefit like healthcare that might be brought to them.

The other issue brought up today is cultural sensitivity. I was working with Maurice Cox in Detroit, and he would often echo the proverb he attributes to South Africa. I am not sure whether it is from South Africa or not, but the notion is relative in Black communities: "Nothing about us, without us, is for us." And you can go all the way back to Fernando's discussion of the favela and how informal settlements of one sort or another, whether they're in a Pruitt Igoe Tower in the Midwest or whether they're in the US informal settlement in Cape Town, they are about communities and shared experience and shared knowledge and share cultural values.

Where does that leave us as design professionals? We have a desire, and we have needs to fulfill. But as a result of COVID-19, the covers have been pulled back, and now we're all seeing the inequities in our society. And there's a real groundswell of interest or compassion to make a change. It begins with meeting people where they are; as professionals, many of us have been working in our communities all of our careers. Whether that was the focus of our practices, where our friends were going, or where there was something we did after hours, there is some cultural competence if we look for a majority for which we've always enjoyed an obligation, a sense of connection to our communities, and want to be helped. So we as design professionals have certain agencies we operate within, realms where we have the expertise that first

starts with an understanding. There's no better way to understand conditions than witnessing them firsthand. Those are quite different from the places we live in, and with that comes a firsthand connection. That connection produces an understanding of empathy, compassion, and a real drive, knowing that there are things that are so much greater and bigger than any of us as individuals. They deserve and warrant our full attention.

Humans are resilient, if nothing else. Although mortality statistics may be much worse in these places, these places—and the people in them—continue to exist. As evident in the intersection of goodwill and science, helping communities in need is at the root of listening to and learning from the environment in which we operate. If we center our practices on that, to either expand it or change it to a more righteous path and to take all of the skills that we possess to become voices and advocates not only through the influence of the work we do but also through the influence of our colleagues to bring them along in this journey to put us as architects and designers in a more powerful position to influence the world through these projects. Then, we will put our minds and hearts together to make good use of them to make fundamental changes to improve the world we share and live within.

10

CONCLUSIVE ENFRANCHISEMENT[1]

Ulysses Sean Vance[2]

In architecture, accessible design may entail the removal of barriers, natural elements, or spaces so that something new may take their place. However, in transcending compliance with a progressive approach, it is critical not to disregard diversity to favor physical reinterpretations, as the cultural significance of space flourishes from the broadest of a spectrum, particularly those associated with vulnerable populations.[3] As a spectrum, these include the economically disadvantaged, the socially disadvantaged, and the sick or terminally ill; they can also tend to be associated with other minority groups, including those identified by race, ethnicity, and previous institutionalization, all of whom are frequently marginalized from participating in the design and planning process. When architectural practices involve rather than removing the spectrum by genuinely engaging these populations, the result shatters exclusion, and the marginalized practices that have inhibited are inverted, introducing true inclusivity to the designed environment.[4]

For example, state-of-the-art accessibility features can be incorporated into designing new facilities around the combination of particular facets of disability. Creating genuinely inclusive, accessible venues with people based on the difference means moving beyond any standardized architectural concerns.[5] It involves a willingness to experience the daily lives in these spaces from someone else's perspective. It demands culturally embracing the full educational day, feeling the fabric of another life as one that parallels the designers, and being receptive to support these experiences. Collaborating within a participatory process involves the whole capacity of the community to inform the design process and not limit who can relate to or engage in a more informed conversation as a single person alone. These types of involvement are suitable for complex topics like health and families, as the definition of these terms

DOI: 10.4324/9781003535768-11

is beyond the administration and the educators, and recognizing the agency and the expertise of each individual who occupies the role of a caregiver, from the youngest child to the most experienced professional, offers something unique to the definition. To achieve this level of informed communication with any community requires considering the broader cultural contexts in which the design project exists, its territories, situations, and facilities, as well as working to emphasize and value the feedback of everyone touched by the designed space and the experience of living and working within it.

Collaboration Is Healthy

In pursuing architectural research, it is crucial to remember that people both contribute to and benefit from inquiry. Recognizing that reciprocity allows the design process to evolve within an approach that is often didactic and pedagogically challenging to address amongst systemic biases perpetuating inequality. Such an environment gains its shape from the perception that a mere place at the table quantifies inclusion, mainly when the designed elements are exponentially applied to multiple settings, as in housing and healthcare, rather than the result of genuine inclusivity. Pedagogical platforms in architectural education frequently emphasize individual achievement and competition, and these agendas promote extractive behaviors as student work prioritizes appeasing requirements often over personal success and learning to listen to one another holistically in advancing their sense for a collaborative process about growth and ethical considerations. These environments reward individual performance through grades, accolades, and recognition, creating a competitive atmosphere that can stifle creativity and discourage teamwork. Additionally, these environments often isolate students from the broader community, limiting their exposure to diverse perspectives and real-world challenges. This isolation can result in designs that are disconnected from the needs and values of the people they are intended to serve.[6]

In contrast, pedagogical approaches prioritizing collaboration encourage students to work together and engage with external communities. These environments foster a culture of mutual support and collective problem-solving, emphasizing the importance of diverse perspectives and shared knowledge. By working collaboratively, students can develop a deeper understanding of their designs' social and ethical implications, moving beyond the limitations of individual achievement. Students can develop a more holistic understanding of design challenges and solutions by collaborating with peers and community members and engaging with people outside their academic circles, which prompts students to reflect on the value and impact of their ideas. These reflective practices born from collaboration help them appreciate their work in a social setting, fostering a discussion about a responsible and inclusive

approach to design. When students are placed in situations where they must engage with people outside their class circle, they are compelled to reflect on the value and benefits of their ideas. This engagement often begins with understanding the community's needs, challenges, and aspirations, building their capacity to learn, listen actively, empathize with different perspectives, and appreciate the complexities of real-world problems.

Working with community members to implement design ideas can be a transformative experience for everyone in the design process. It shifts the perception from seeing a design solution as abstract or detached concepts to understanding them as tangible solutions that impact real lives. The process of collaboration and implementation also helps all parties recognize the importance of accountability, responsibility, and ethical practice in their work. Similarly, reinforcing the collaborative agreement to remain active with a community can significantly alter the perceptions of who is invariably the client or the designer and who is responsible for its continued success beyond the project's realization. When design teams work closely with community members, they see themselves as partners rather than distant experts. This shift in perception is crucial for developing a more inclusive and empathetic approach to design.

Engagement Is Pedagogy

Ultimately, inclusive design is a call to transcend the superficial markers of accessibility and engage in a deeper, more authentic practice of inclusion via direct encounters with those to be served by design. In working with spaces as devices, it was necessary to develop a pedagogical approach to direct participants toward a critical juncture between the intellectual capital of a medical network and the spatial expertise they have built thus far as students in architecture. The research criteria for this approach address healthcare instrumentation that reads, images, works on, and displays pertinent information and what methods may achieve those ends. In doing this work, collaborators must address the capacity for disciplinary vocabulary to be translated into architectural metrics. The importance of this exercise is in how the lexicon creates the design framework, and it is unique to each project in developing a core of instructional knowledge that allows participants to communicate across disciplinary boundaries and thereby facilitate a direct correlation between material design analysis and occupational functionality. Recrafting these conceptual devices establishes the space as a device. It seeks new vehicles for studying spaces, particularly medical spaces, through equipment as an informal link between the healthcare provider, patient, and designer. The intent in future applications of the framework is that it serves as an executable research approach to work collaboratively and includes developing knowledge of healthcare services and devices unique to each project,

encompassing sanitation, distribution, and engagement. The goals direct the studio's endeavors:

1 *To understand sanitation, distribution, and engagement systems through drawing exercises using anatomical units of measurement based on the body's functions.*
2 *Utilize critical analysis tools to explain the interdependence of human figures and their surroundings during medical procedures and create environments that support discussions of inclusive health innovations.*
3 *To disrupt current practices (which favor closed-loop directives for patient care) by establishing equitable civic wellness goals through inquiry and engagement with providers and patients utilizing games that feature sight, sound, and motion exercises.*

These investigatory exercises also aid the research team in developing a practical understanding of the systems required to resolve a theoretical proposition in architecture. After completing these exercises, the work incorporates an analysis of case studies investigating the functions of building systems supporting sanitation, distribution, and engagement between provider and patient. The case studies prompt discussions about physical accessibility and challenge students to compare and contrast social space characteristics through objectively measuring encounters and activities within a physical space. As a result, the research materials include a body of work that contrasts physical access against physical ability, situating it within broader territorial constraints and contextual agency. These comparisons form the basis for discussing physical limitations of personal independence in different types of domestic and occupational space, as well as for comprehending a similar contrast, at the urban scale, between cognitive ability and cognitive access, that is, for gaining a spatial comprehension of depth, distance, and direction. The research also encourages addressing the ethics of exclusionary privacy in contemporary healthcare settings and the historical biases that have generated barriers to care, translating design equity into architectural elements for medical institutions adjacent to an urban corridor or into public spaces that could be sites for distributing healthcare services.

Practicing design ethically means adhering to integrity, respect, and responsibility during the collaborative process and other design principles. It involves recognizing and valuing the contributions of everyone involved and is grounded in the belief that architecture should serve the public good and contribute positively to society. This requires a commitment to transparency, inclusivity, and equity in all aspects of the design process. To prevent extractive behaviors in architectural practice, fostering a community-centered approach that emphasizes genuine engagement and collaboration is essential. One effective strategy is to prioritize cultural competency and sensitivity

in architectural practice. Pursuing this involves understanding and respecting the cultural contexts of the communities we work with and ensuring that our designs are informed by their unique histories, traditions, and artistic expressions. By embracing cultural diversity, architects can create functional spaces that resonate deeply with the people who use them.

Collaborating with local artists, craftspeople, and cultural organizations can also help prevent extractive behaviors. These partnerships provide opportunities for mutual learning and exchange, allowing architects to draw on the community's rich cultural resources while contributing their expertise. By working together, architects and community members can co-create innovative and culturally meaningful designs. A trusted advisor empowers future community participation and requires a commitment to ongoing education and professional development. Architects must stay informed about the latest research and best practices in community engagement, cultural competency, and ethical design. Implementing these goals requires tracking community participation in design processes, assessing the cultural relevance and inclusivity of completed projects, and evaluating the impact of designs on community well-being. These metrics can provide valuable feedback for architects and help ensure that their work remains aligned with the communities' needs and values, transforming the design industry through these strategies and building a more just and equitable future.

Conclusion

Instead of practicing architectural extraction by foisting professional solutions onto an anonymous public of people with physical and intellectual disabilities or differences, engaging in genuine inclusive design practice should aim to plant the actual needs and experiences of particular communities, such as children with disabilities and differences into the context of their lives and education. This means engaging vulnerable populations directly in meaningful, participatory ways beyond primary perfunctory consultations. It involves understanding or even experiencing their daily challenges, exchanges, and aspirations firsthand and learning about how they interact with their environments. By actively involving the community in decision-making, architects and designers can ensure that the solutions they develop are functional and deeply resonate with the lived experiences of those their work is meant to serve.[7]

It is invaluable not only to seek out and collaborate with disability advocates and researchers who can provide valuable insights and perspectives but also, more importantly, to include within the design team people whose firsthand experiences will directly inform the process. Practically, this might mean conducting focus groups and workshops with vulnerable communities. It may also include visiting their homes and schools, engaging with them in

the spaces that inform the project, answering fundamental questions about prototype solutions, and gathering feedback before making any adjustments to the designed spaces.

Ultimately, genuine inclusive design aims to create welcoming and empowering environments for the individuals in which they are designed. Active, inclusive design work might also involve advocating for policy changes that support more inclusive practices. Architects' involvement in raising awareness about the importance of non-extractive inclusive design to clients, colleagues, and the wider community is fundamental for rethinking the role and agency of design, moving away from a focus on compliance and accommodation and toward a model of practice that is deeply rooted in empathy, respect, and collaboration. In doing so, we will fulfill our ethical obligations and enrich our built environment, making it a more inclusive, equitable, and vibrant place for everyone.

Notes

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APPENDIX

Affordance Studies

Ulysses Sean Vance

The positions established in this book result from interrogating accessibility in three capacities: as displacements from an instance determined by motility, using mobility to inform affordances within a given area, and as instances of the interface during an activity based on reach and range of motion. The purpose of these interrogations of kinematics is to apply the findings from visual assessments to interactions with select building elements as a study into the plausibility of architectural elements in promoting physical behaviors. The work prioritizes digital tools in architectural practice to interrogate inclusive design concepts and has pursued a multidisciplinary approach to research, scholarship, and creative practice. It focuses on the functional aspects and physical characteristics of body systems related to building design. Collaborating with researchers and practitioners from diverse fields, the work explores through spatial practices how interactions can inform the design of human-occupied spaces, documenting the altering of walls and arrangement of passages in modifying the spatial characteristics of the built environment to promote physical activity as a key element of health and wellness.

Through continuous engagement with experts outside the design discipline, the research critically analyzes the architectural element's similarities with assistive systems, provisions for medical staff during hazardous procedures, and environmental filters supporting transitions between activities and changes in the movement pattern through spaces. These analyses are framed through the lens of the body's range of motion and motility, conceptualized as a syntactical narrative that defines clearance as a unit of architectural measurement. Research initiatives resulting from these prior studies are emphasized in this book as a discourse on equity and inclusion informed by these understandings of physical activity. The work in this appendix manipulates surface orientations to optimize physical engagement, investigates material

challenges for interactivity, and studies these informed design decisions across building types to establish new agendas for occupational activities and engagements in health-related disciplines. Data visualization plays a crucial role in objectively defining body movements within specific environments, enabling the evaluation of narratives related to walls, floors, and apertures. These visualizations, supported by anthropometric analytical drawings, serve as a foundation for exploring architectural technologies. Solutions are tested across scales—from building elements as play devices and rooms as immersive realities to buildings as complex networks—through simulations, fabrications, and communications between passive and active systems. The presence of playfulness in these studies further enriches the efforts of inviting critique through the use of the building as a proposed technology.

Understanding Movements

Physical activity, which is essential for maintaining a healthy condition, is often non-parallel, particularly in the curriculum of early adolescent education. Isolated to recess and gym class or as separate extra-curricular activities, its metrics tend to be behavioral and external to cognitive activities. The research studies are the findings from hybrid computer-aided visualization and simulation tools used to define adequate space for adolescent physical activity in the classroom. The findings both develop the hybrid digital systems that map geographies of movement in adolescent bodies and work to facilitate an understanding of physical activity as an ecology.

Central to this research is the drawn documentation of motion capture movement derived from a compendium of activities selected to be pursued by adolescent children in the classroom near their desks. The architect gains insight into disciplinary perceptions of shared problems by listening to the challenges within their fields. These insights are translated into architectural investigations that illustrate human body size, shape, and ability diversity through simulations that visually reference a vocabulary tailored to various exertion levels. This process reinforces the architect's contribution to creating a healthier built environment by codifying the physical deviation in the activities from a standing or seated position to foster a dialogue between spatial design as a practice and spatial implementation of wellness for the broader health-focused field.

The study utilized a Microsoft Xbox Kinect, equipped with a three-camera system, to record and analyze individual and group skeletal movements. This technology proved effective in capturing a wide range of motions categorized by intensity: low (seated or resting), medium (stretching or light walking), and high (climbing, jumping, running). Initial simulations highlighted that puppeteer-based models significantly enhanced the precision of tracking and evaluating motion ranges across physiologically diverse groups, outperforming traditional methods. The analog approach, relying on manual spatial measurements of video-recorded data, served as a control but lacked the accuracy of the

puppeteer simulations. Moreover, these findings were contextualized within an analysis of current classroom layouts, exploring how transitional activity zones could redefine the boundaries between work and learning spaces. These early insights lay the groundwork for reimagining spatial configurations that integrate movement as a fundamental element of educational environments.[1]

Question:

1 What are the maximum displacements from a centered location during a specified physical activity based on the deviation from a standing or seated position?

Methods:

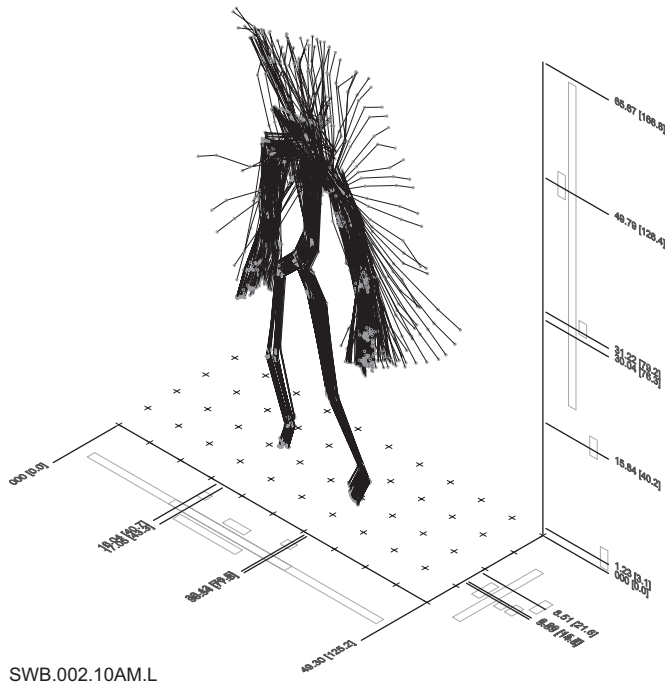
1 Determine a taxonomy of current exercises applicable to in-class activity breaks.
2 Derive a means of motion capture using current spatial design tools.
3 Document the displacements and determine the adequate area per child during each activity.

Figures 11.1–11.66 are visual documentation of displacement during specific exercises selected from a compendium of activities to measure the range of motion associated with an activity. The exercise for each visualization and the level of activity are described in each image caption.

Understanding Affordances

As part of an ongoing study intervening sedentary classroom activities with physical activity, this comparative study of work zone versus activity zone per child engages in a "tug-of-war" with administrative and building safety policies that influence classroom conditions when facilitating these activities with an increased density of children. Isolated to operating within the confines of a single classroom, the work utilizes scanning and simulation methodologies to exact the displacement of persons and furniture during transitions between learning activities and a compendium of physical activities, measuring disparities in access and orchestrating the room interventions.

The research is an exacting of the differences between proving measurement and the effectiveness of measures, which are confounded when addressing activities in spatially limited situations. Our first paper in this series maintained that physical activity is essential for maintaining a healthy condition and that throughout early adolescent education, there is a need for stressing extra-curricular physical activities to manage behavior-related stress in classroom conditions.[2] These acts of spatializing health are similar to the goals of the proceeding hypotheses on the model mechanisms of the classroom environment and how issues of crowding in these conditions inhibit the student's ability to self-regulate their behavior as a symptom of the furniture type,



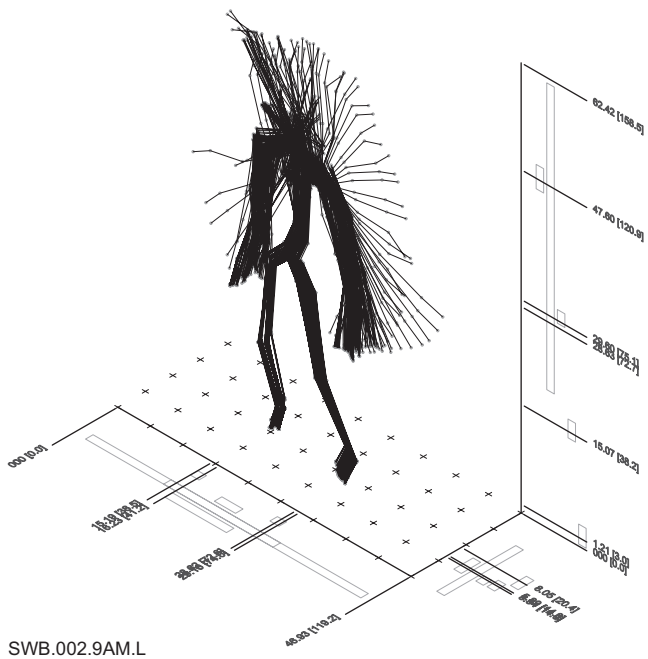


FIGURE 11.1 Side Waist Bends (SWB) Low

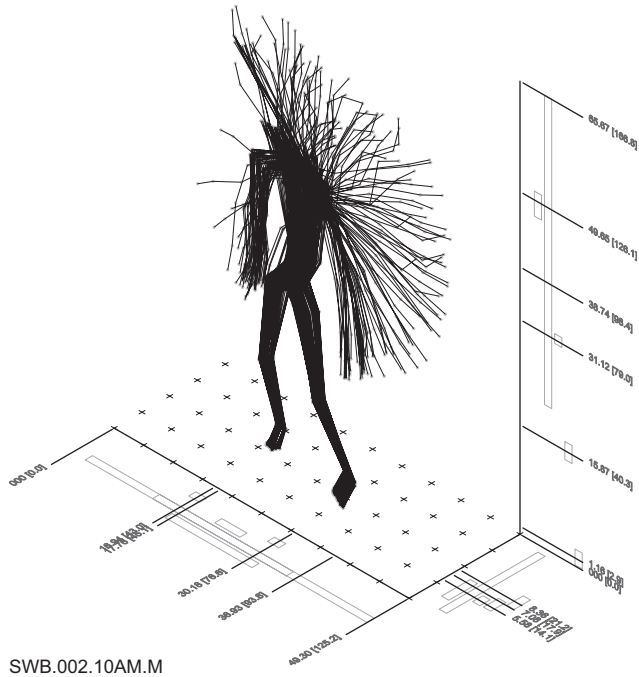
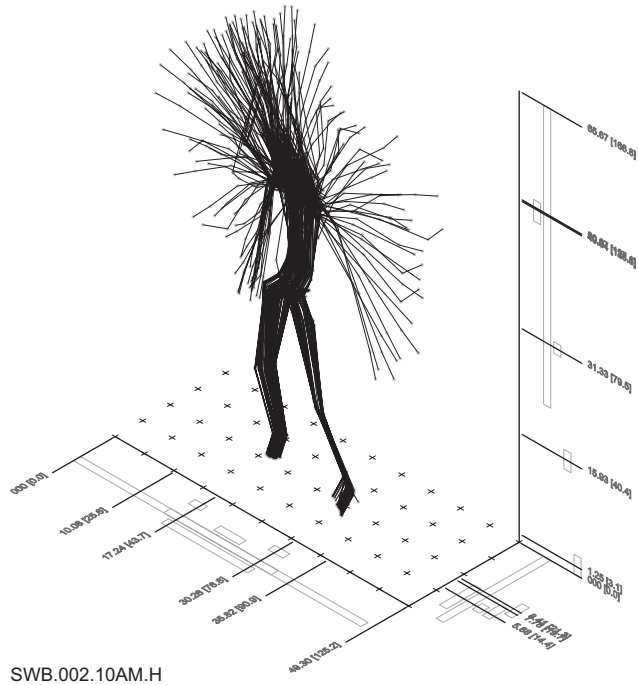


FIGURE 11.2 Side Waist Bends (SWB) Moderate



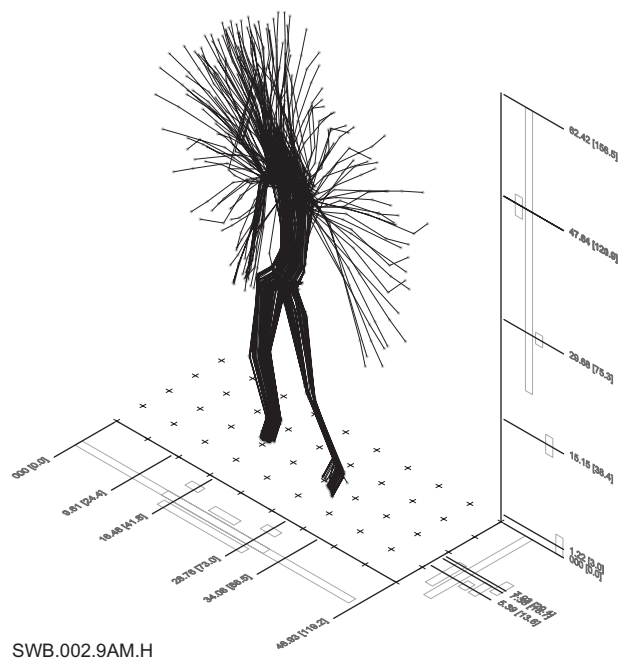
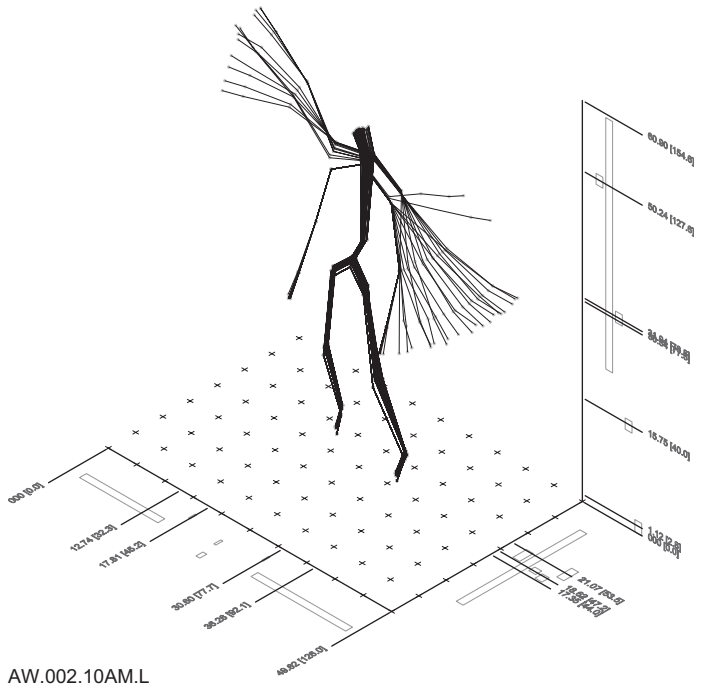


FIGURE 11.3 Side Waist Bends (SWB) High



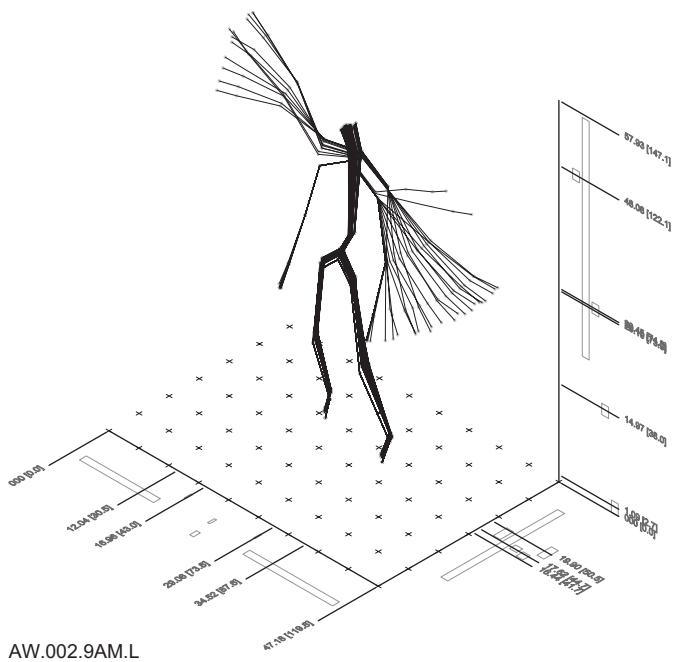


FIGURE 11.4 Arm Windmills (AW) Low

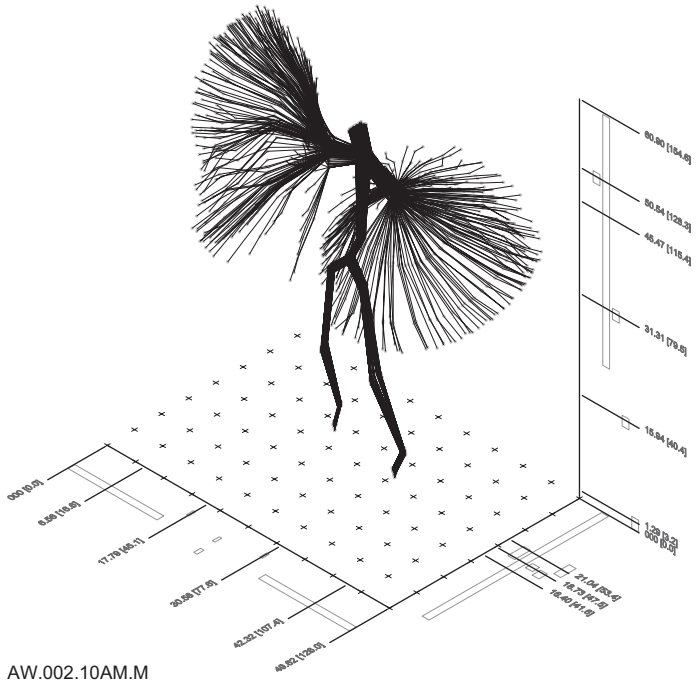
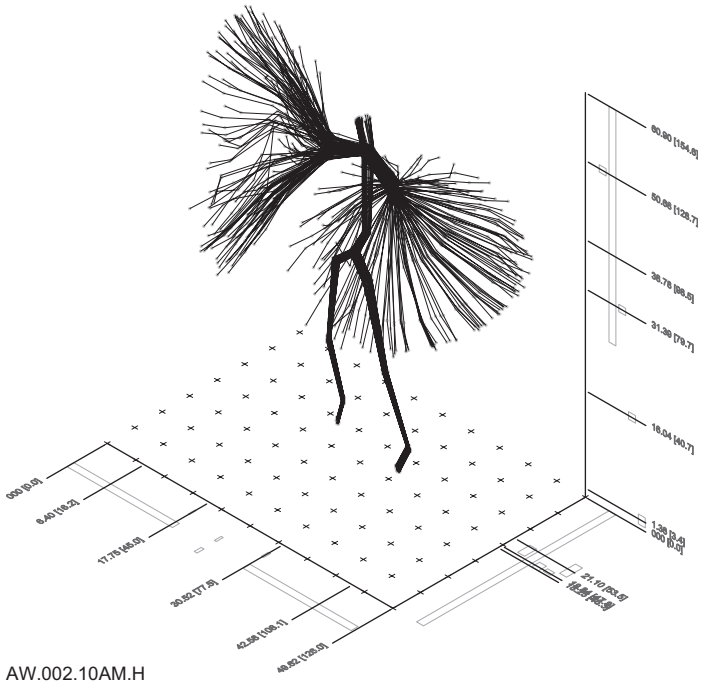


FIGURE 11.5 Arm Windmills (AW) Moderate



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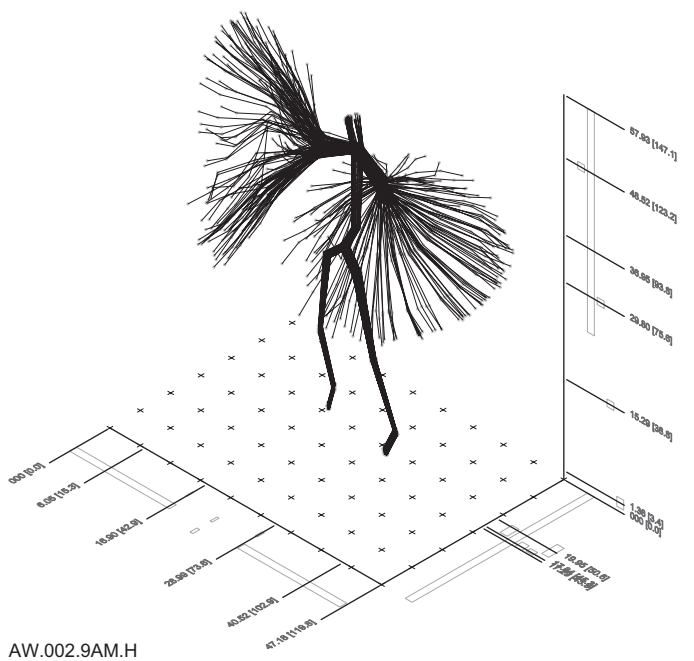


AW.002.9AM.H

FIGURE 11.6 Arm Windmills (AW) High

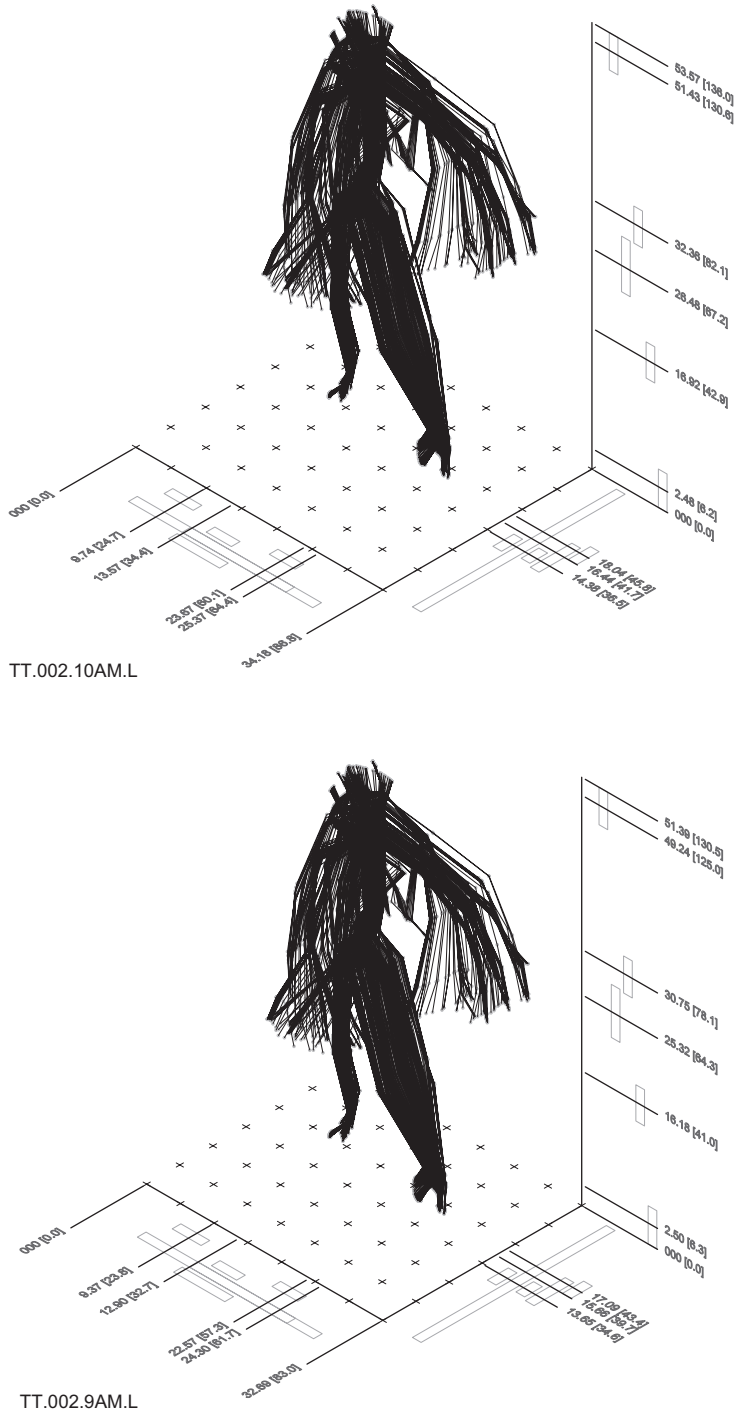
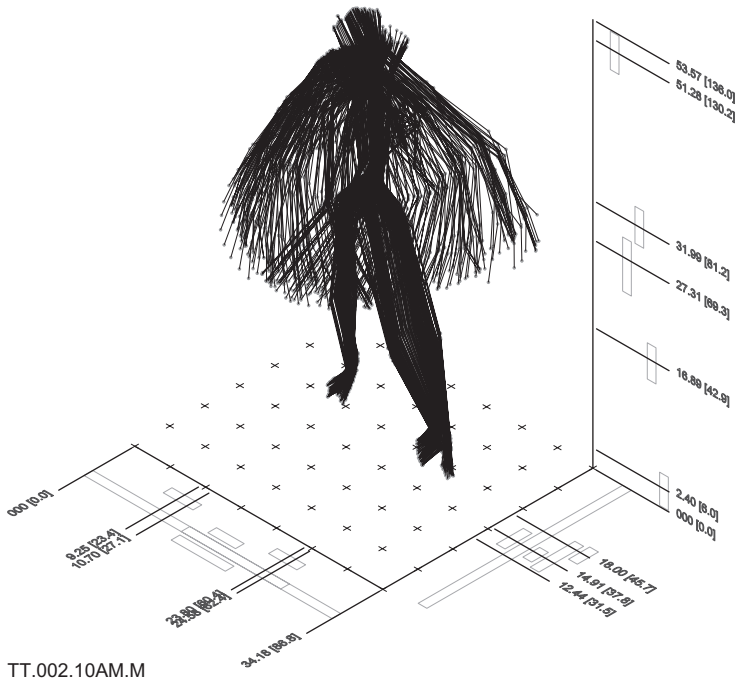


FIGURE 11.7 Trunk Twists (TT) Low



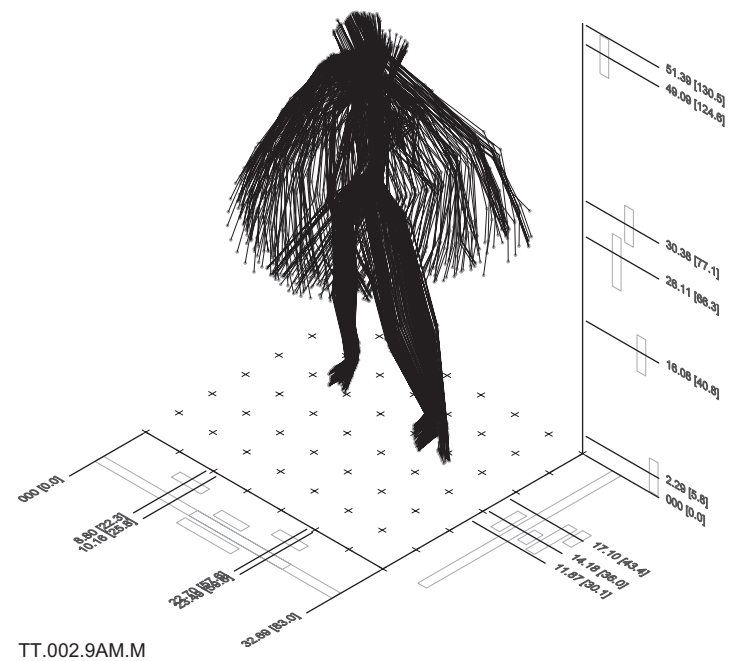
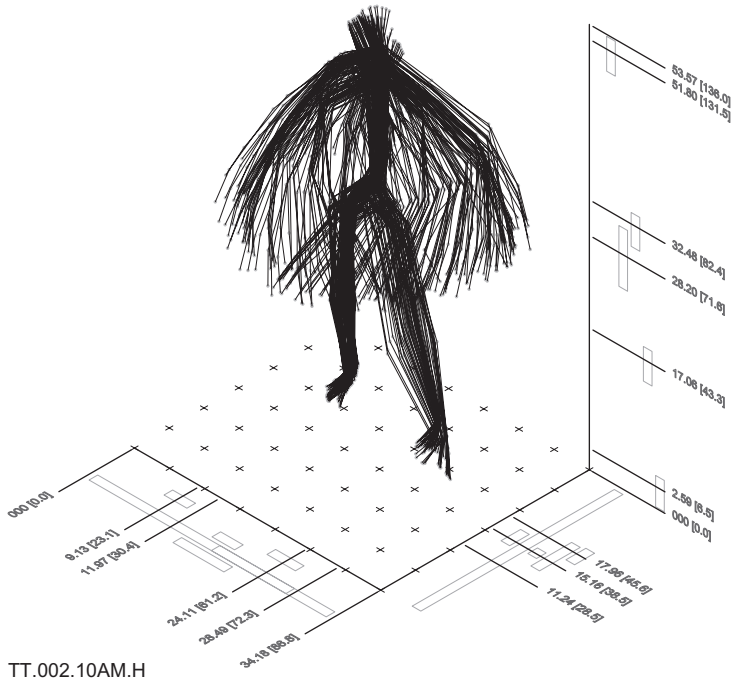


FIGURE 11.8 Trunk Twists (TT) Moderate



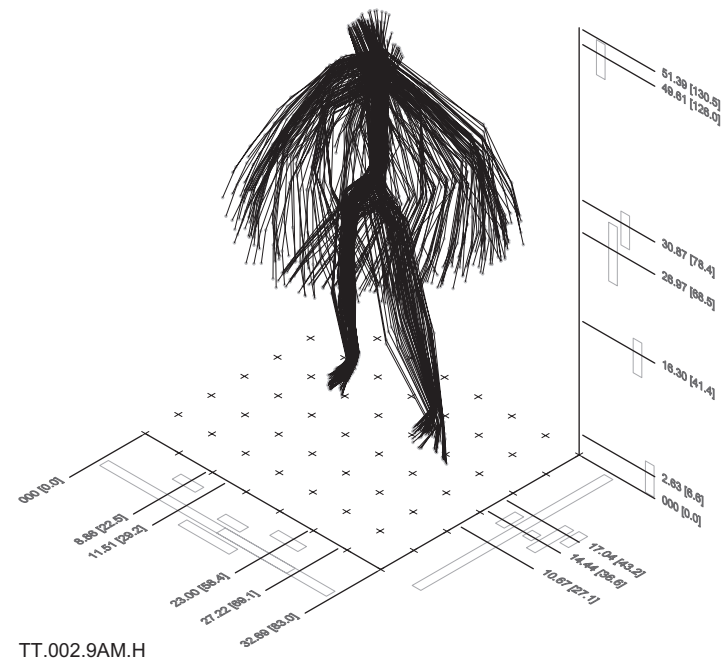
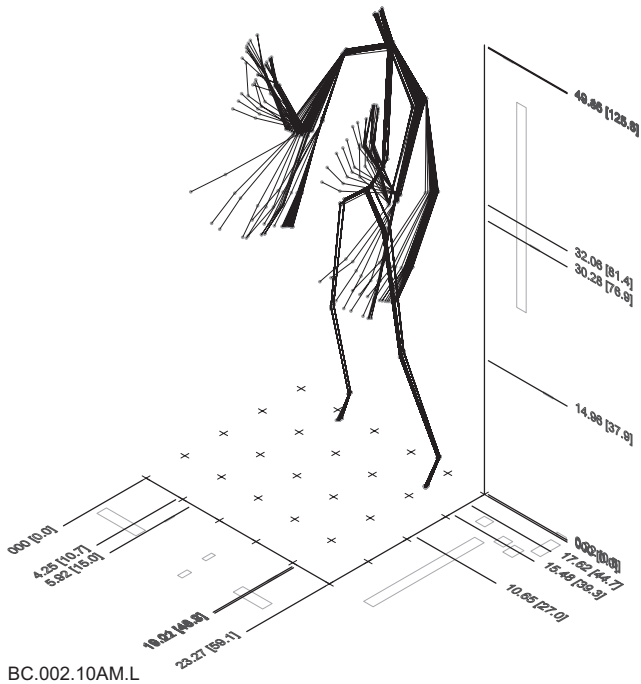


FIGURE 11.9 Trunk Twists (TT) High



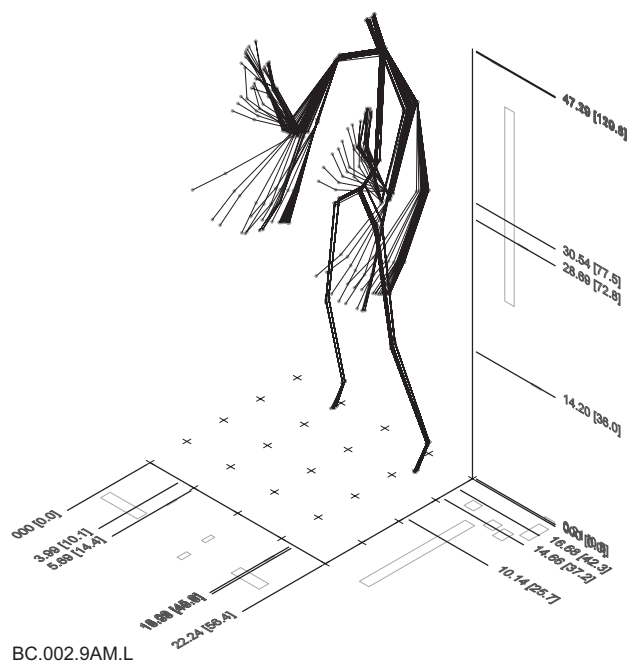
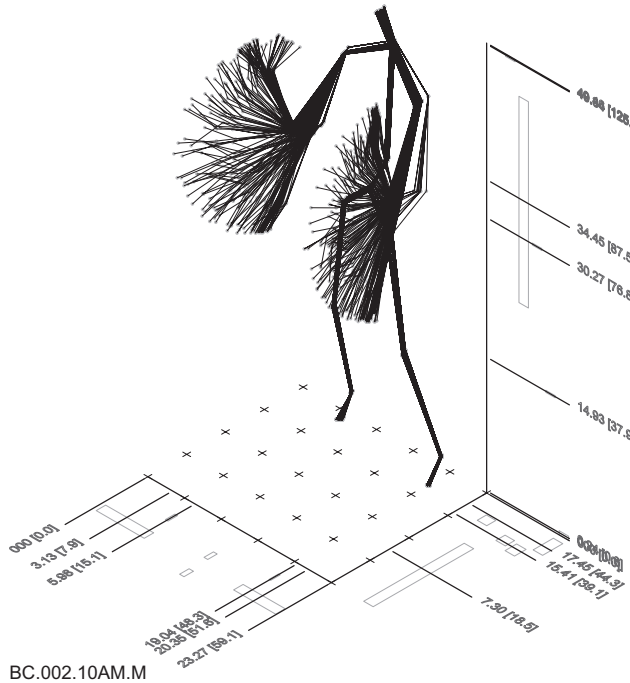


FIGURE 11.10 Bicep Curls (BC) Low



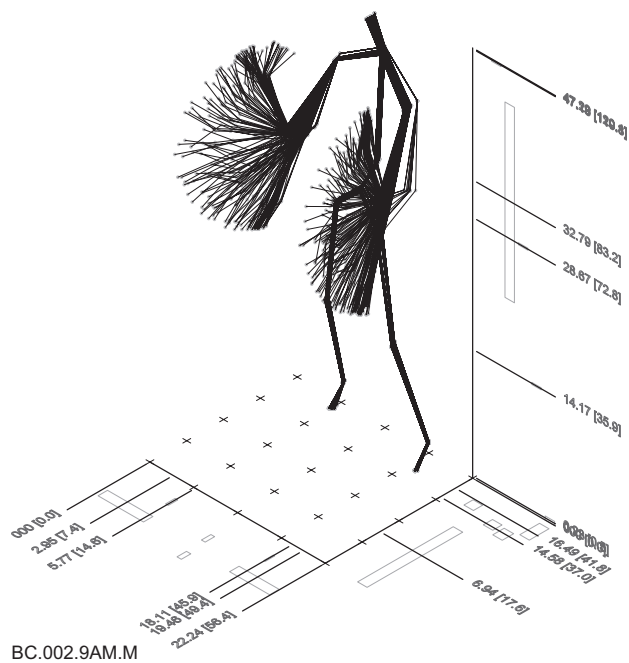
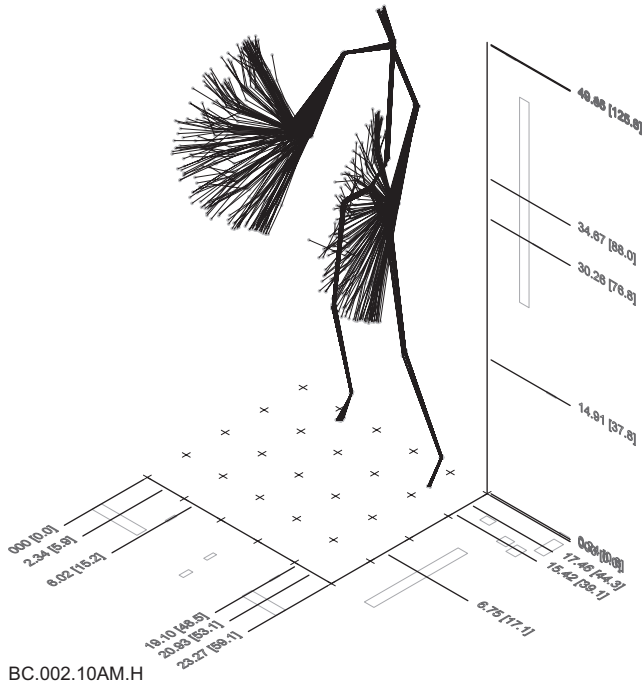


FIGURE 11.11 Bicep Curls (BC) Moderate



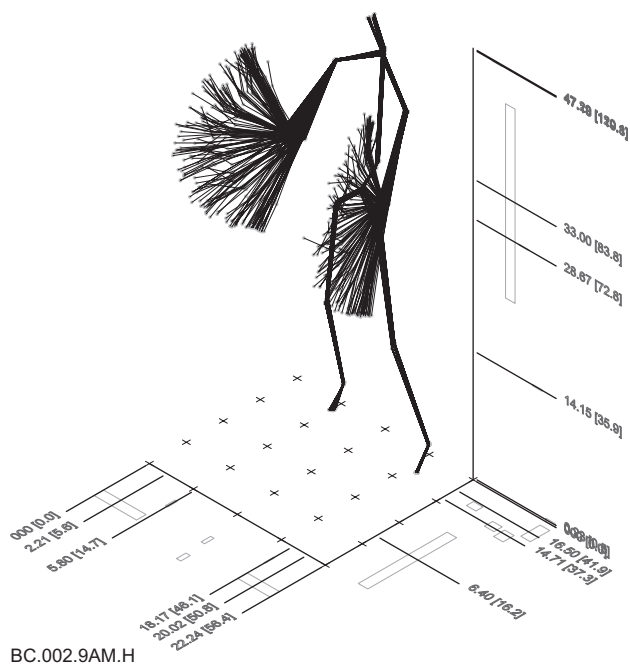
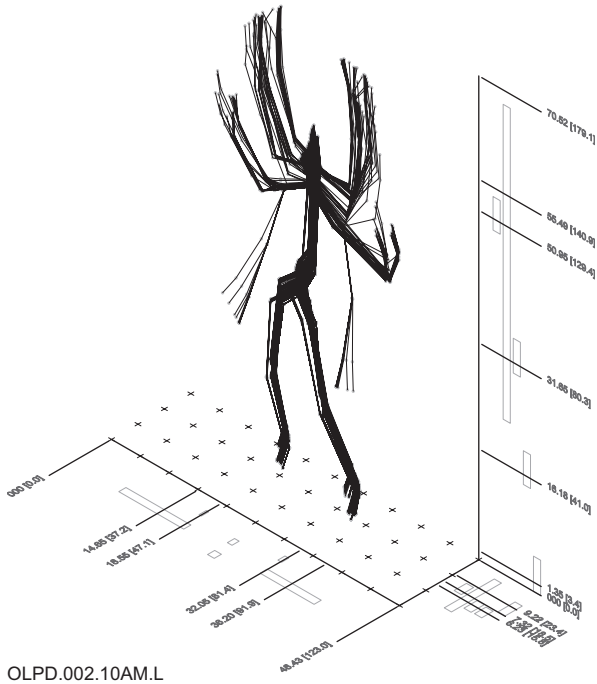
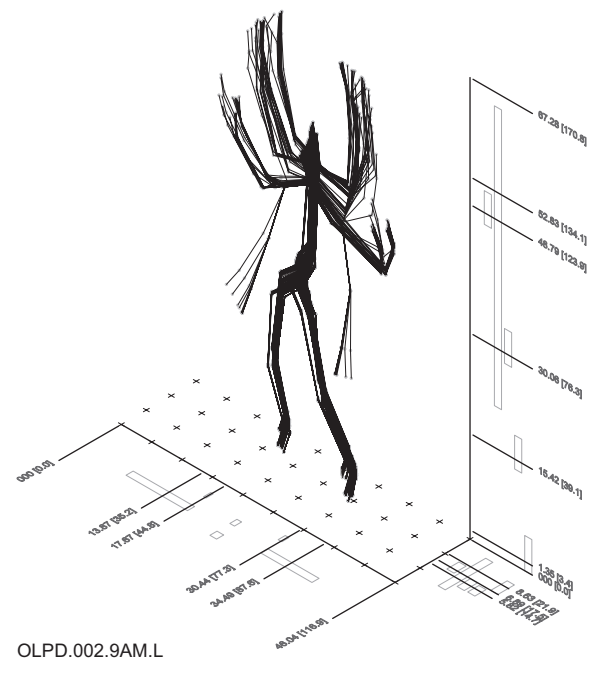


FIGURE 11.12 Bicep Curls (BC) High

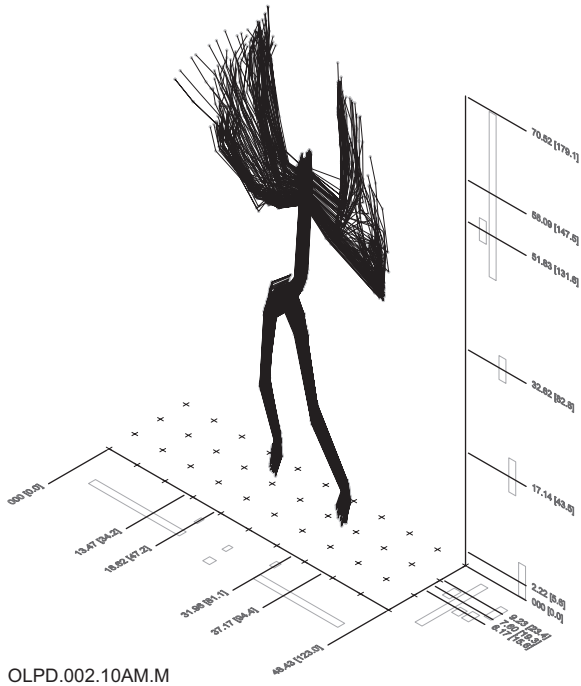


OLPD.002.10AM.L



OLPD.002.9AM.L

FIGURE 11.13 Overhead Lat Pull Down (OLPD) Low



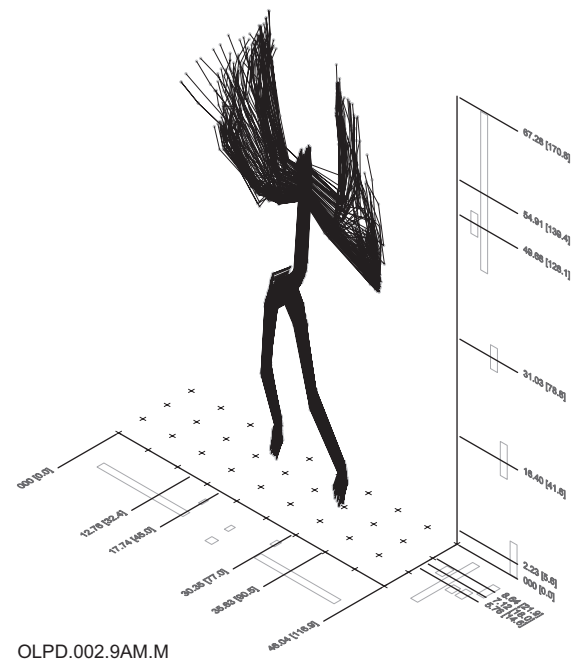
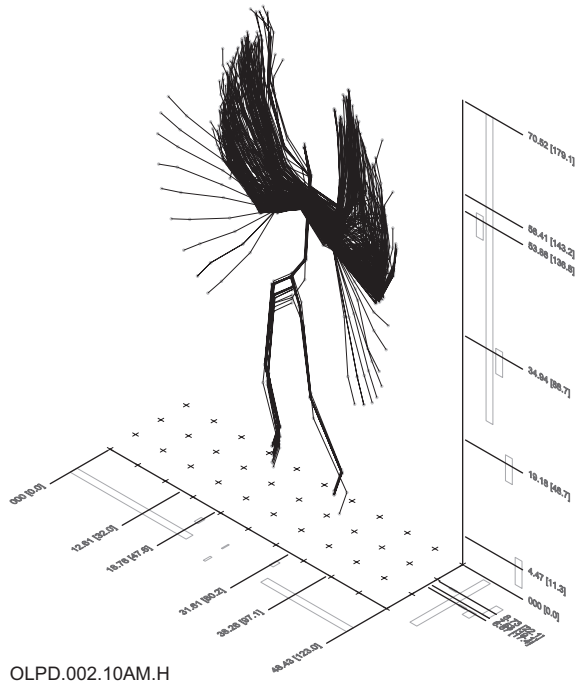


FIGURE 11.14 Overhead Lat Pull Down (OLPD) Moderate



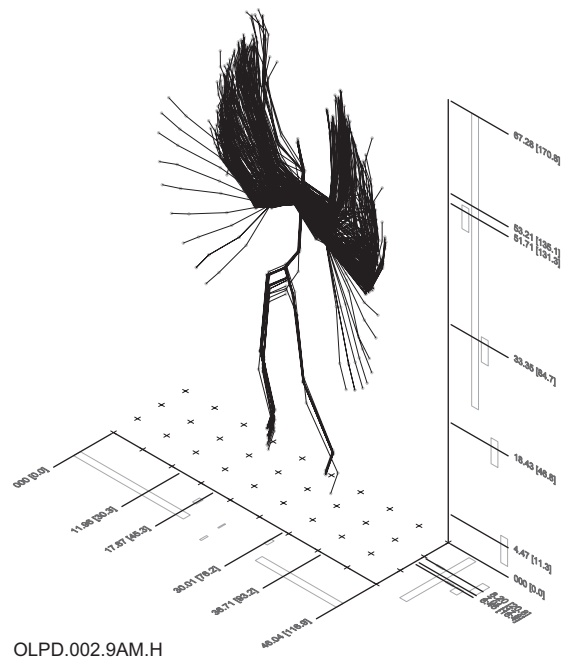


FIGURE 11.15 Overhead Lat Pull Down (OLPD) High

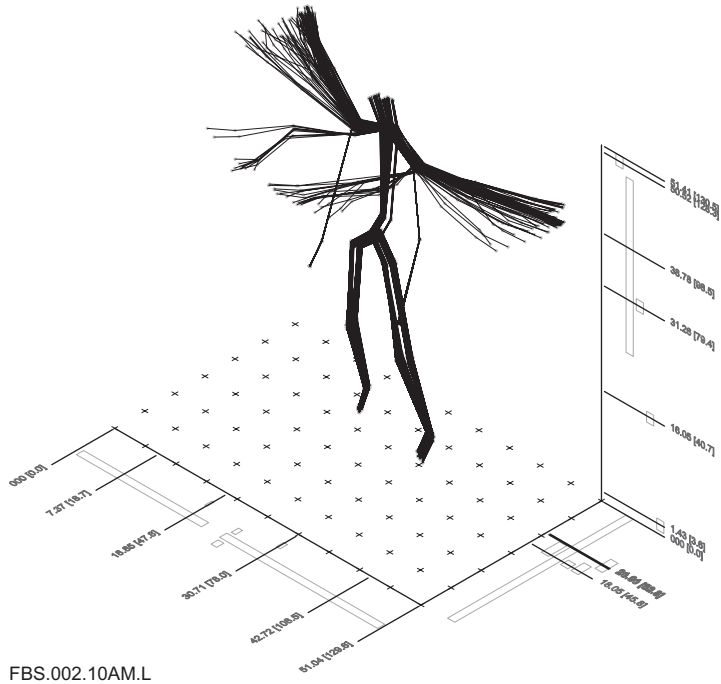
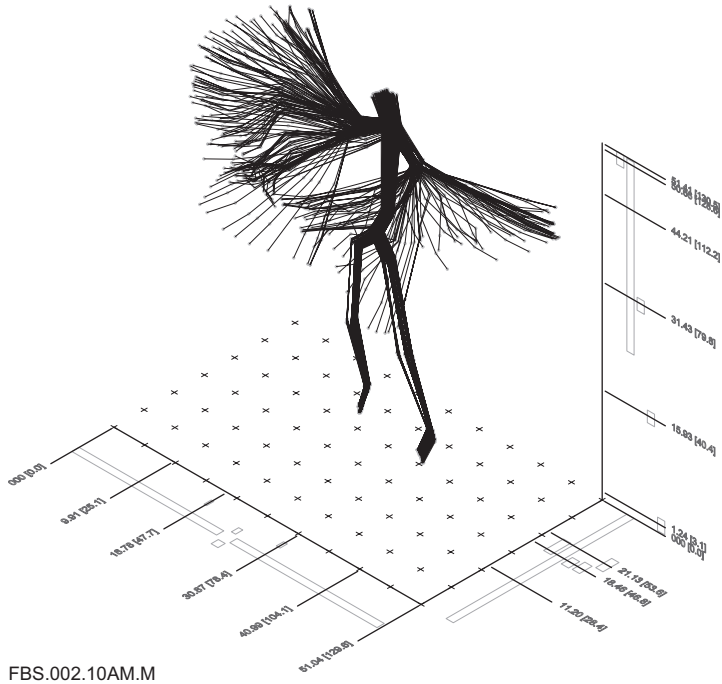
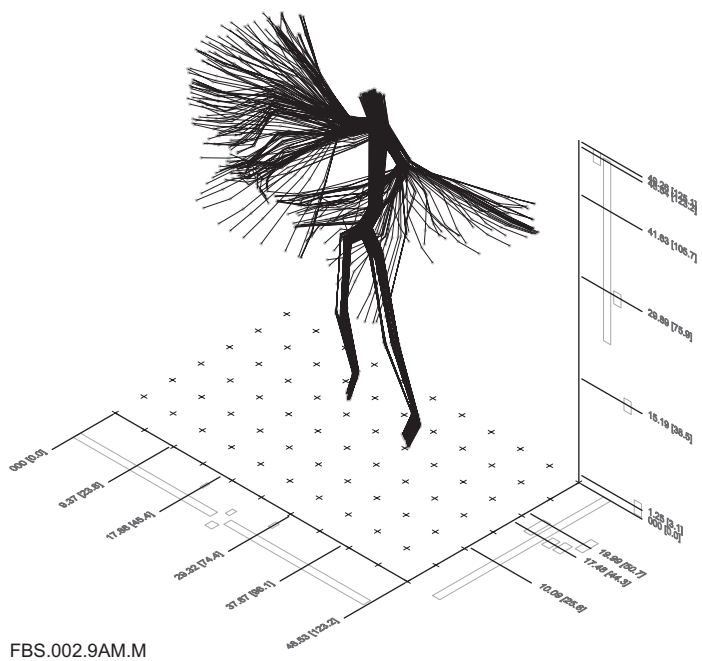


FIGURE 11.16 Forward Band Stretch (FBS) Low

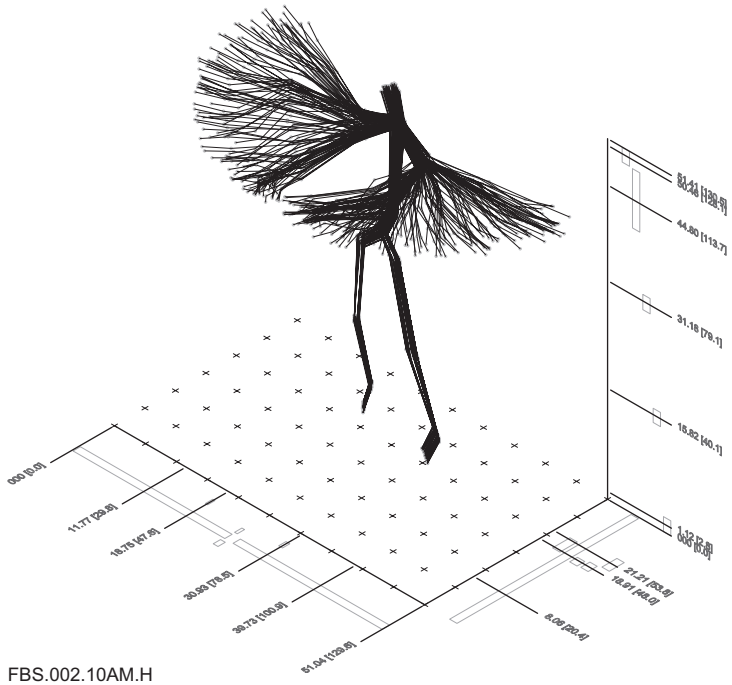


FBS.002.10AM.M



FBS.002.9AM.M

FIGURE 11.17 Forward Band Stretch (FBS) Moderate



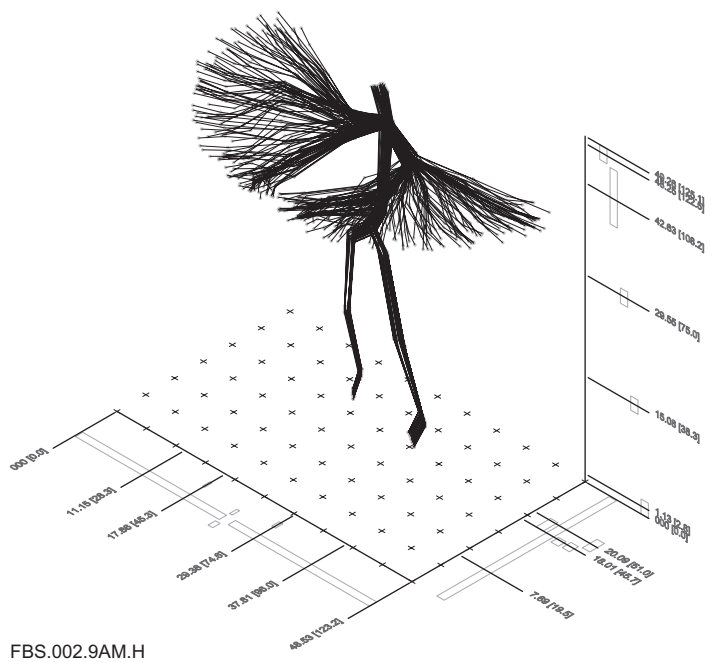
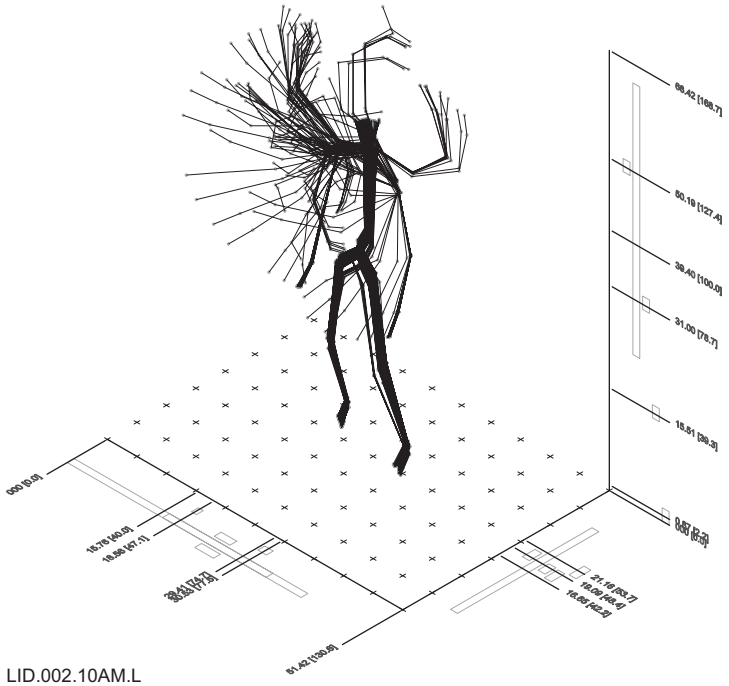


FIGURE 11.18 Forward Band Stretch (FBS) High



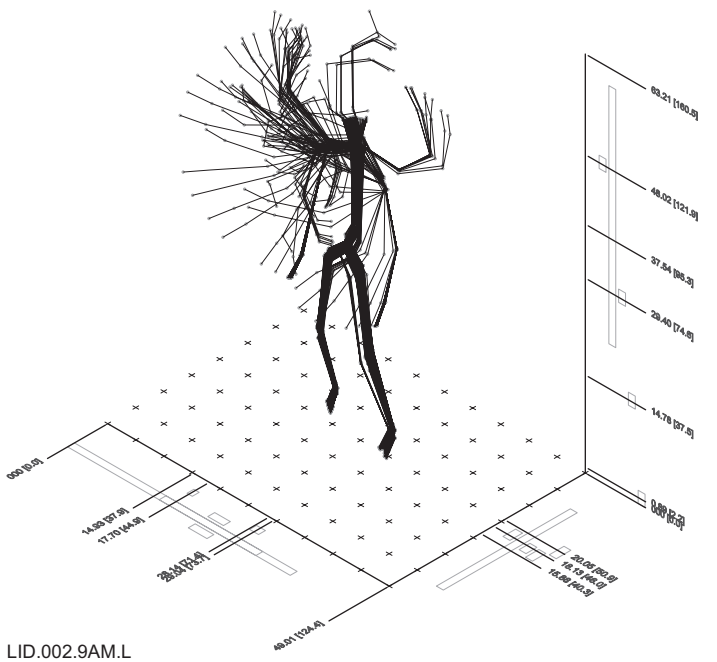
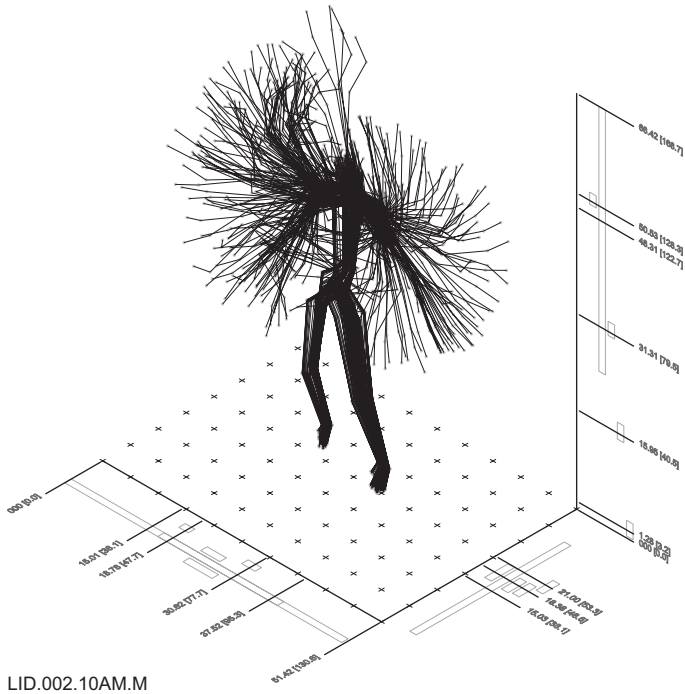


FIGURE 11.19 Low-Intensity Dancing (LID) Low



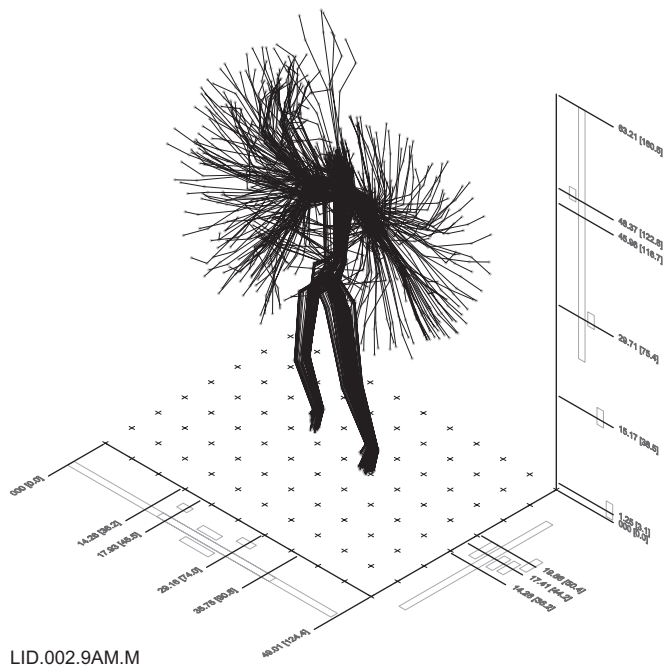
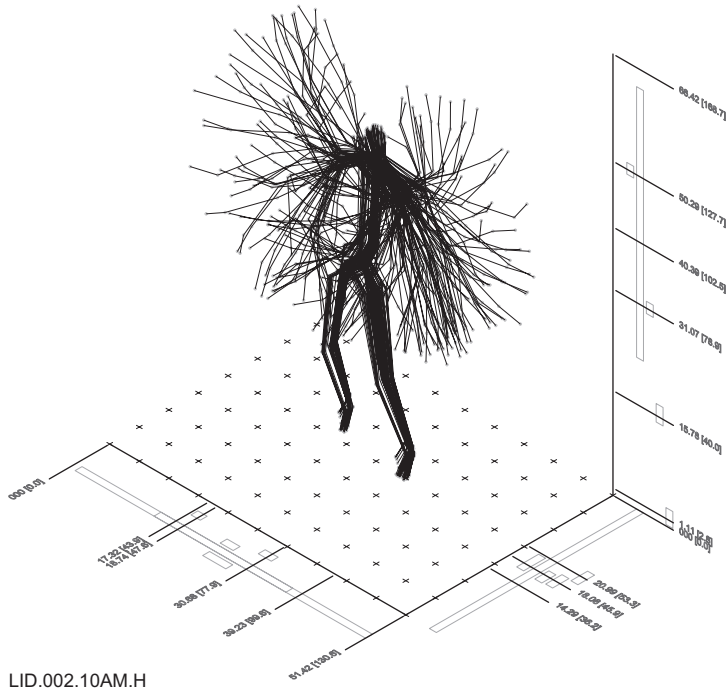


FIGURE 11.20 Low-Intensity Dancing (LID) Moderate



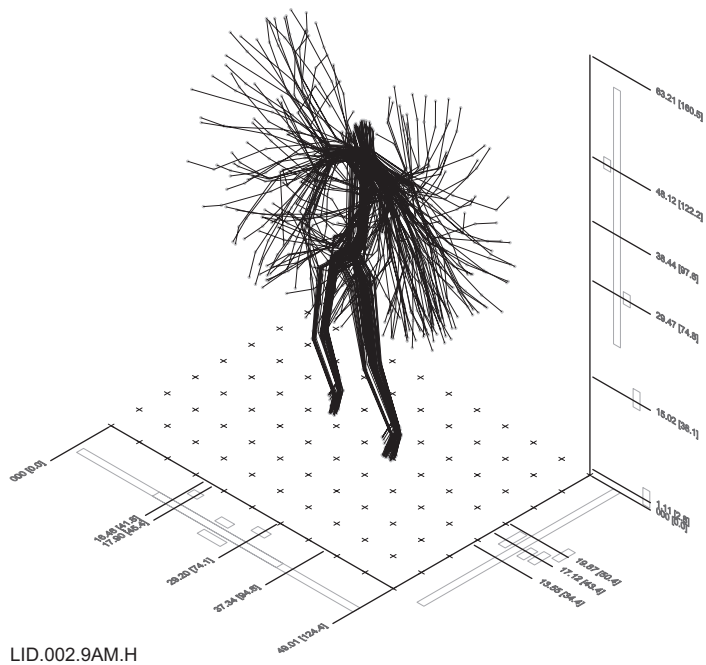
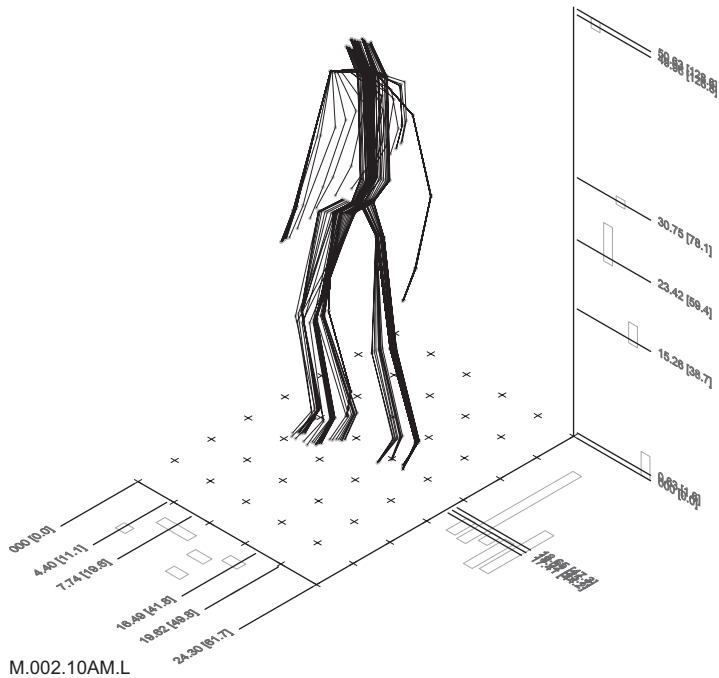
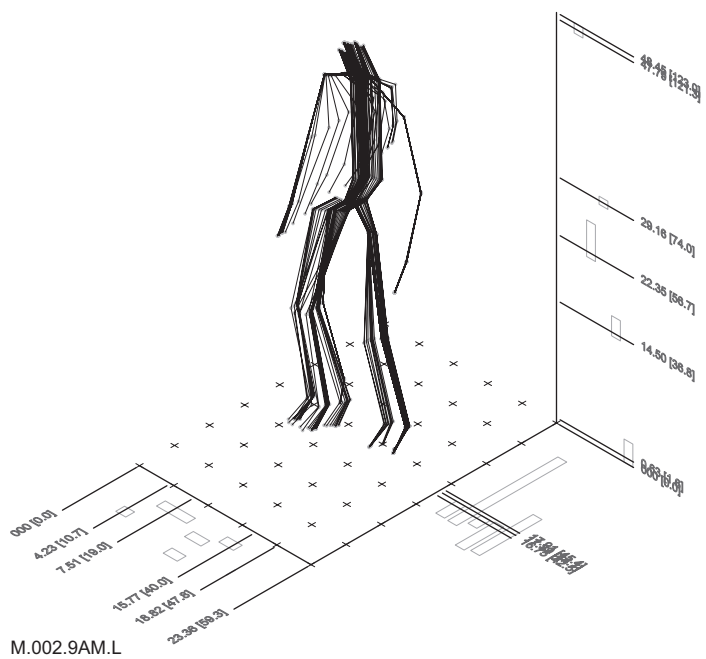


FIGURE 11.21 Low-Intensity Dancing (LID) High

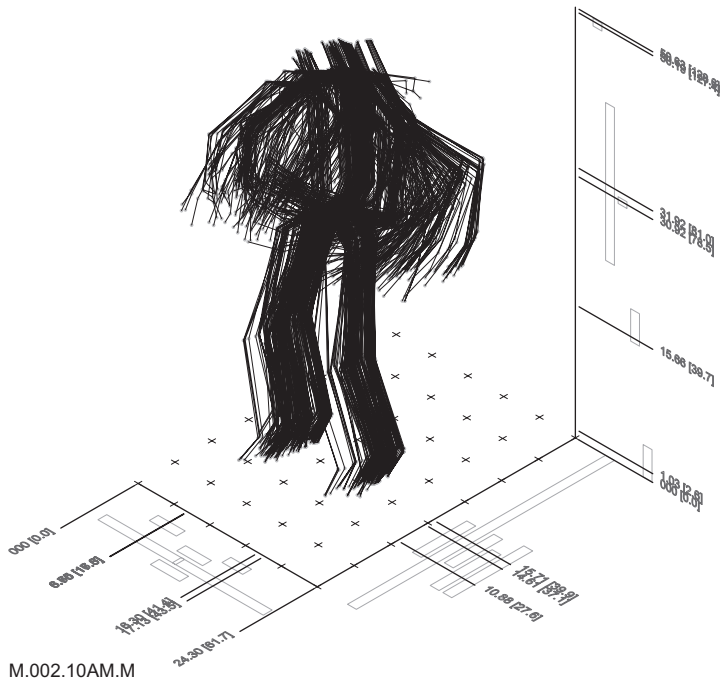


M.002.10AM.L



M.002.9AM.L

FIGURE 11.22 Marching (M) Low



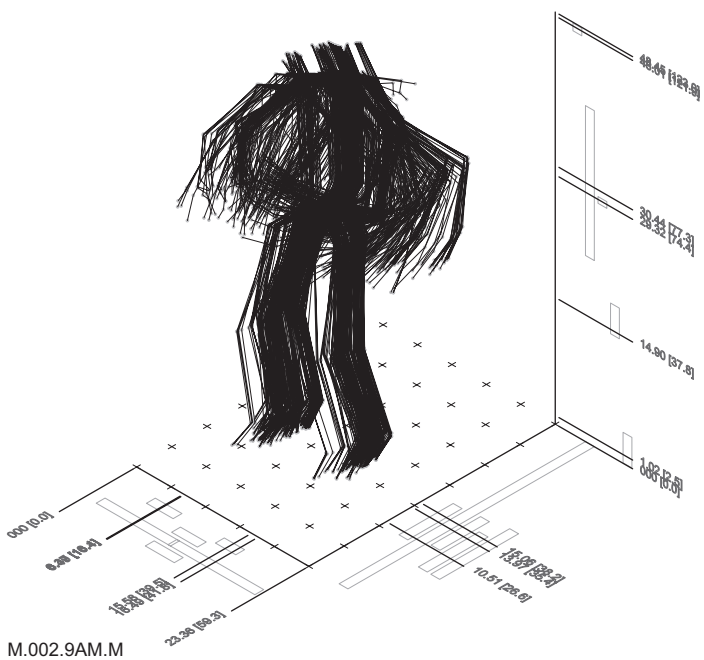
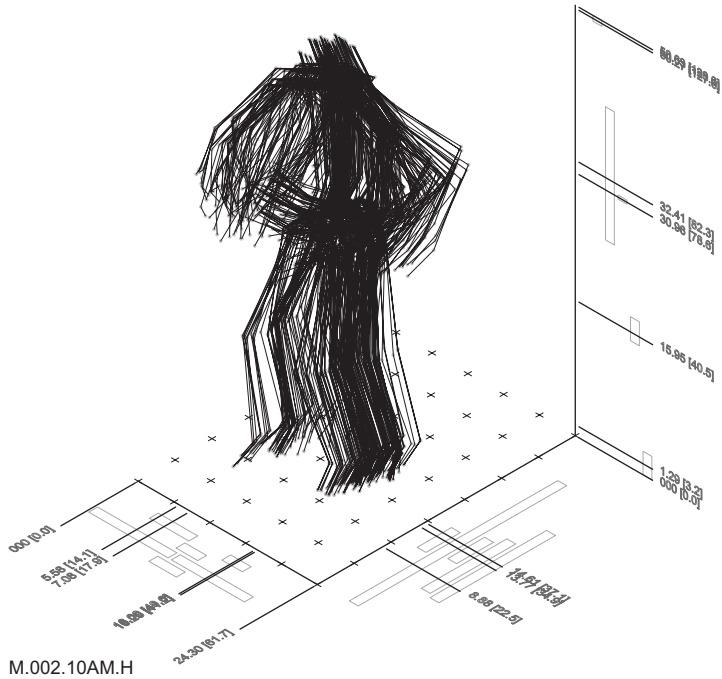


FIGURE 11.23 Marching (M) Moderate



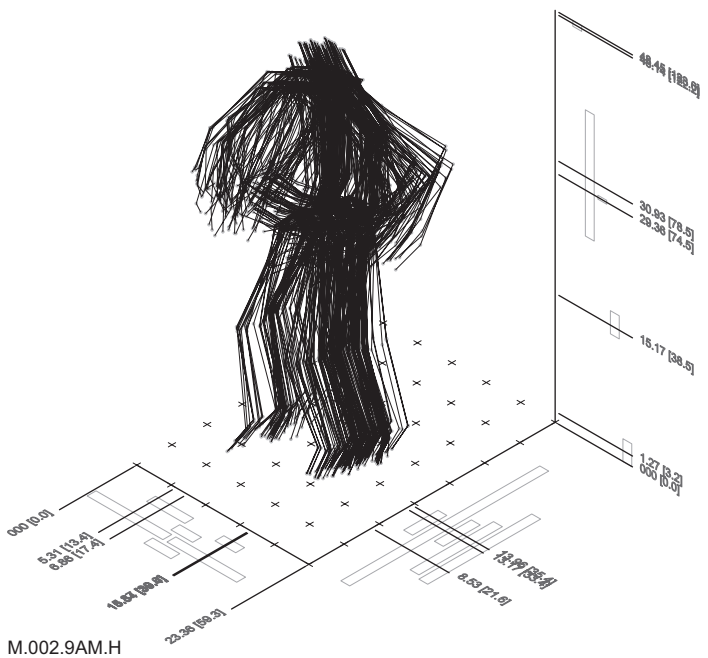
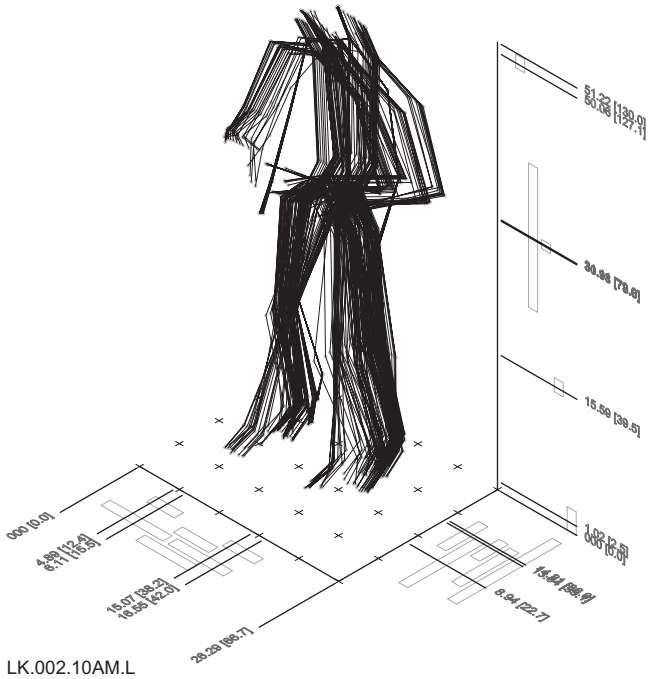


FIGURE 11.24 Marching (M) High



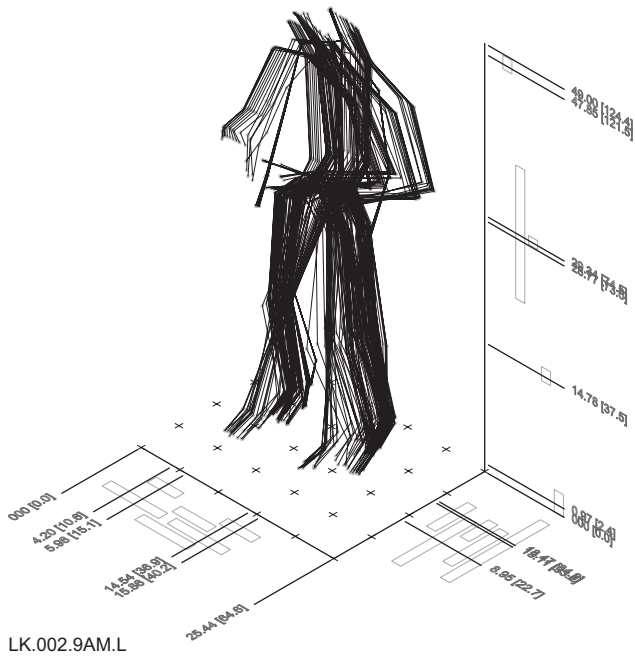
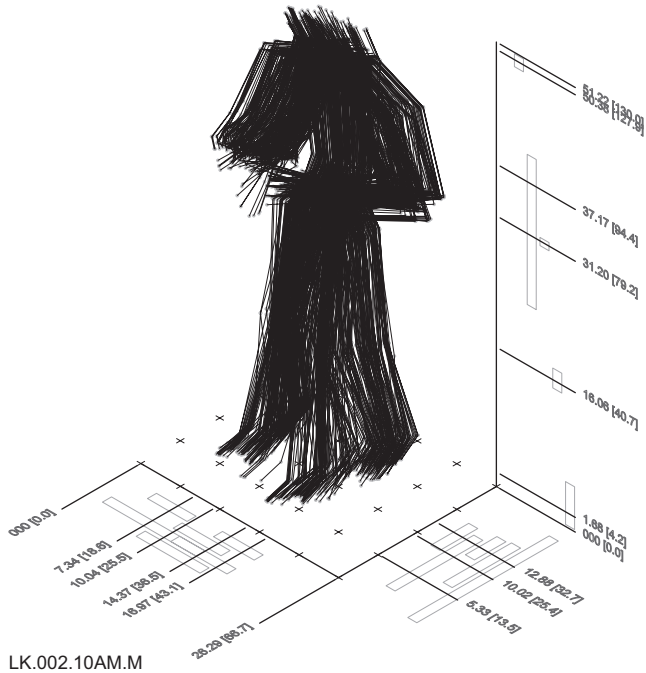


FIGURE 11.25 Leg Kicks (LK) Low



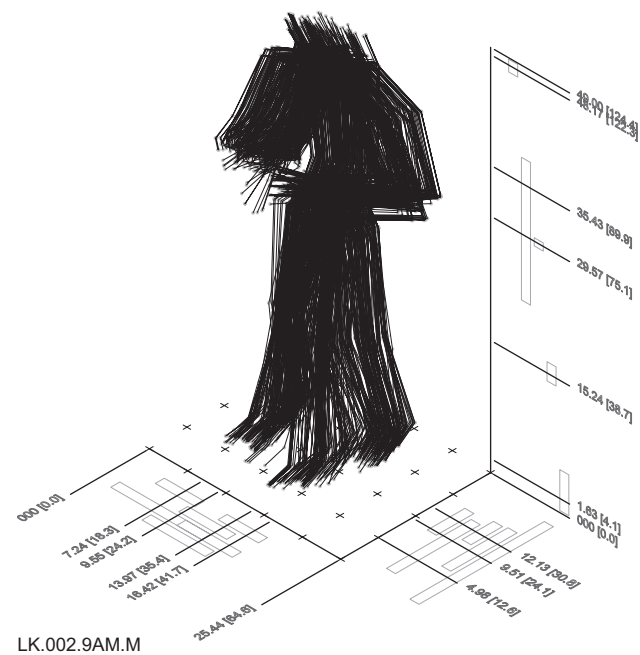
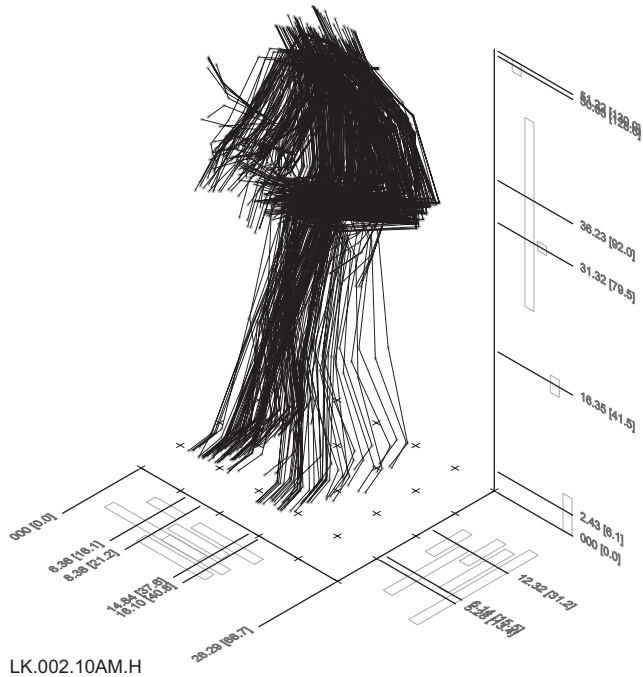


FIGURE 11.26 Leg Kicks (LK) Moderate



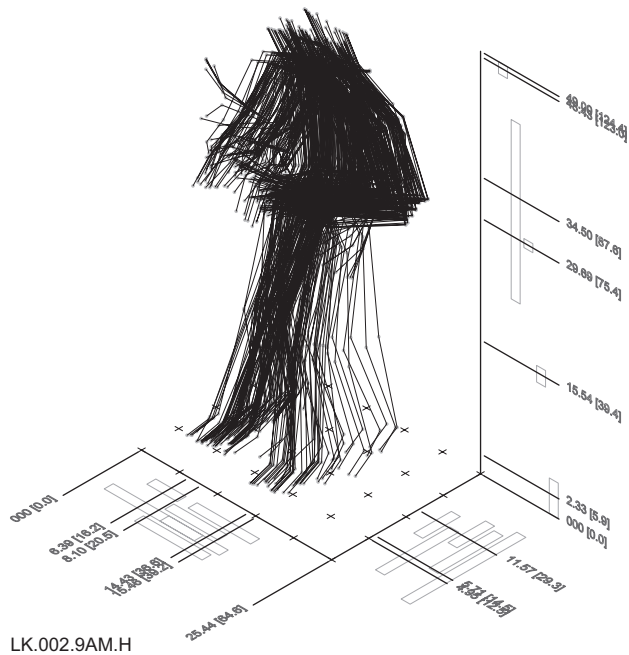
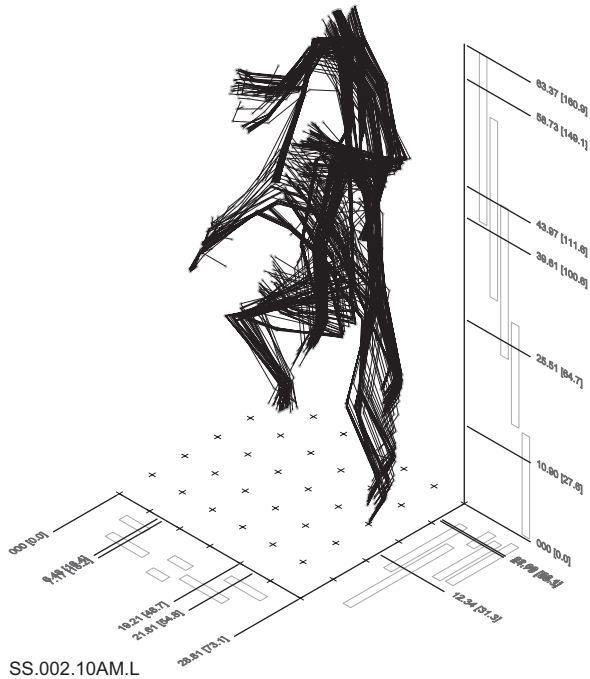


FIGURE 11.27 Leg Kicks (LK) High



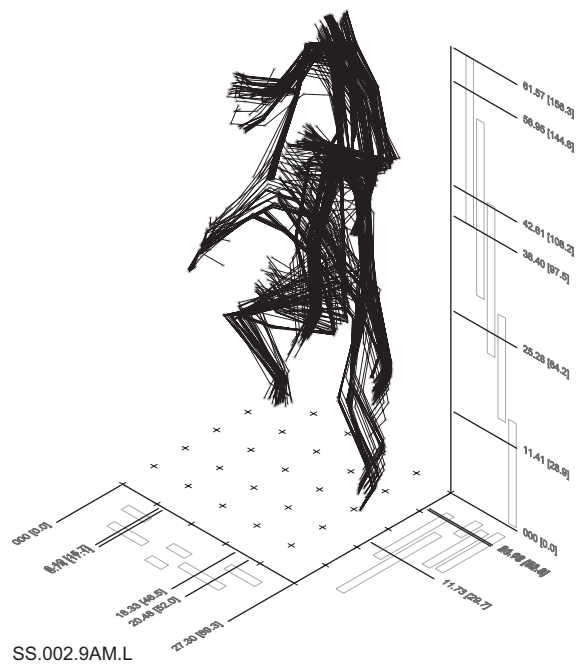
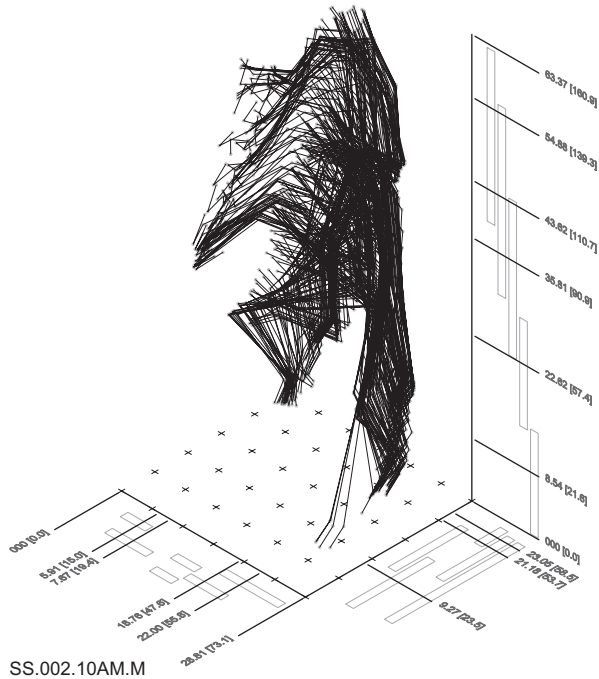


FIGURE 11.28 Standing Squats (SS) Low



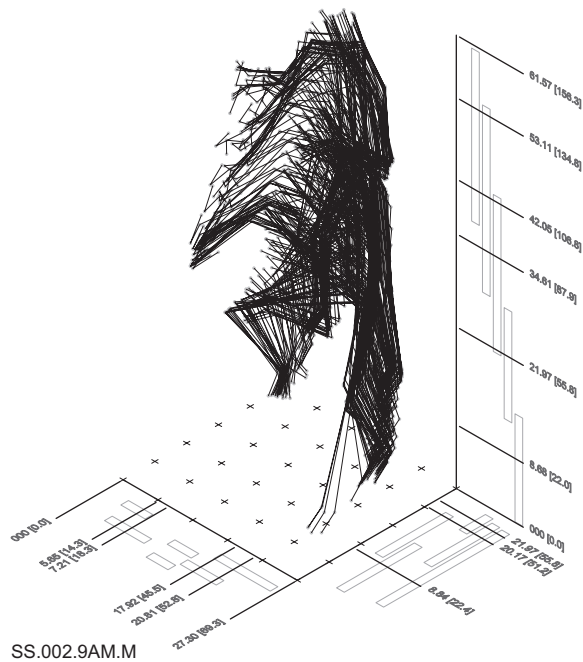
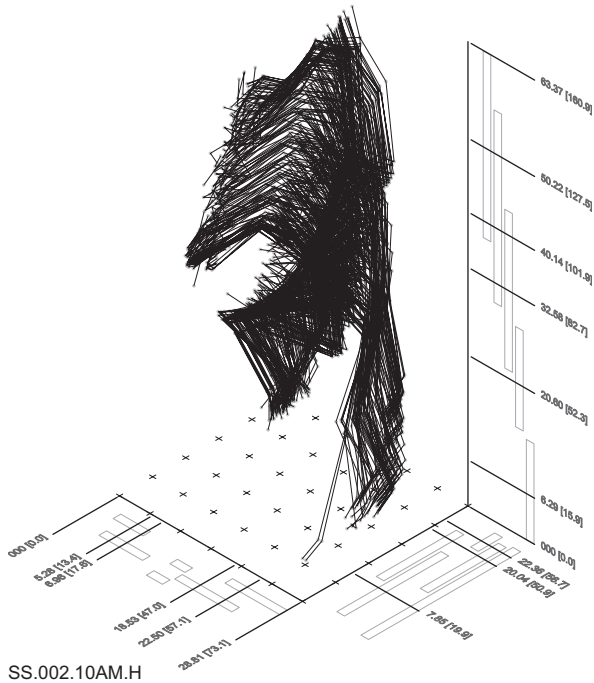


FIGURE 11.29 Standing Squats (SS) Moderate



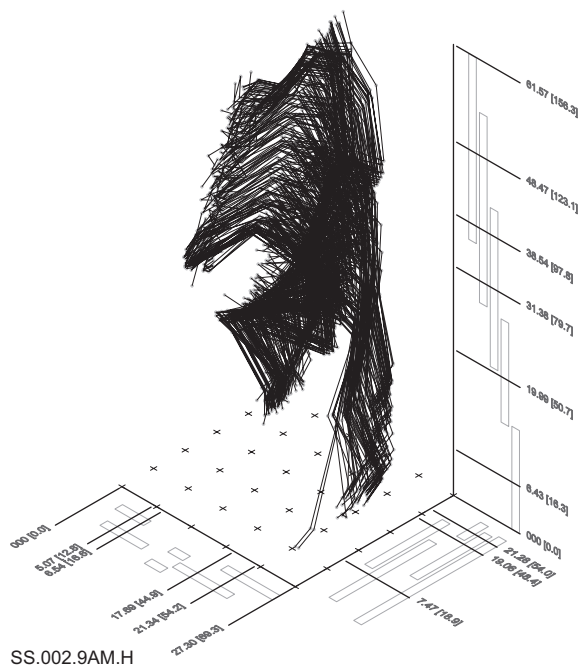
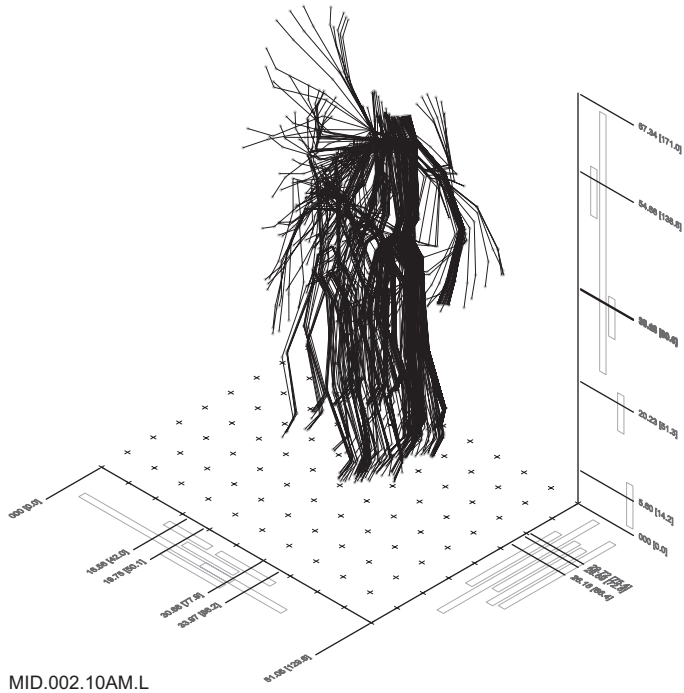


FIGURE 11.30 Standing Squats (SS) High



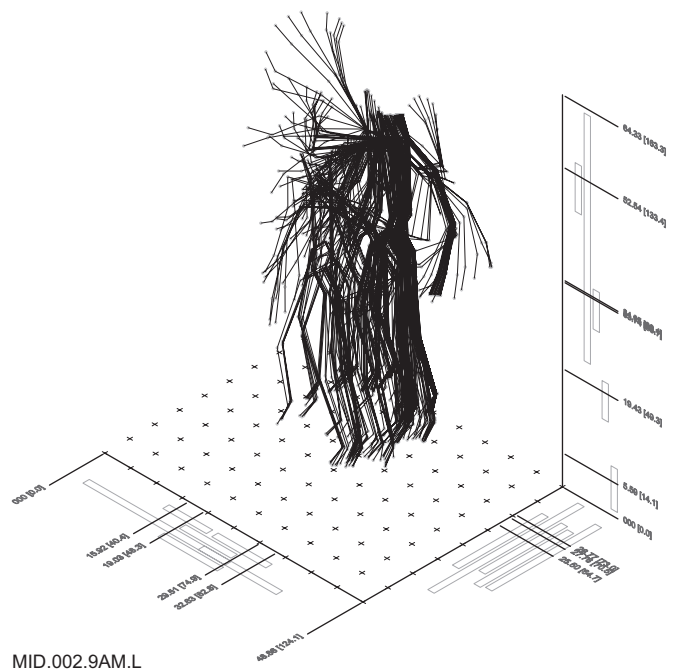


FIGURE 11.31 Moderate-Intensity Dancing (MID) Low

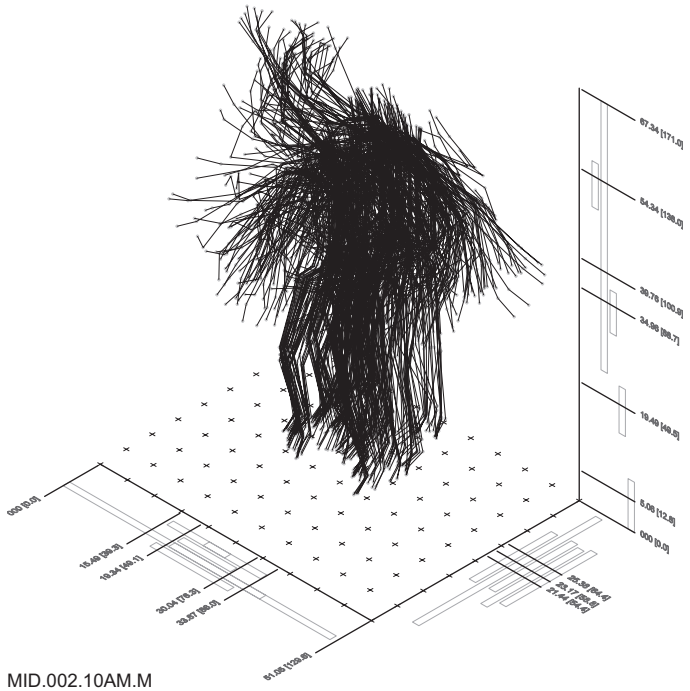


FIGURE 11.32 Moderate-Intensity Dancing (MID) Moderate

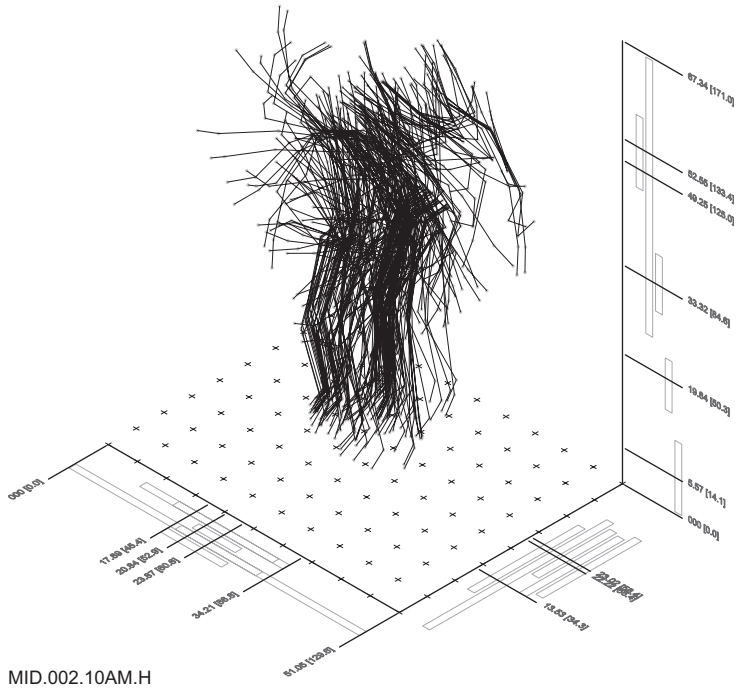


FIGURE 11.33 Moderate-Intensity Dancing (MID) High

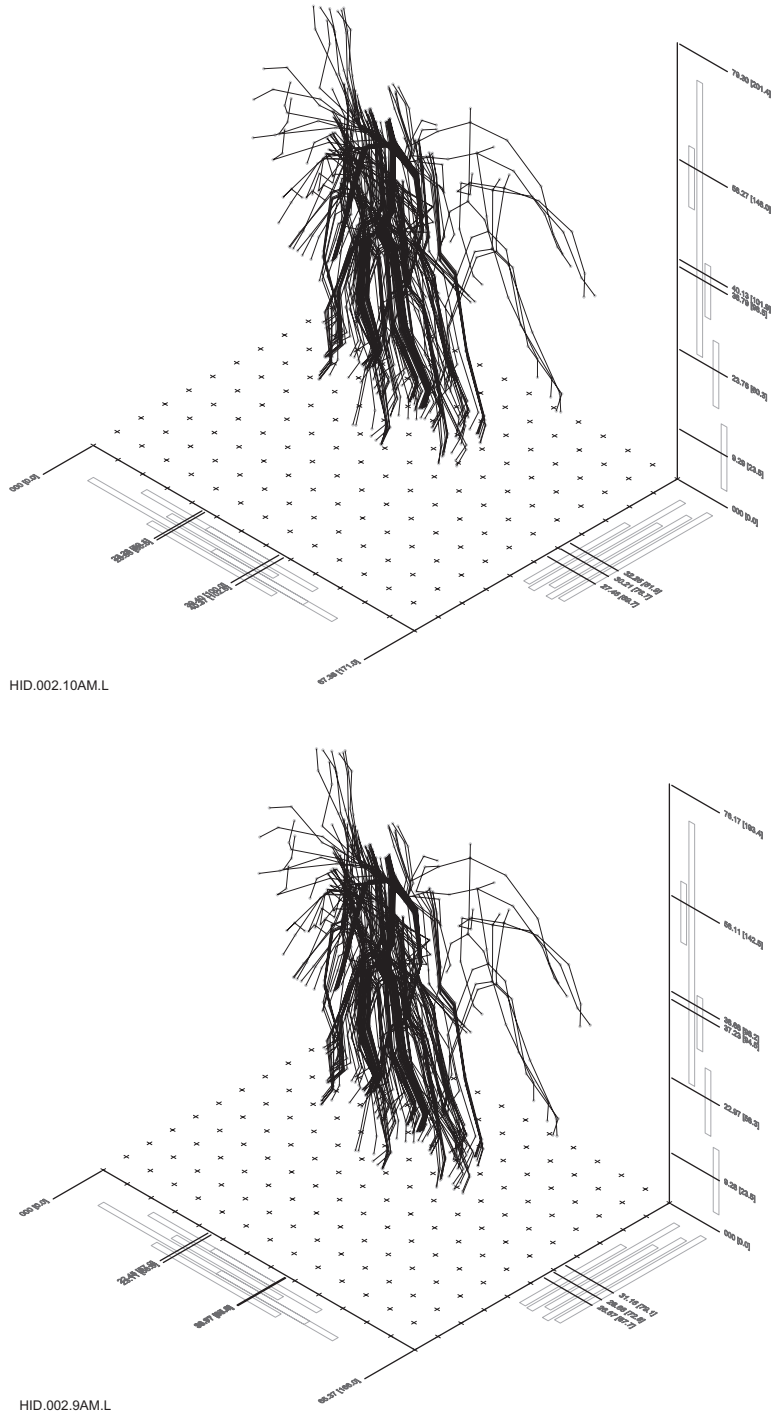
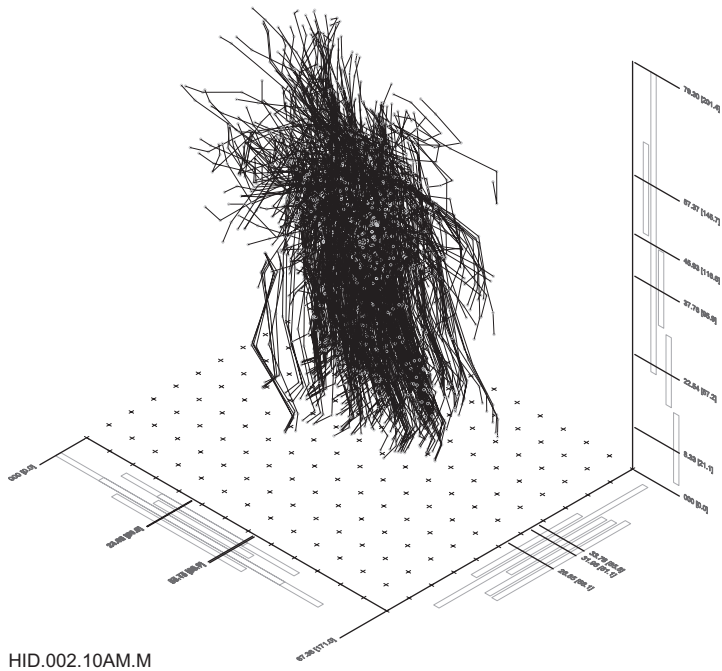
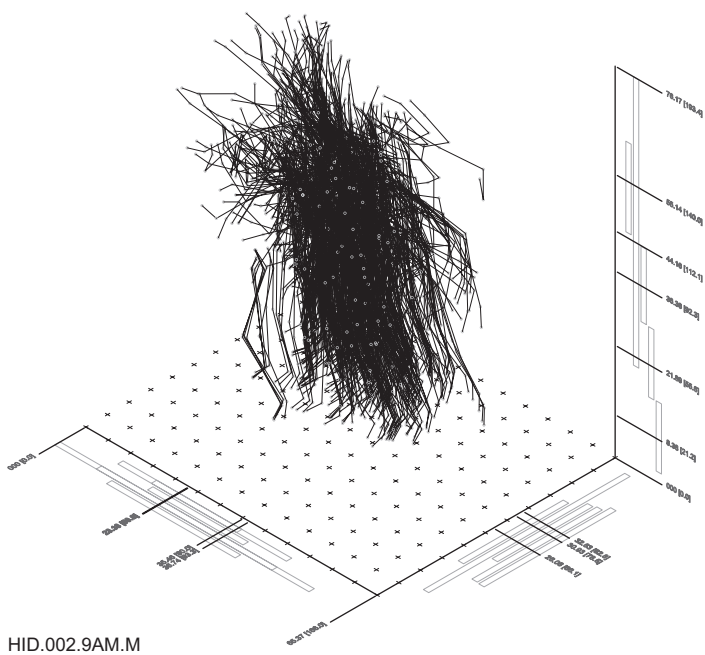


FIGURE 11.34 High-Intensity Dancing (HID) Low



HID.002.10AM.M



HID.002.9AM.M

FIGURE 11.35 High-Intensity Dancing (HID) Moderate

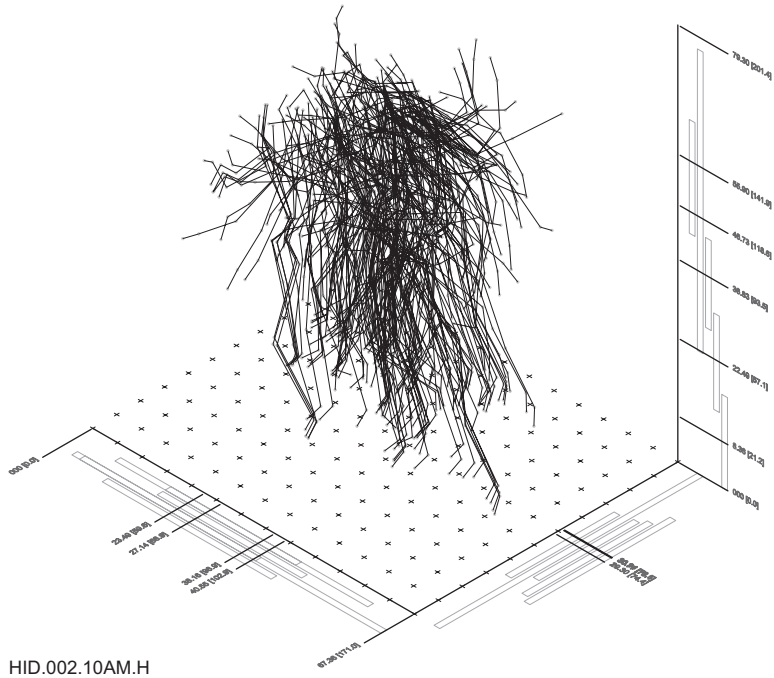
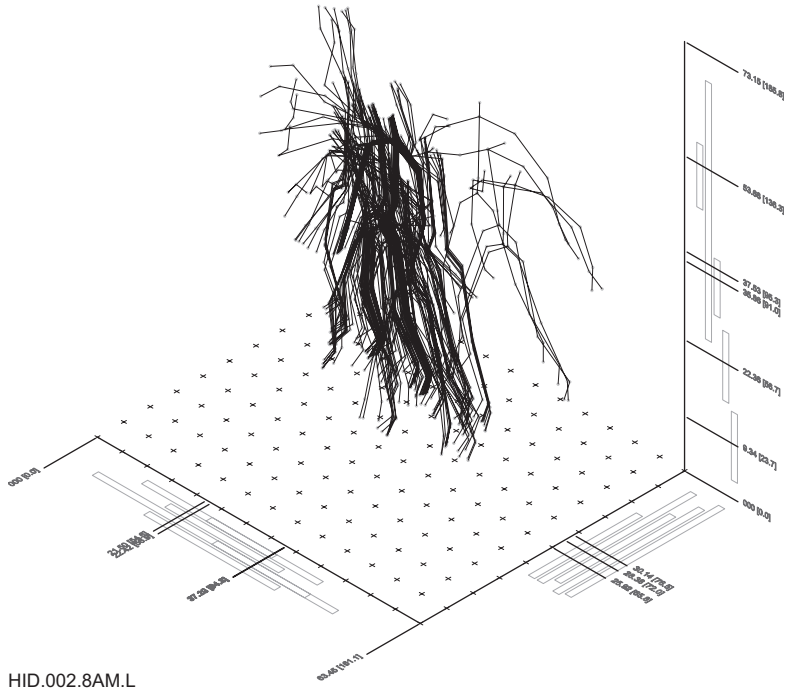


FIGURE 11.36 High-Intensity Dancing (HID) High



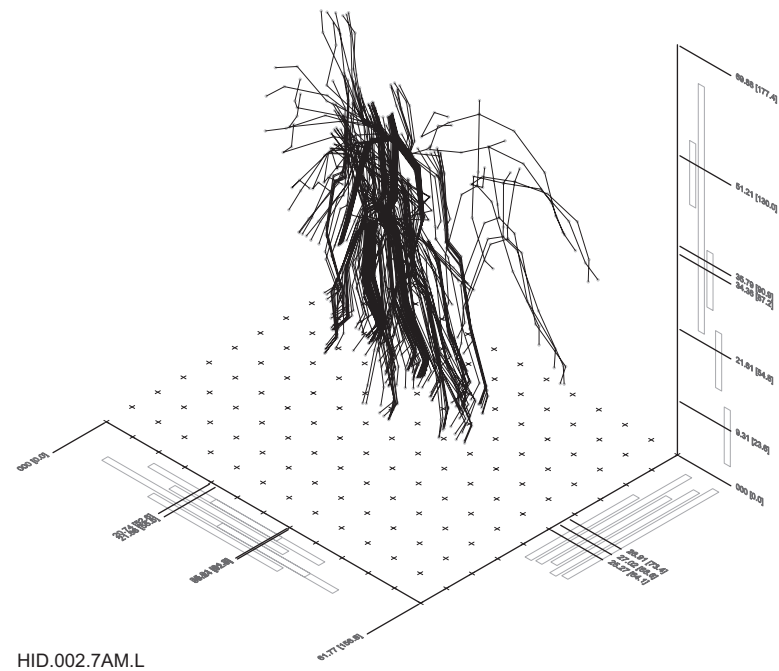
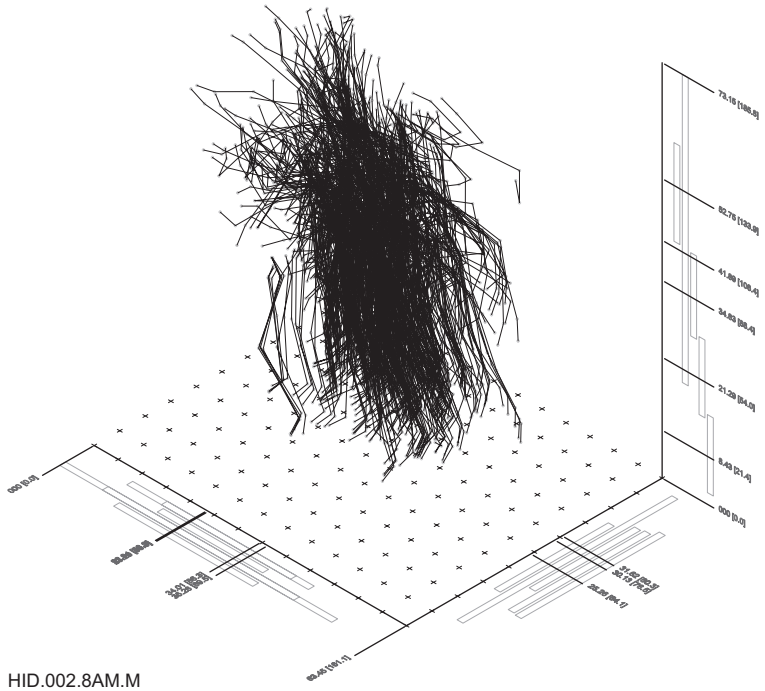


FIGURE 11.37 High-Intensity Dancing (HID) Low



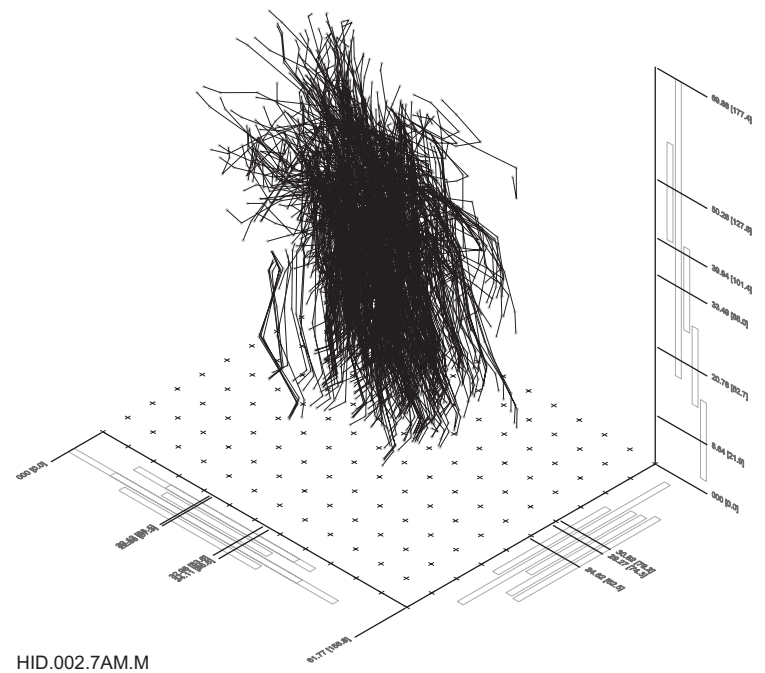
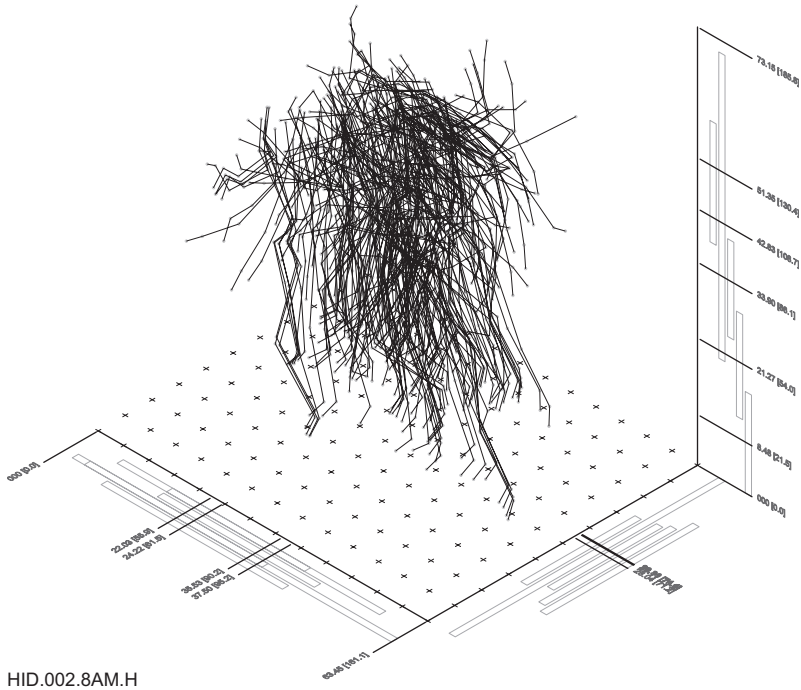


FIGURE 11.38 High-Intensity Dancing (HID) Moderate



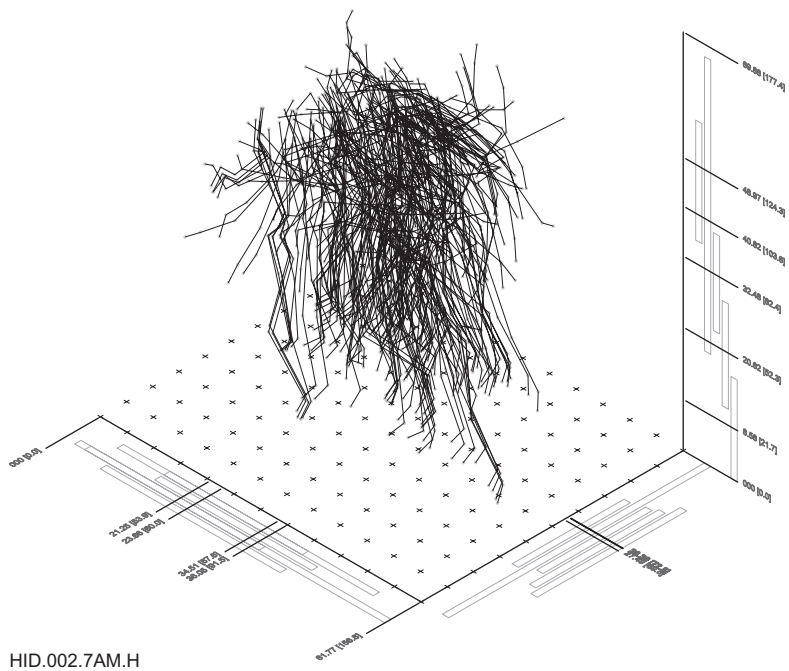
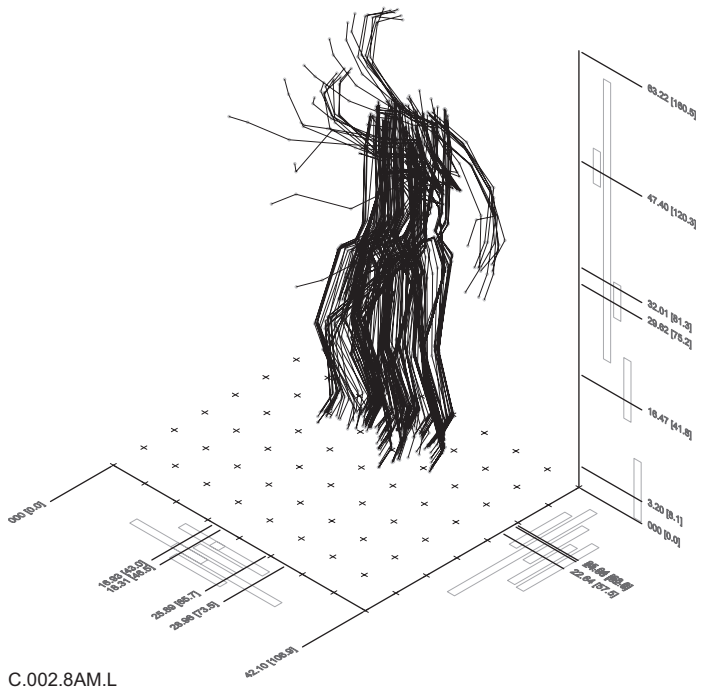
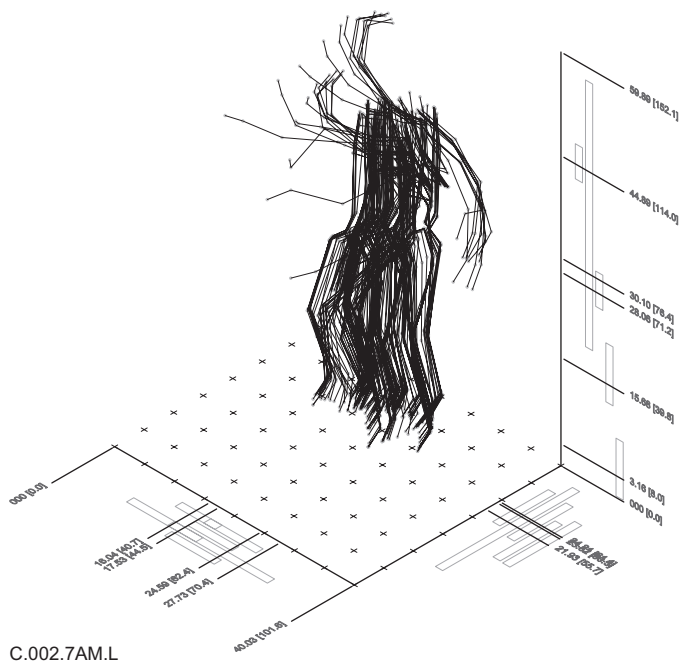


FIGURE 11.39 High-Intensity Dancing (HID) High

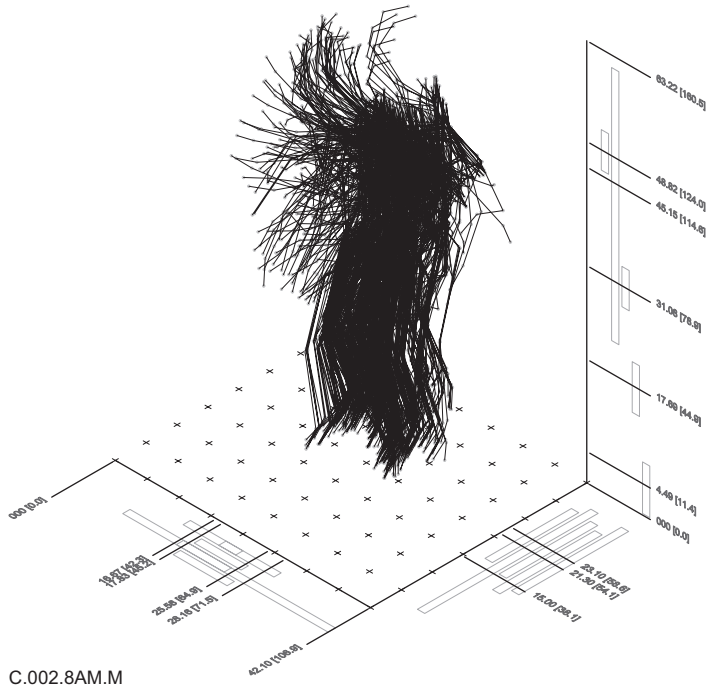


C.002.8AM.L

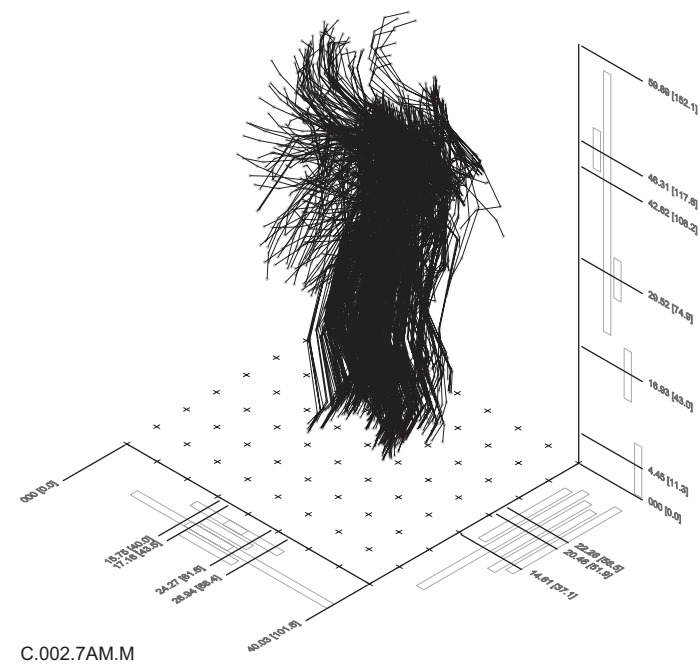


C.002.7AM.L

FIGURE 11.40 Climbers (C) Low

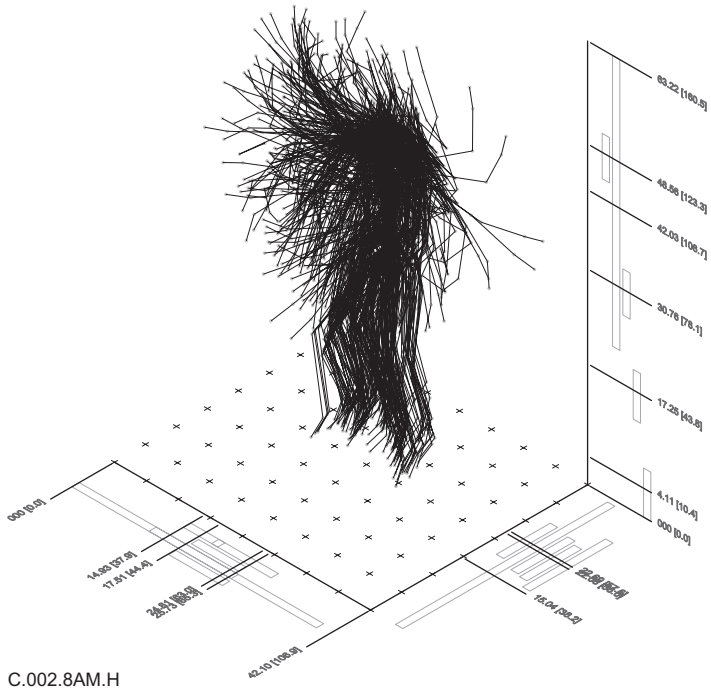


C.002.8AM.M



C.002.7AM.M

FIGURE 11.41 Climbers (C) Moderate



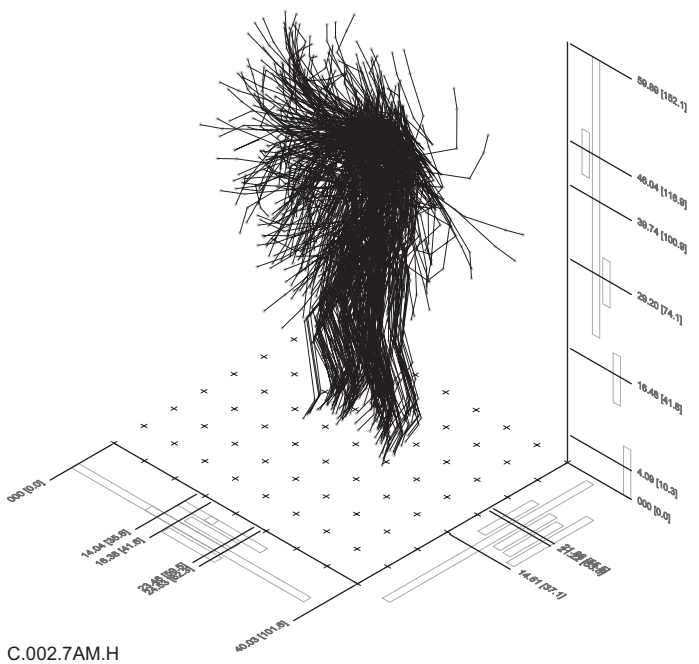
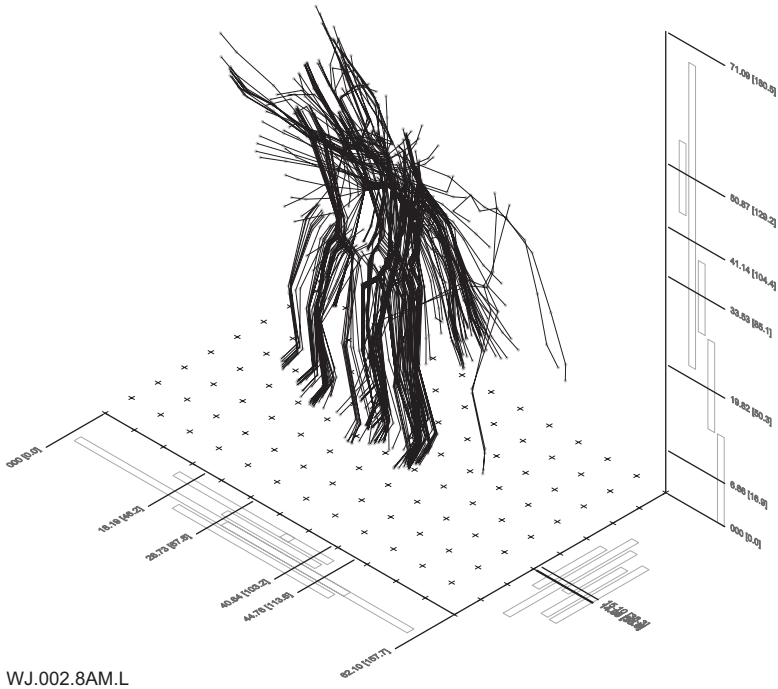


FIGURE 11.42 Climbers (C) High



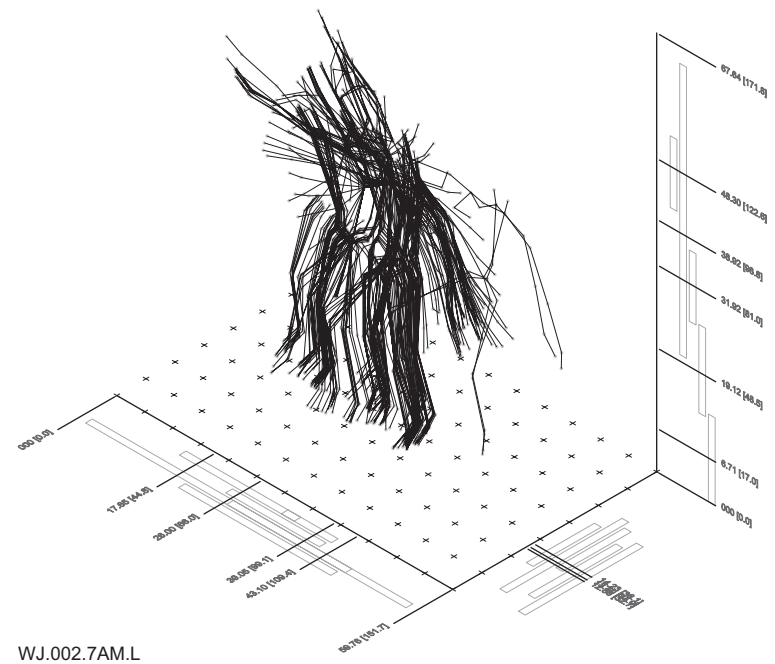
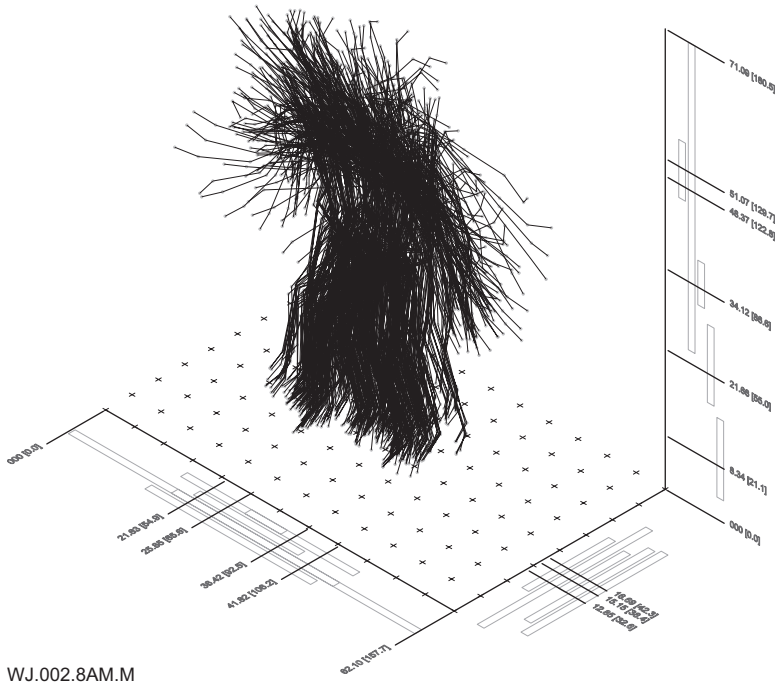


FIGURE 11.43 Wacky Jacks (WJ) Low



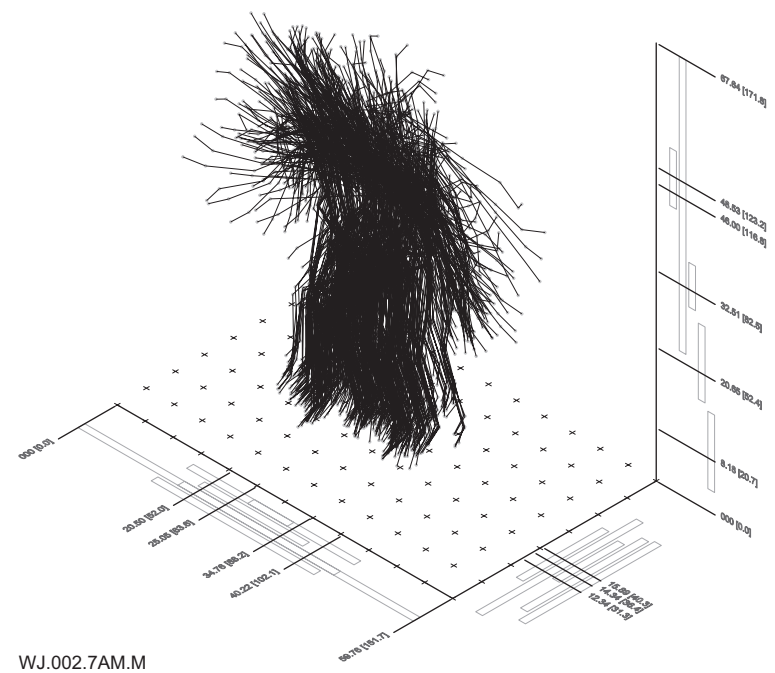
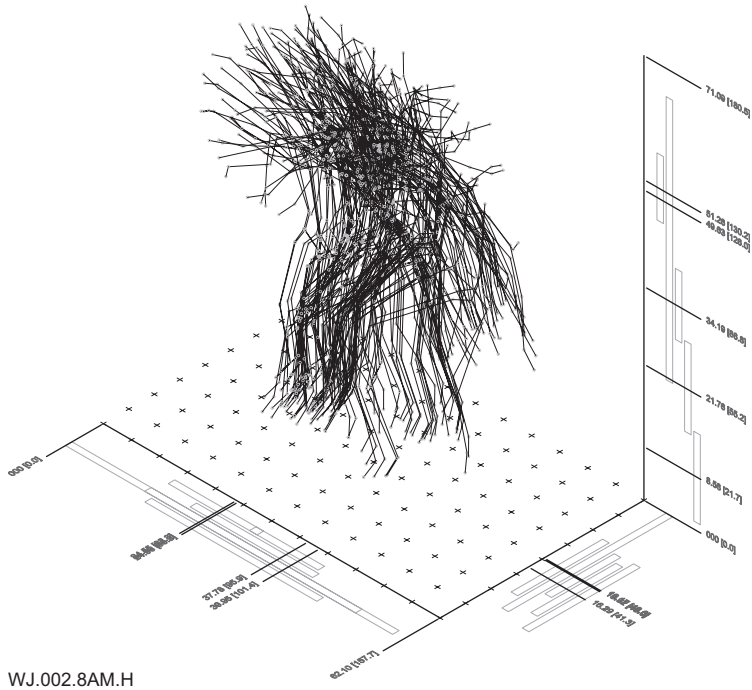


FIGURE 11.44 Wacky Jacks (WJ) Moderate



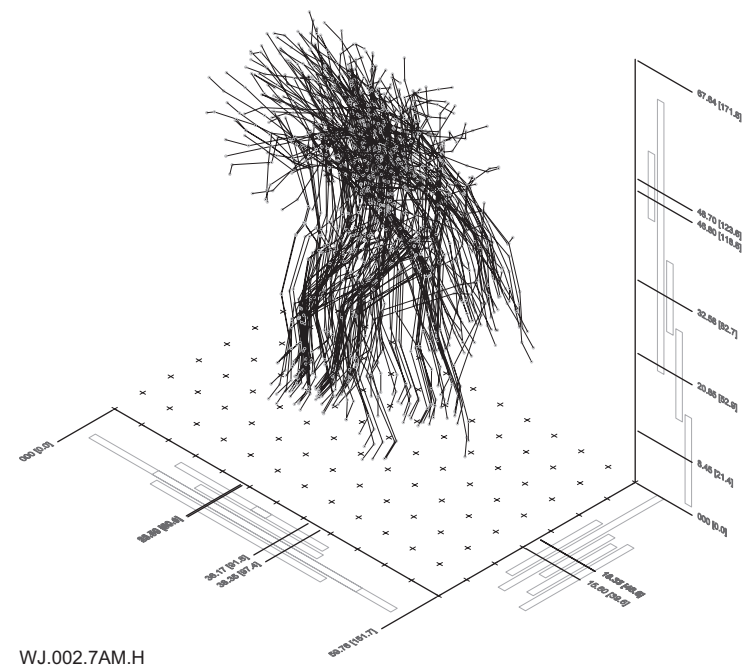
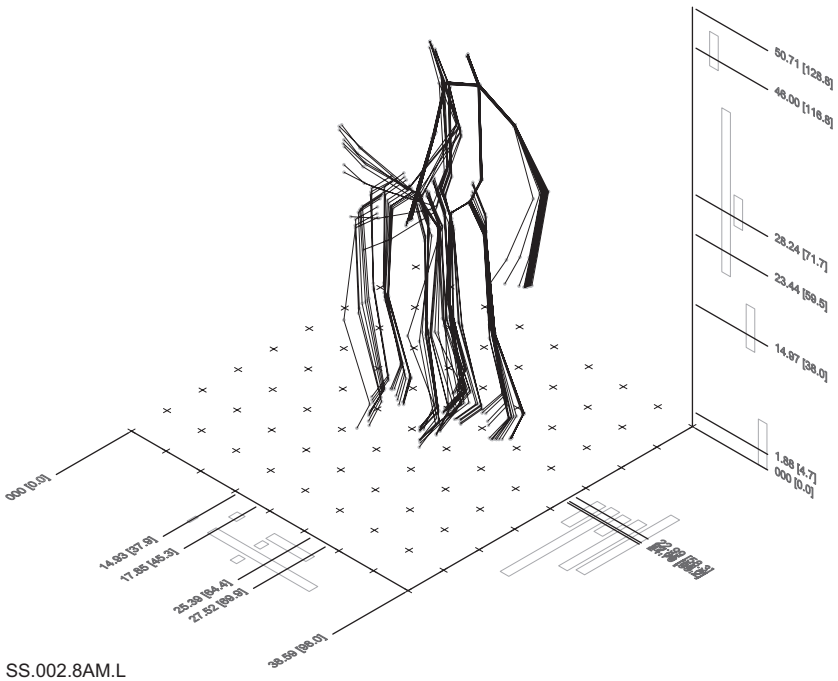


FIGURE 11.45 Wacky Jacks (WJ) High



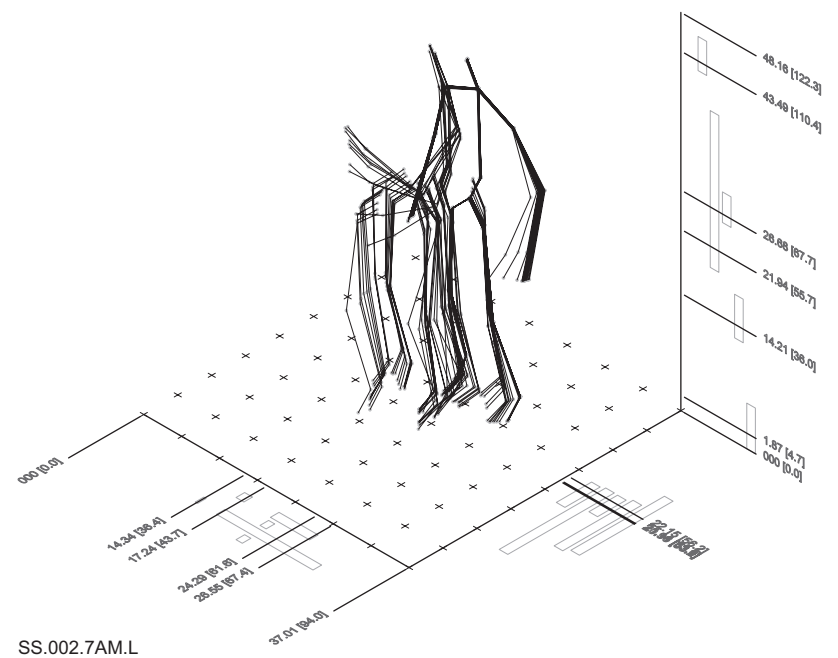
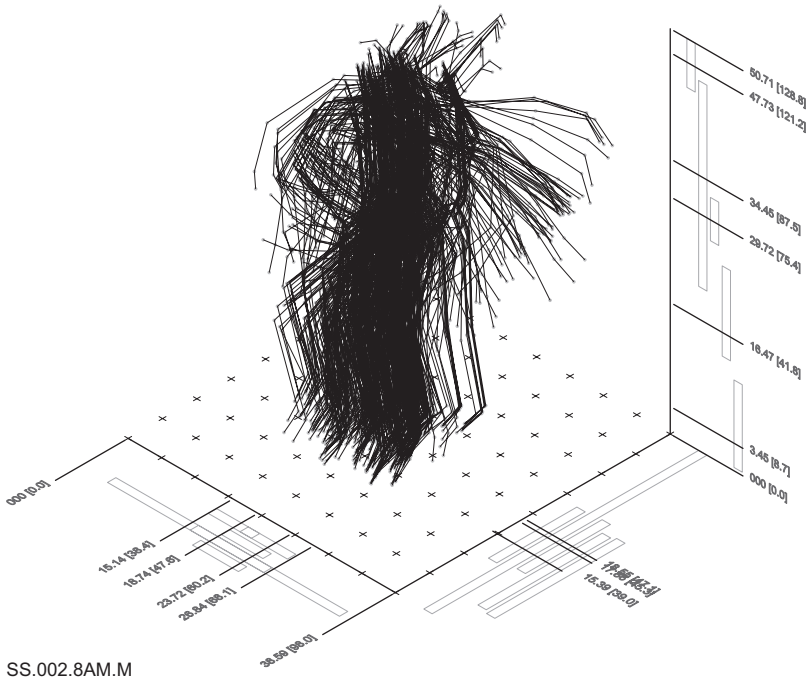


FIGURE 11.46 Standing Squats (SS) Low



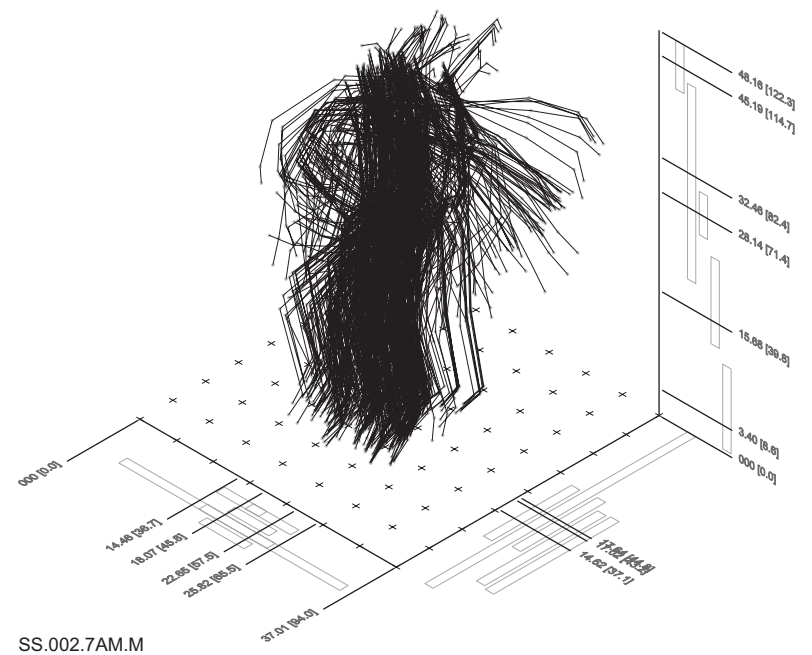


FIGURE 11.47 Standing Squats (SS) Moderate

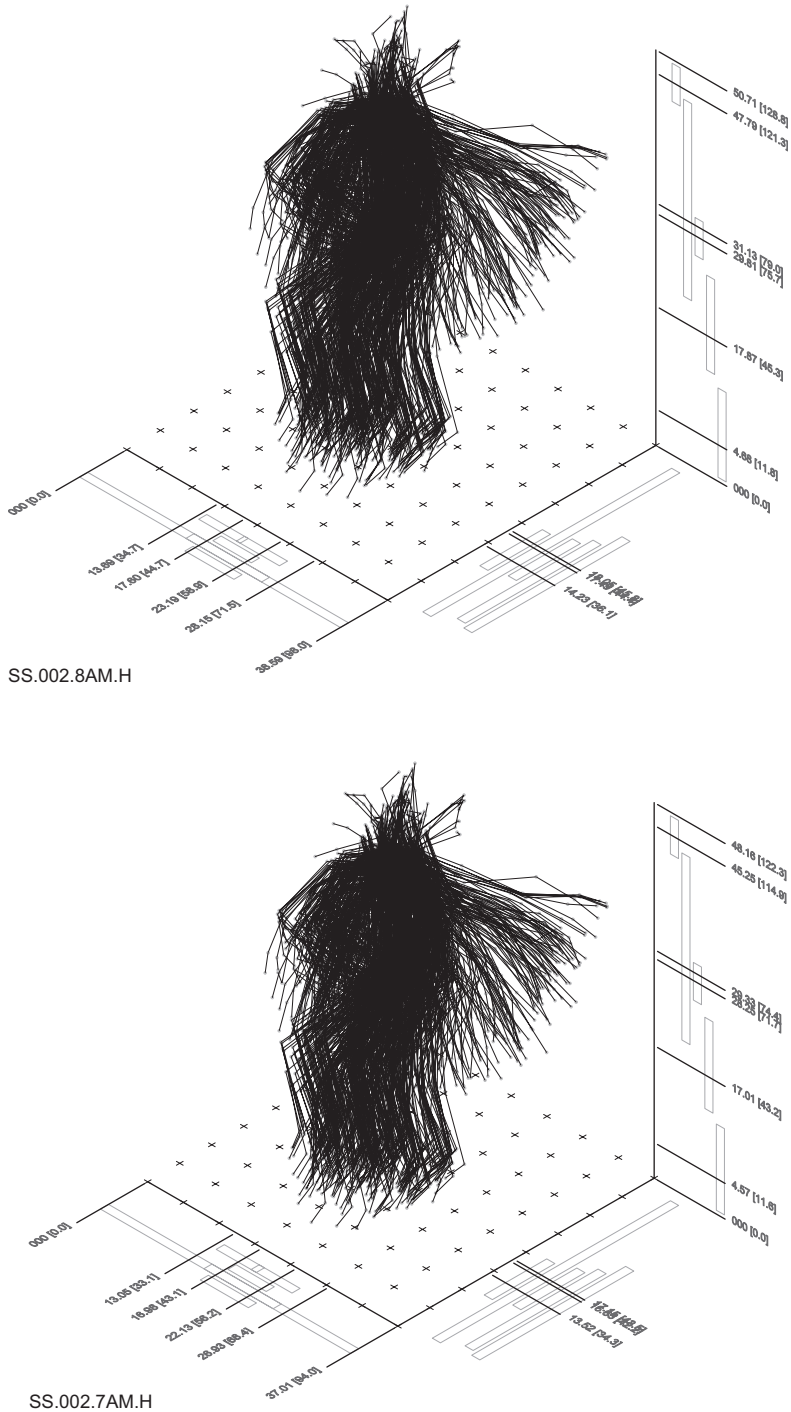
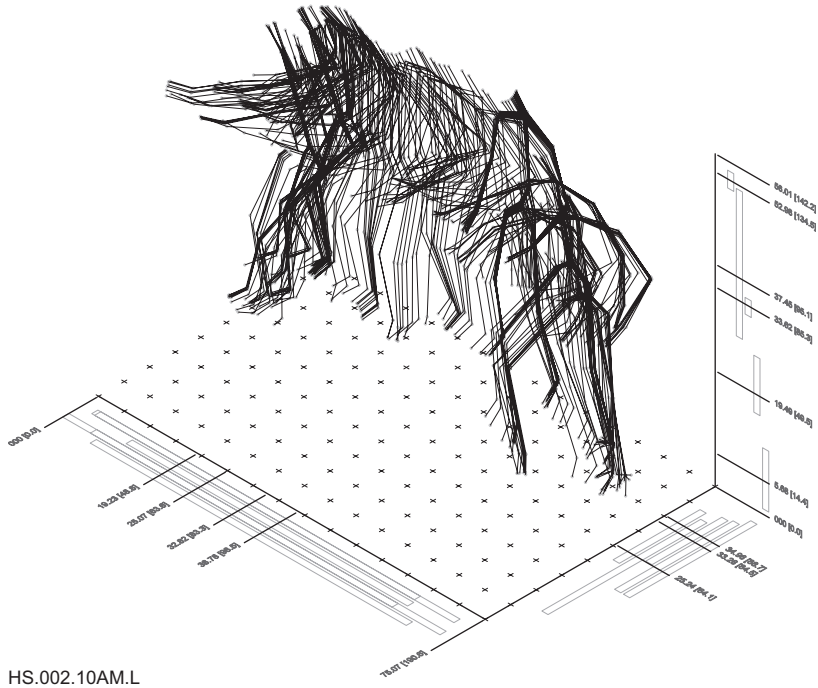


FIGURE 11.48 Standing Squats (SS) High



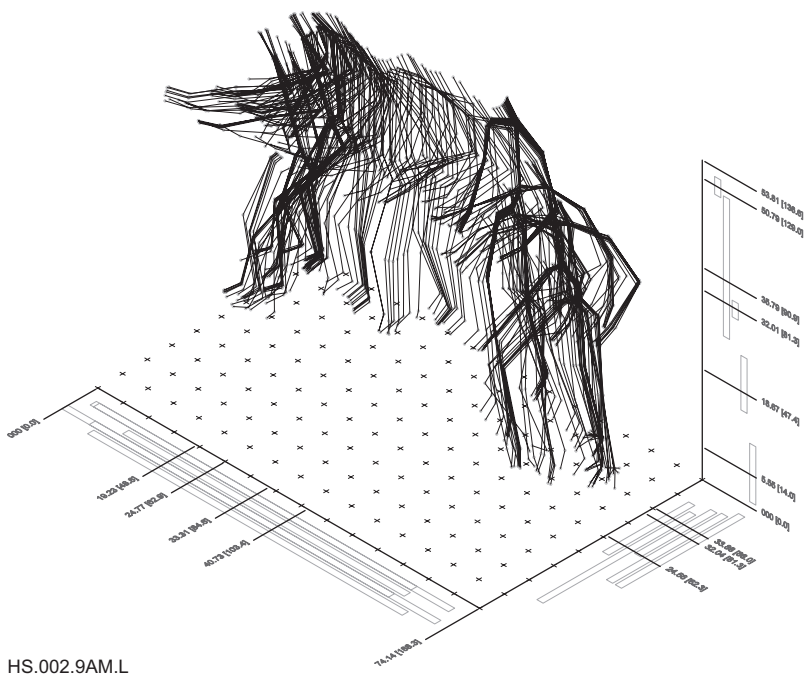
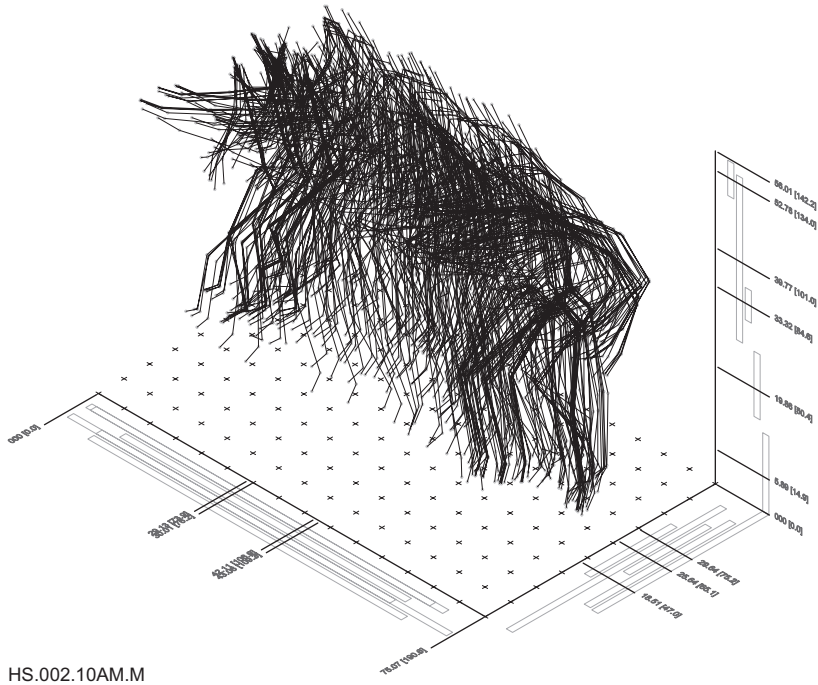


FIGURE 11.49 Heisman Shuffle (HS) Low



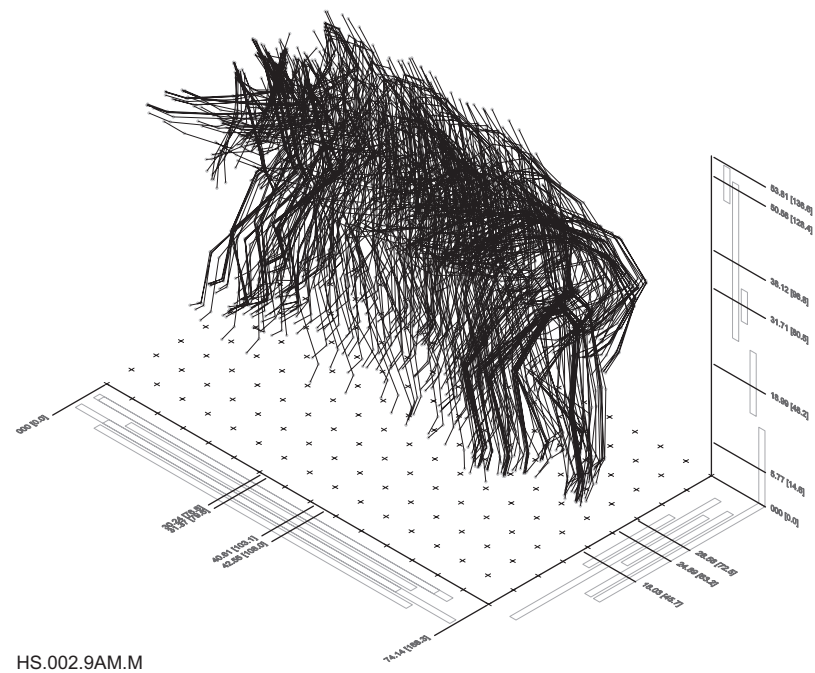
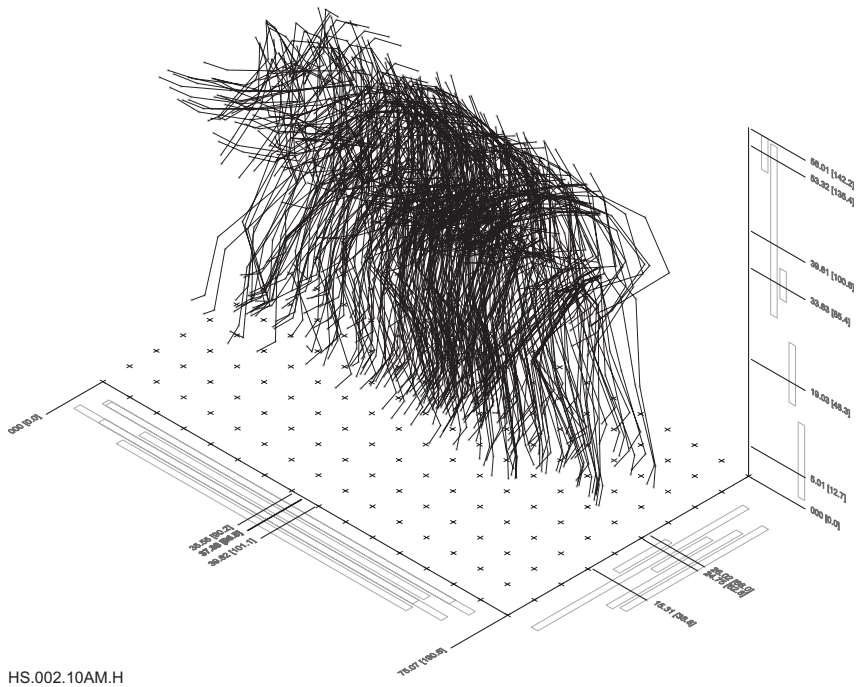


FIGURE 11.50 Heisman Shuffle (HS) Moderate



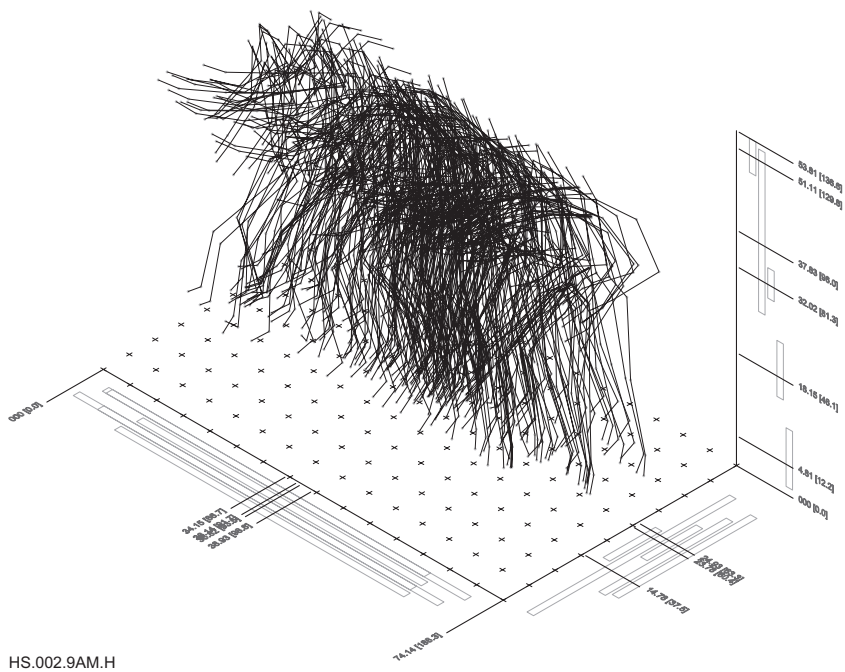
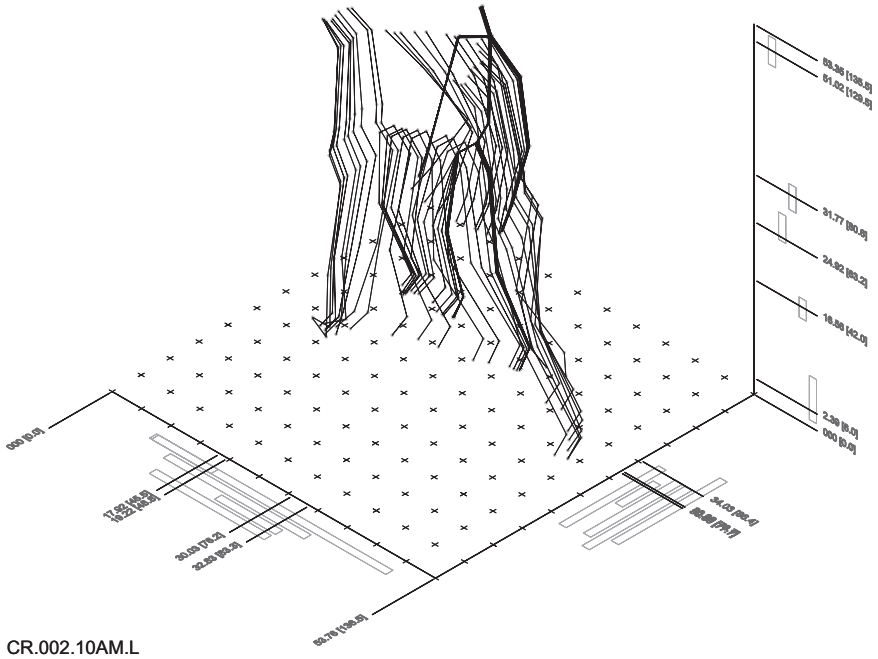


FIGURE 11.51 Heisman Shuffle (HS) High



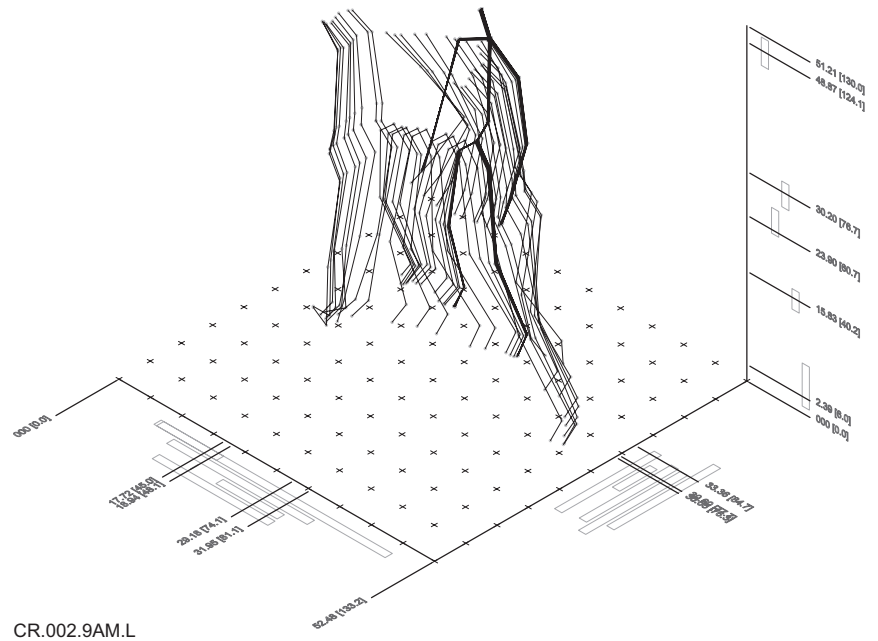
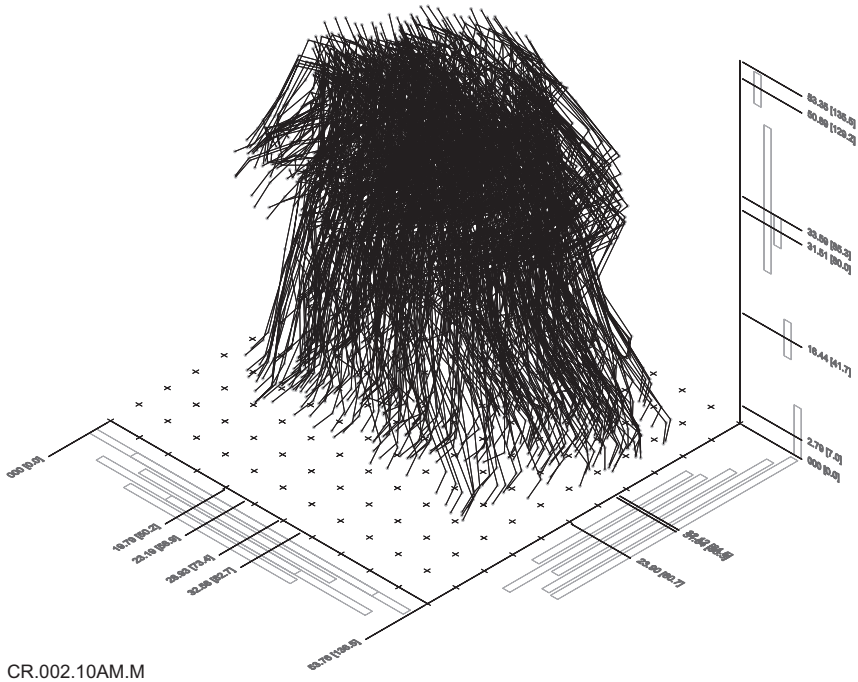


FIGURE 11.52 Circle Run (CR) Low



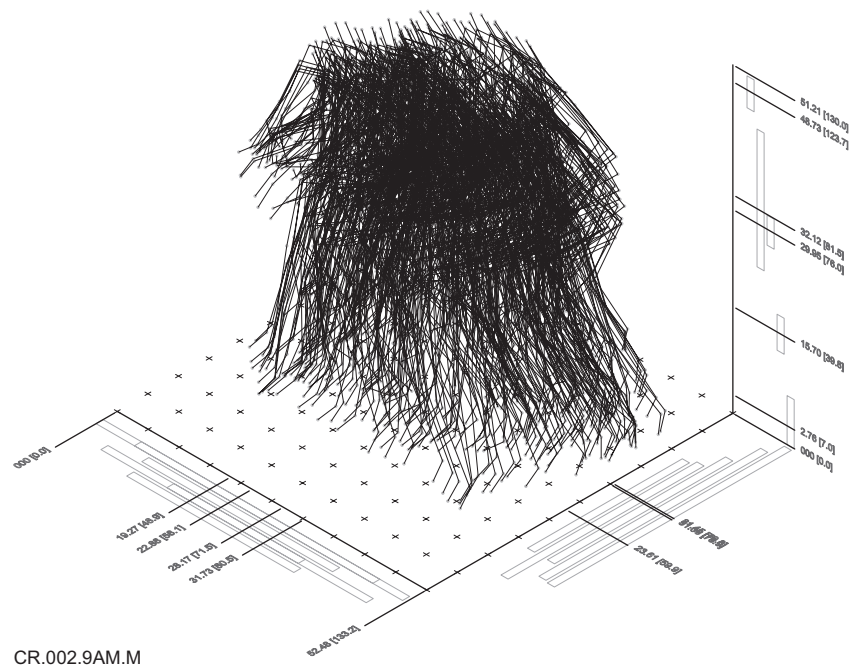
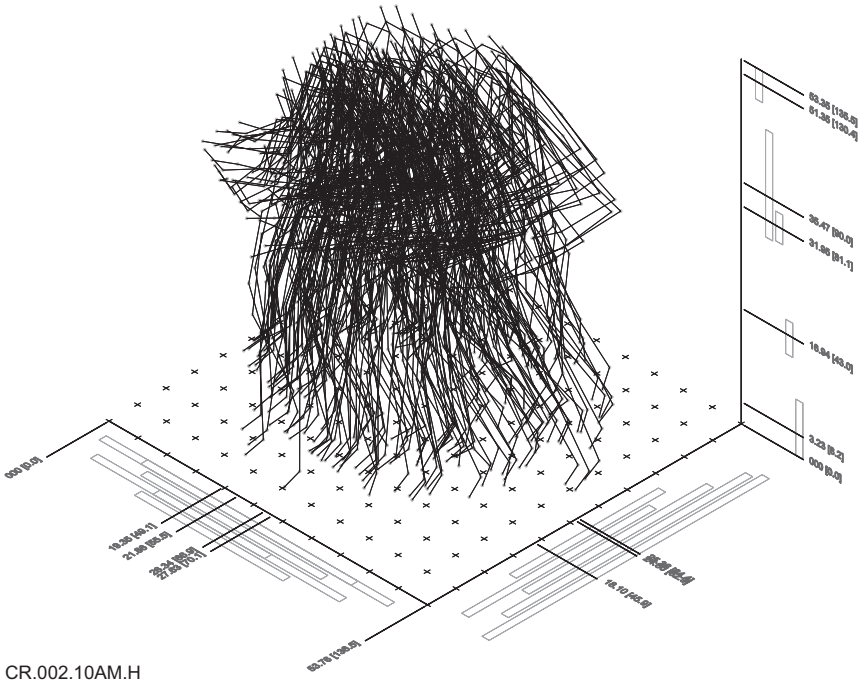


FIGURE 11.53 Circle Run (CR) Moderate



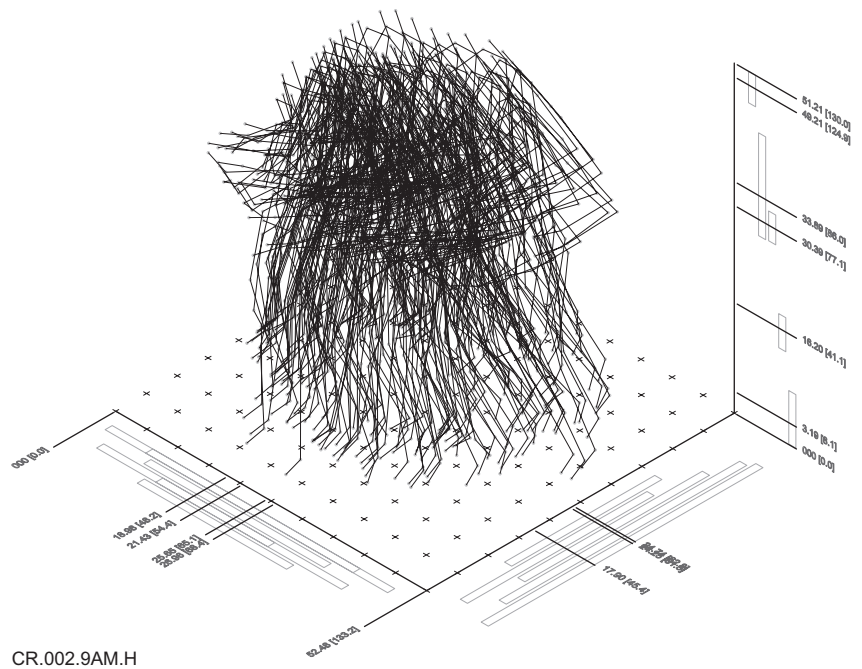
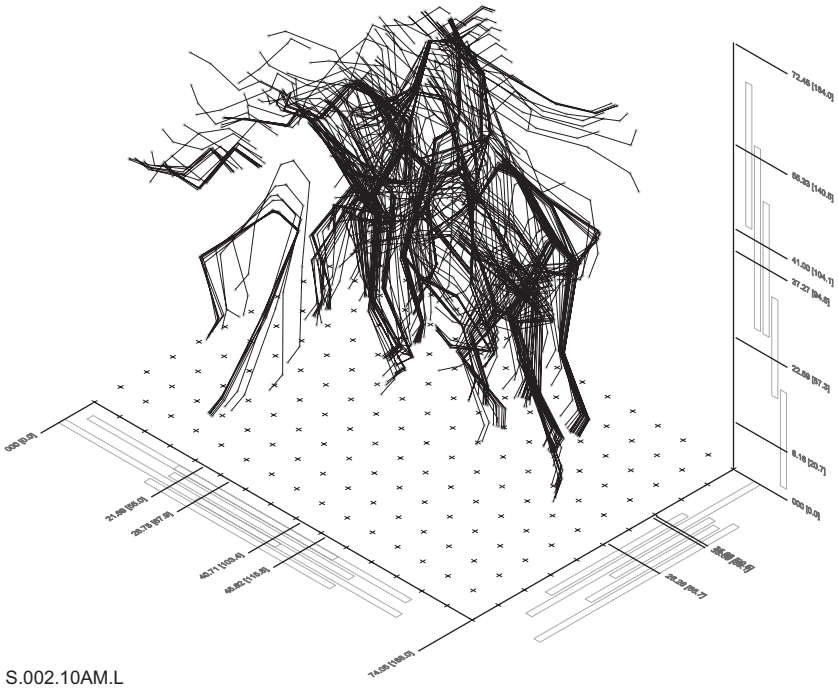


FIGURE 11.54 Circle Run (CR) High



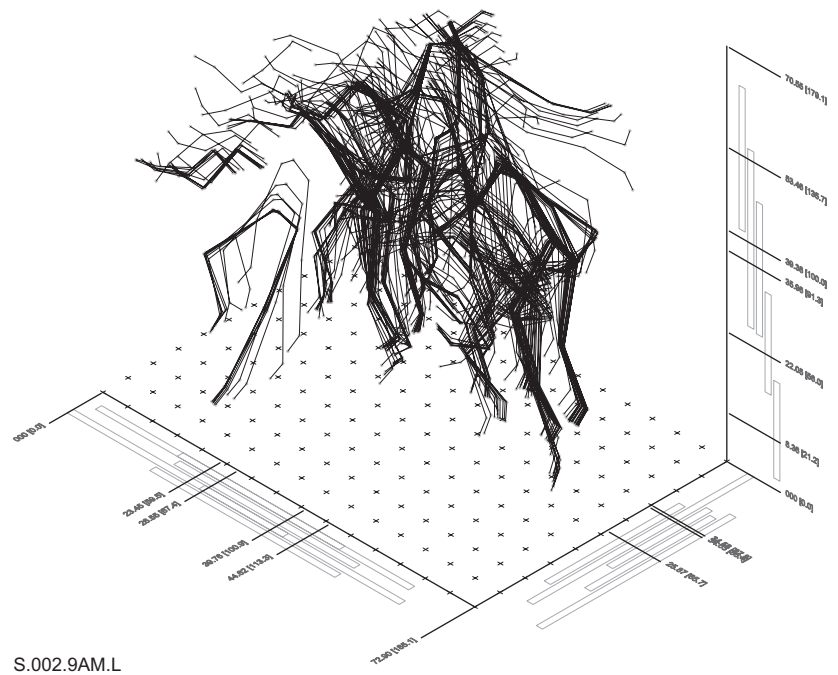
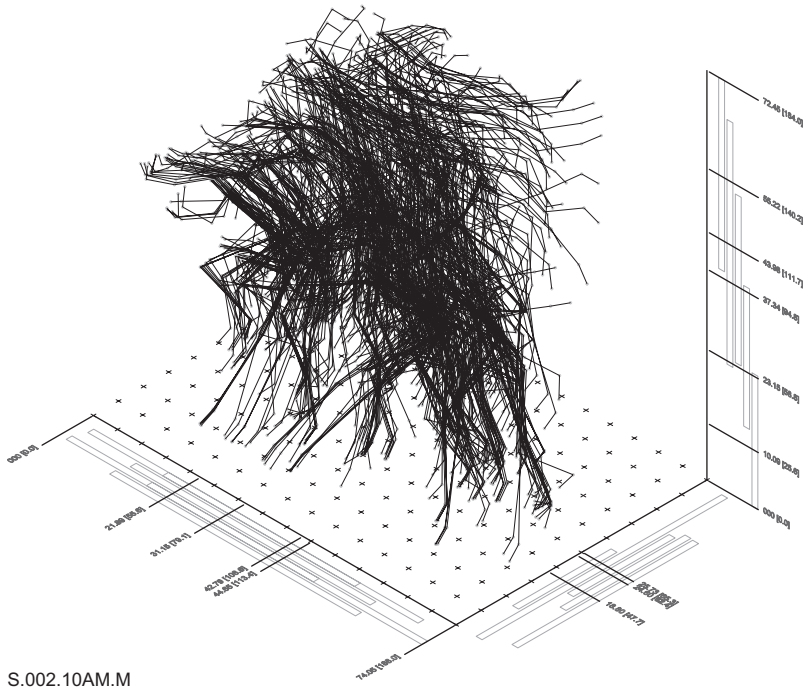


FIGURE 11.55 Skiers (S) Low



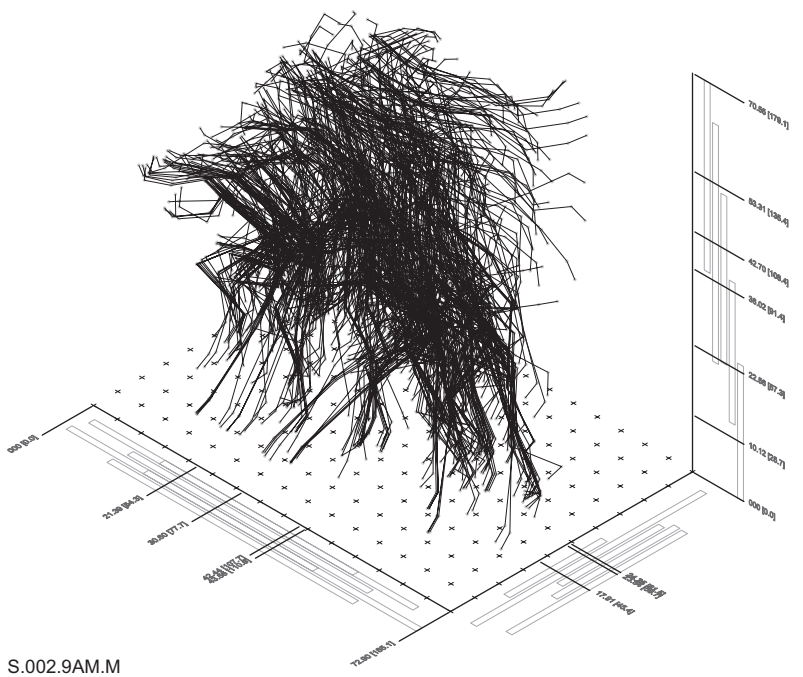
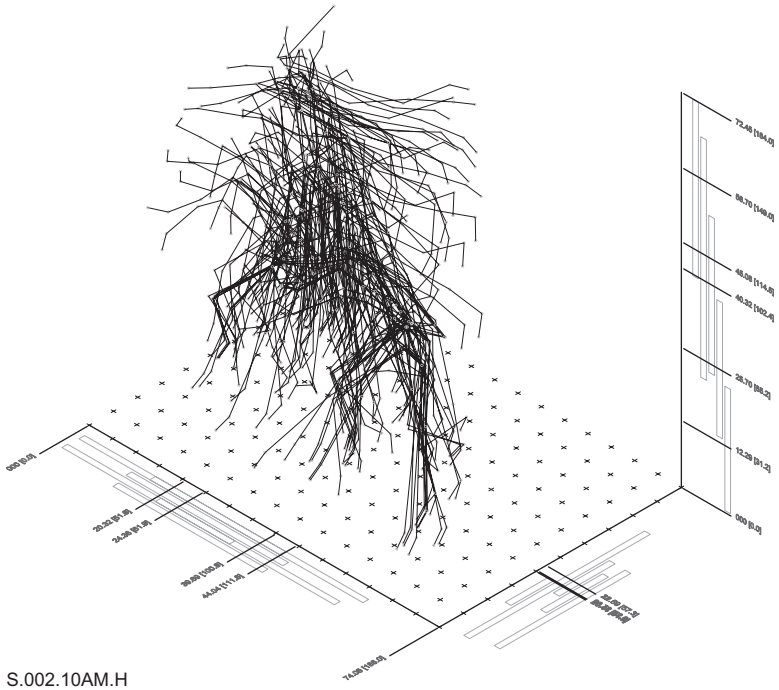


FIGURE 11.56 Skiers (S) Moderate



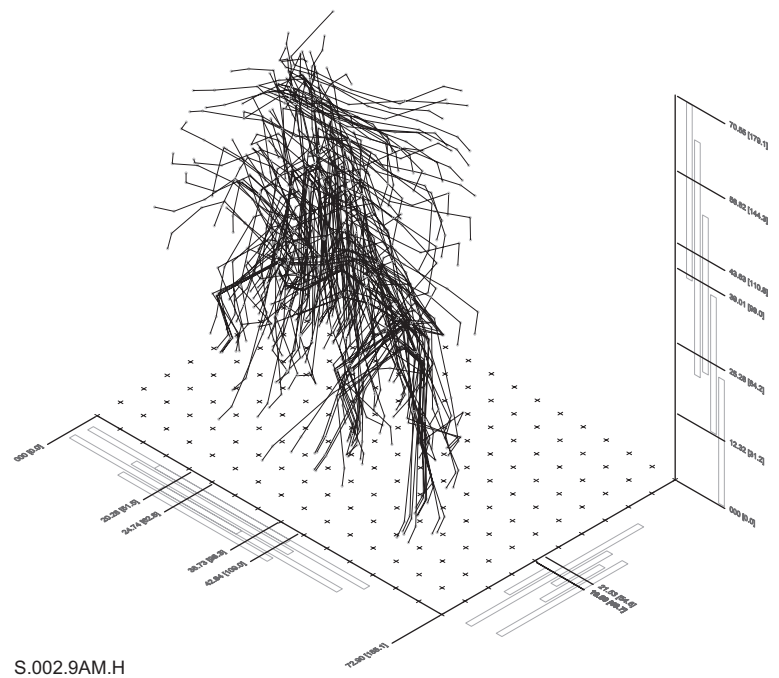
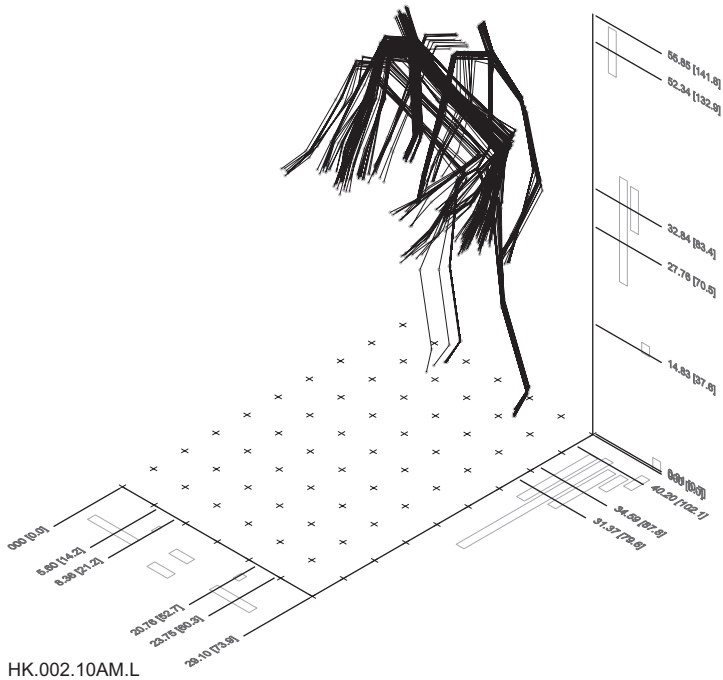


FIGURE 11.57 Skiers (S) High



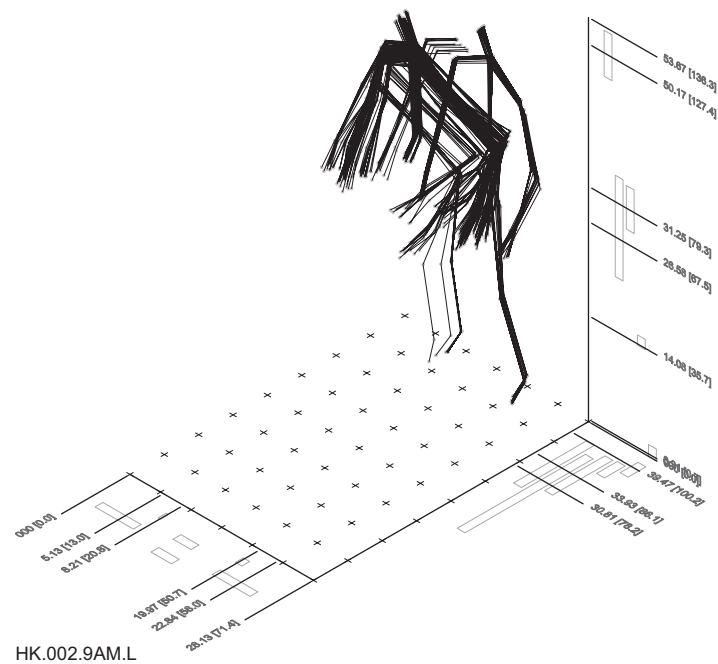
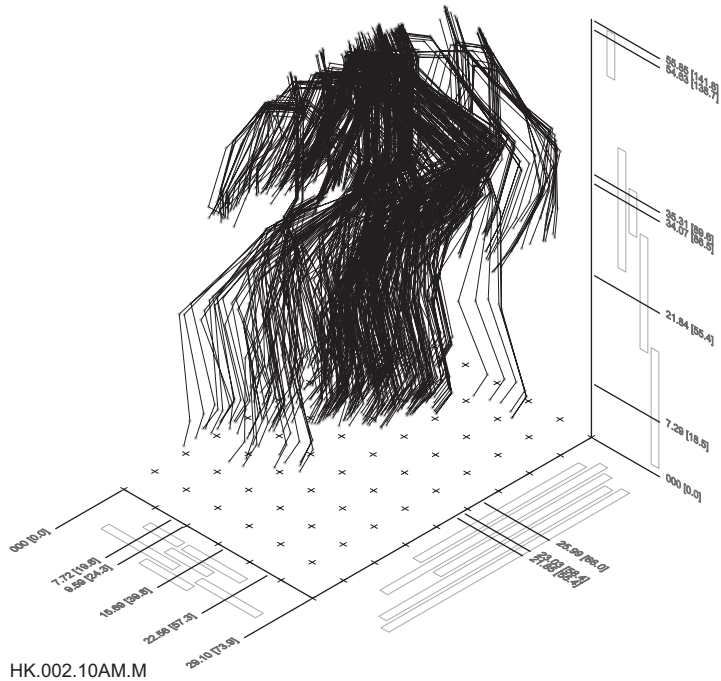


FIGURE 11.58 High Knees (HK) Low



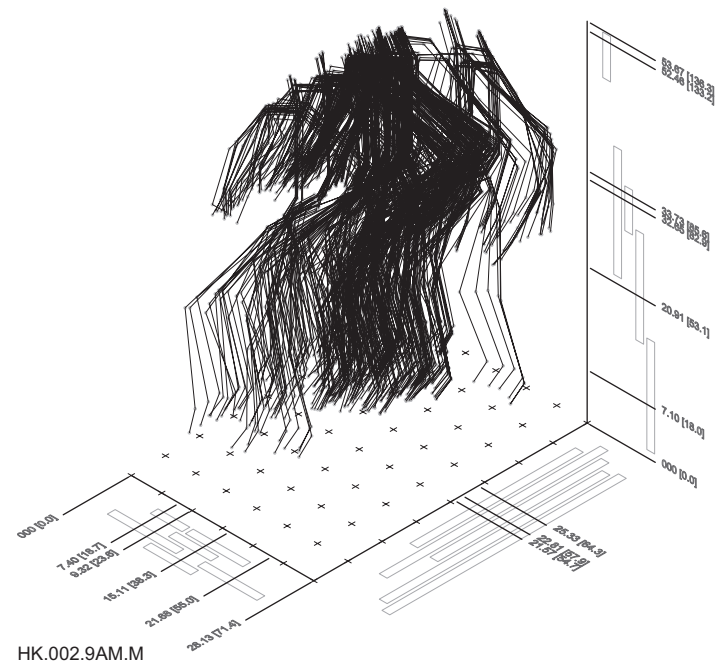
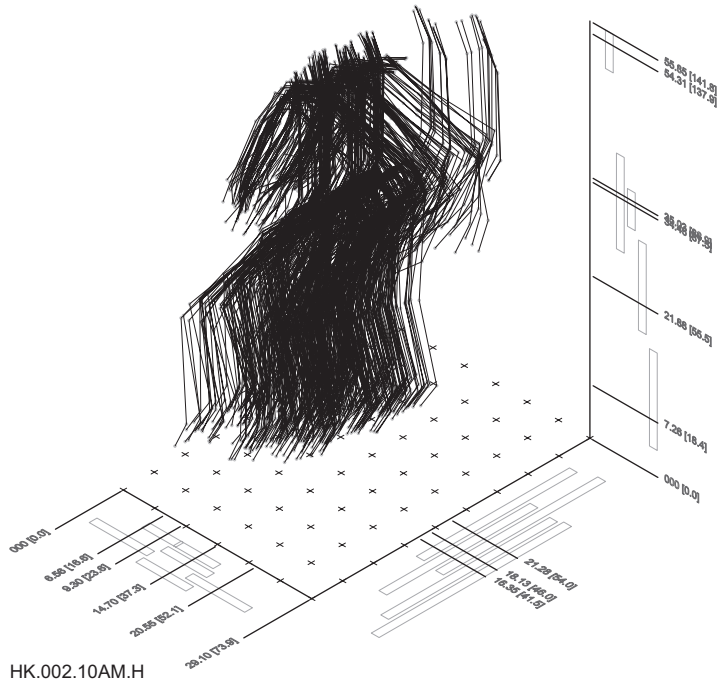


FIGURE 11.59 High Knees (HK) Moderate



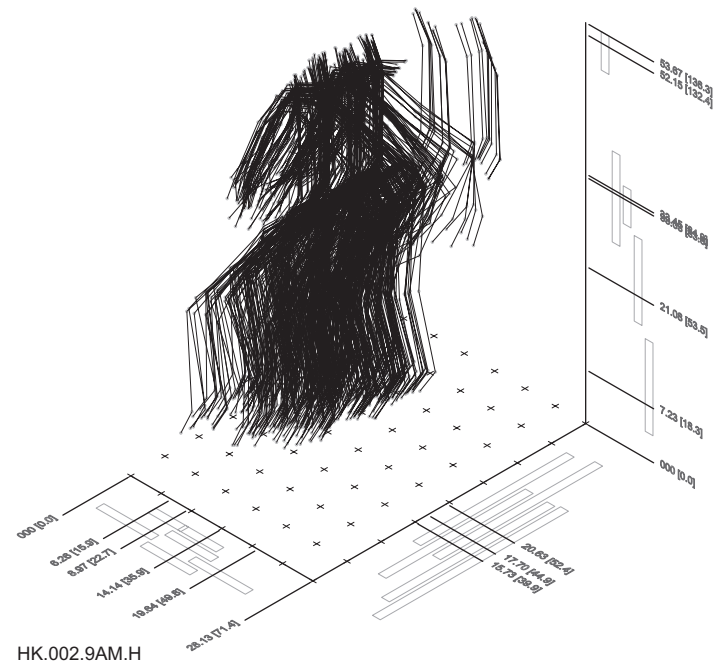


FIGURE 11.60 High Knees (HK) High

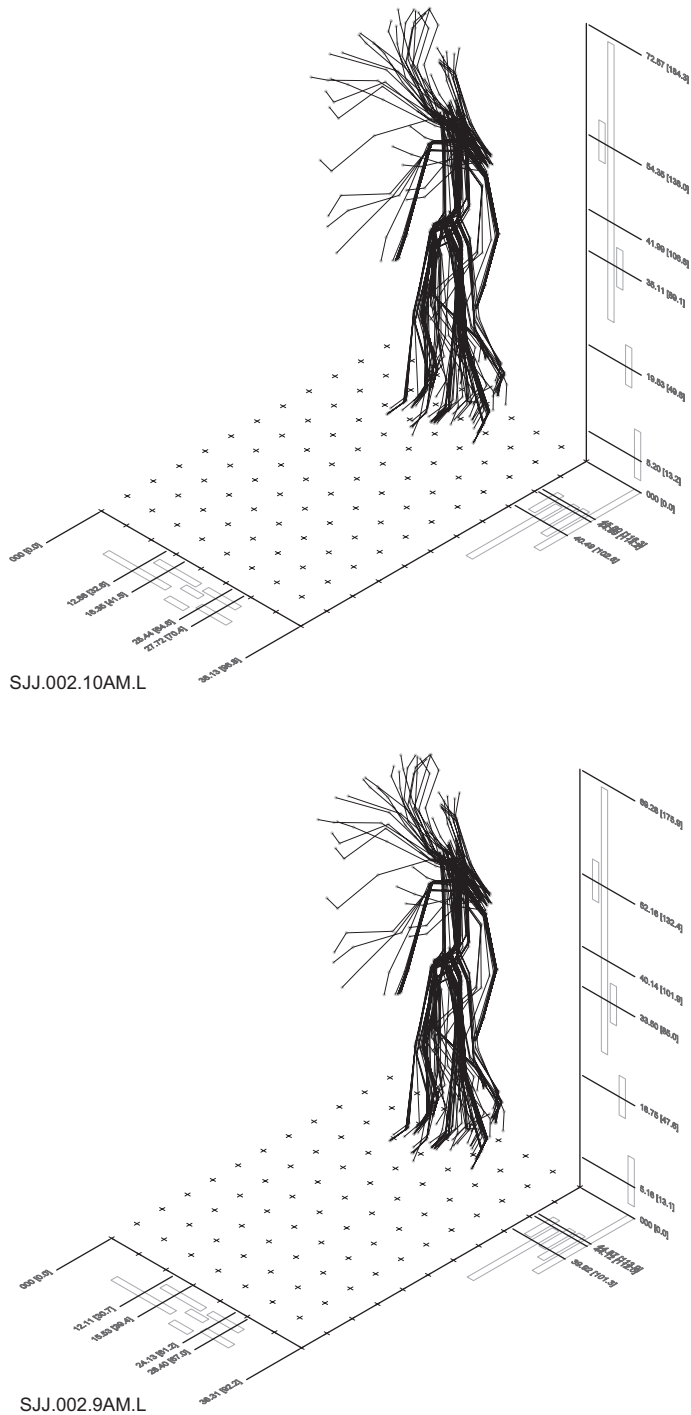
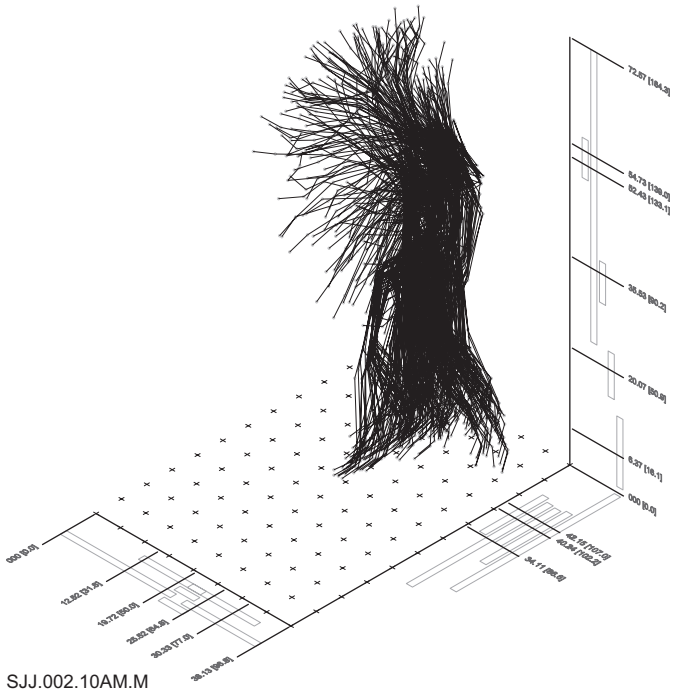


FIGURE 11.61 Sagittal Jumping Jacks (SJJ) Low



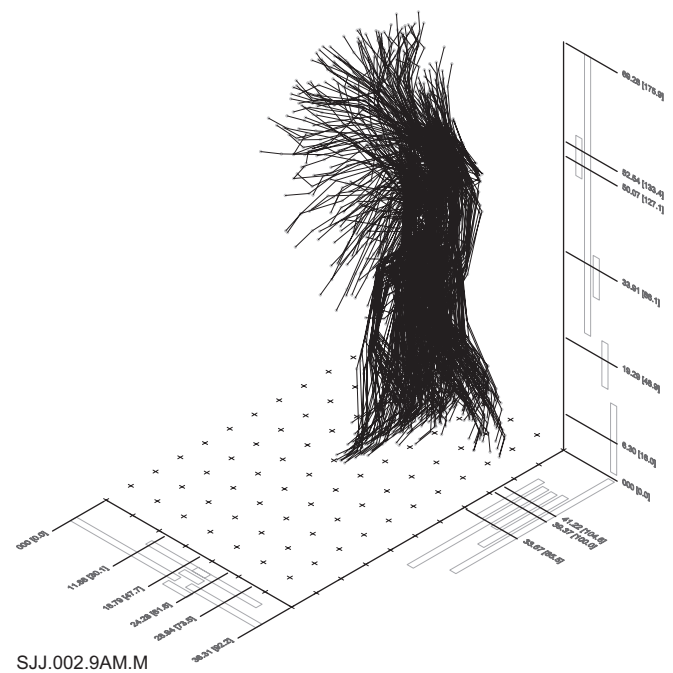


FIGURE 11.62 Sagittal Jumping Jacks (SJJ) Moderate

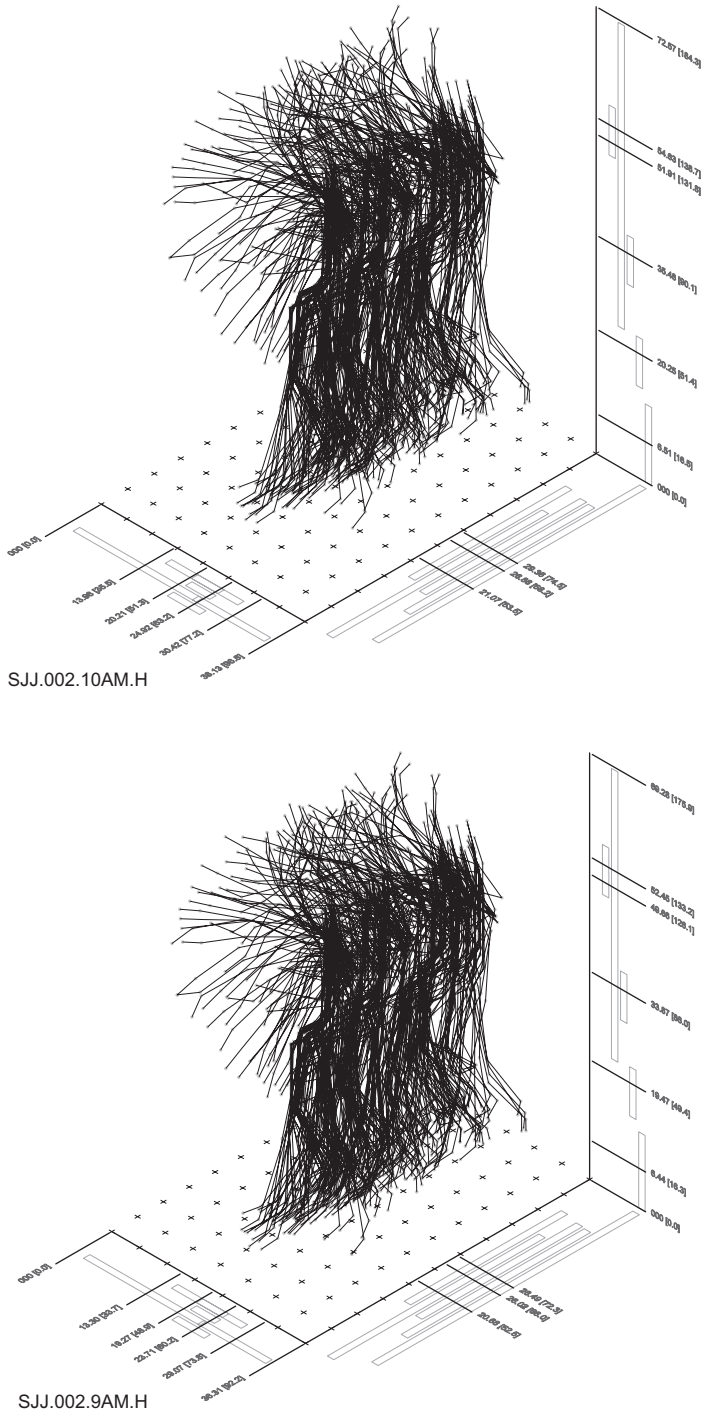
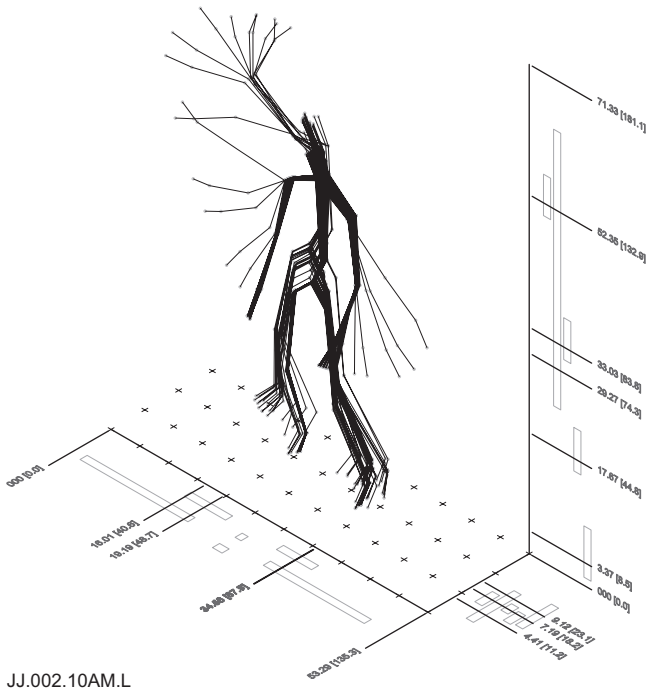


FIGURE 11.63 Sagittal Jumping Jacks (SJJ) High



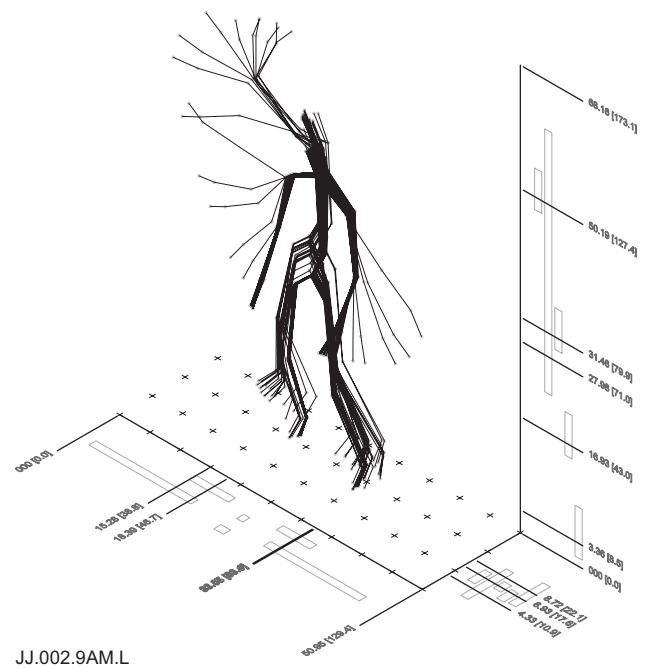
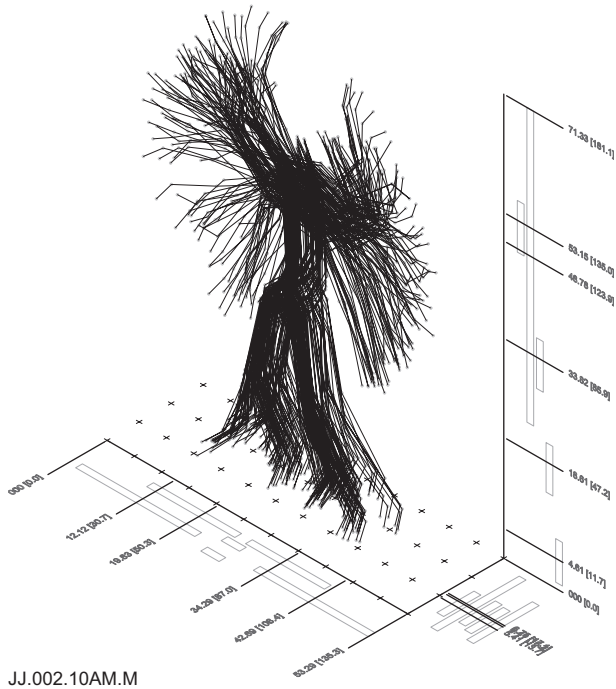


FIGURE 11.64 Jumping Jacks (JJ) Low



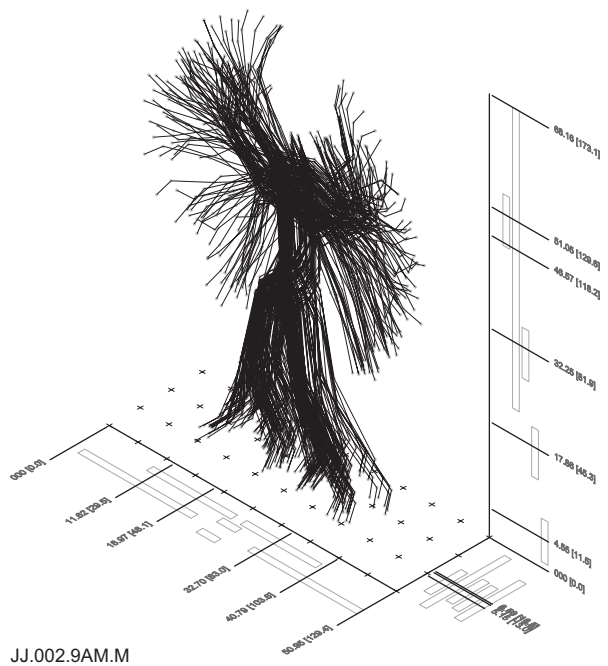
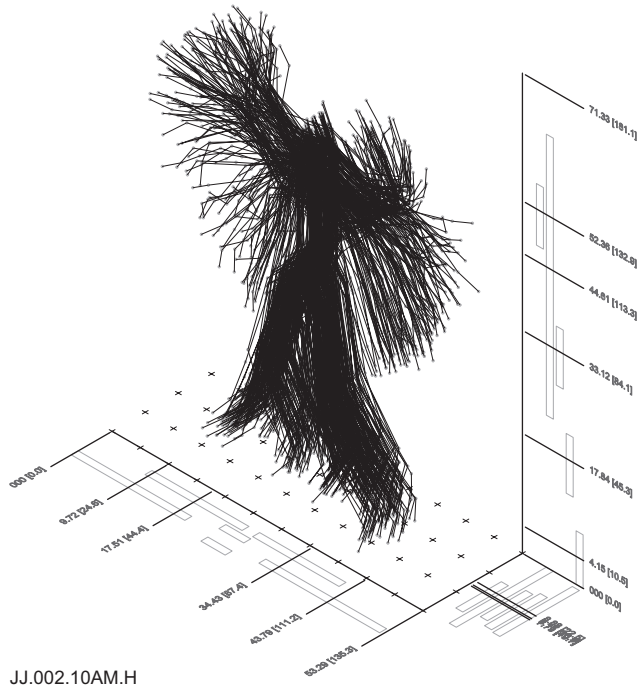


FIGURE 11.65 Jumping Jacks (JJ) Moderate



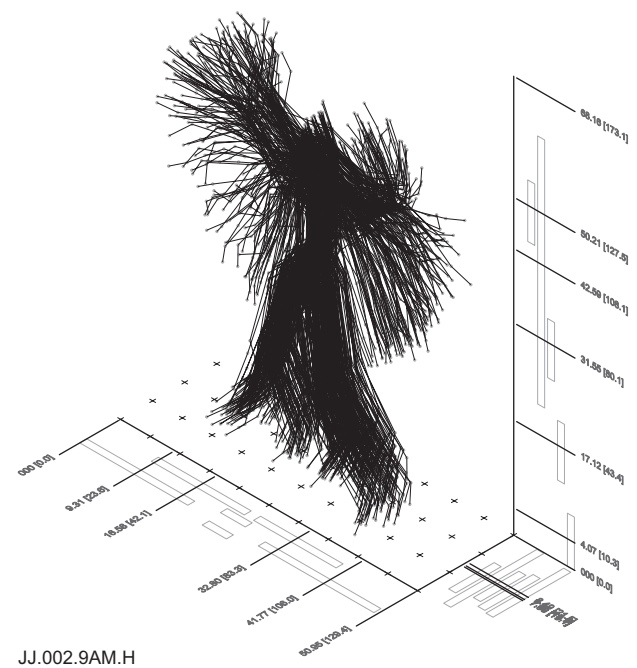


FIGURE 11.66 Jumping Jacks (JJ) High

orientation, and spacing. Additionally, the research expanded to introduce new furniture models for the room, which, when coupled with a more flexible teaching model, embraces greater student independence internally and externally in the hallway between classrooms. These are studies presented in the next section of this appendix. These conceptual theories contribute to the multidisciplinary question of the single classroom as a multi-activity speculative apparatus capable of adapting to the student's needs for individual or group activities, both seated and standing in the classroom.

While it seems natural to think of the problem as the desk arrangement in a room, the crowded conditions warranted a comparative analysis of the policy guidelines and practices against the prevalent furniture types. Primarily relying on our initial study mapping the coordinated movements of select exercises to determine the field of motion in defining the space needed to perform the activity break, the second study was the intersection of these findings with the territory between assigned desks. The behaviors in this condition warrant the student remaining in their desk throughout the day without moving from this location unless directed into coordinated activities by the teacher. The model sought to redefine the classroom into separate learning and activity zones, consolidating the activity zones into a shared common space connecting multiple clustered environments. The representational diagramming measured the differences in learning activity space less and was more focused on asserting the activity zone and querying the volatility of curricular control when separating measures for observation and engagement of class space activities.

Questions:

1 Are square footage designations established by the educational code reinforced in the daily school and classroom practices?
2 What is the impact on participation in in-class activity breaks when the population densities of children per classroom in low-socioeconomic schools are higher than the prescribed teacher-to-student ratio?
3 What modifications to furniture orientation and spacing can be done to elevate the lack of activity spaces in these conditions by measuring arrangement configurations based on existing furniture or no-cost adaptation to meet the participatory criteria within crowded conditions?

Methods:

1 Understanding current practices in facilitating physical activity in schools.
2 Architectural Drawings as investigative tools and documentation of space utilization during testing of activity breaks through research collaborations.
3 Rigorous analysis of the prototypical classroom environment.

The illustrations that follow are diagrams of a proposed classroom redesign reference depicting the furnishing arrangement in the classroom that will

allow clear floor space for the associated number of children seated at desks to participate in activity breaks within the classroom. Central areas are the activity zones, and border areas are the transition buffer spaces to prevent contact with furnishing during the activity (Figures 11.67–11.75).

Constructing Instances of Interface

The act of spatializing health is similar to the goals of the proceeding hypotheses on the model mechanisms of the classroom environment and how issues of crowding in these conditions inhibit the student's ability to self-regulate their behavior as a symptom of the furniture type, orientation, and spacing. The research of Drop, Kick, Push, and Pull expanded these previous studies of motion and affordances for interaction to propose the modification of building elements that embrace playful interdependence with the environment to encourage movement. These conceptual theories contribute to the multidisciplinary question of the value of informal spaces and transition spaces to individual health and wellness as a multi-activity speculative apparatus capable of adapting to the playful activity of an individual or group, seated and on the move.

The research interests involve the physical adjustments the body makes when encountering a range of varied surface positions to activate a gamified wall surface and how small amounts of displacement in the surfaces of

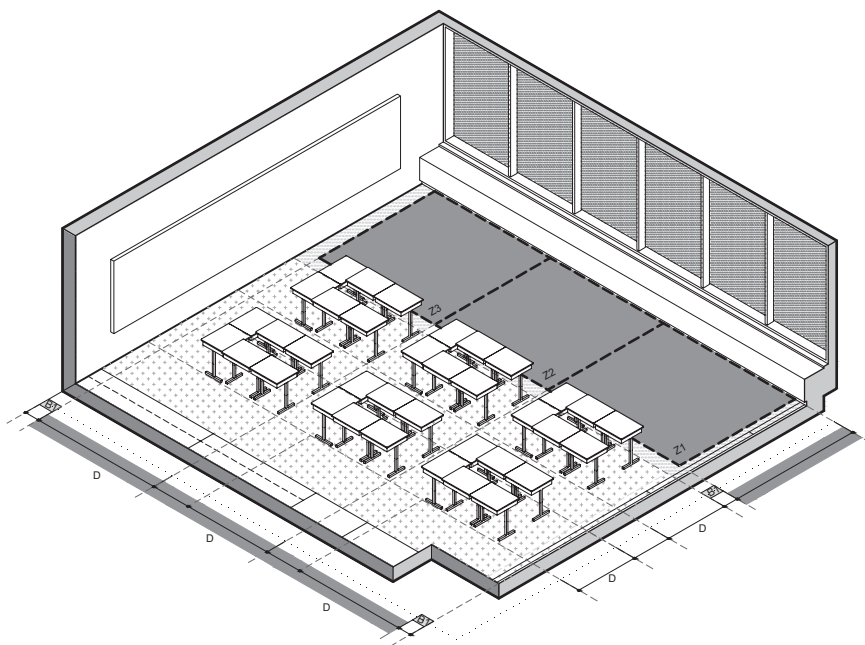


FIGURE 11.67 Zoned Activities: Linear Scheme 2

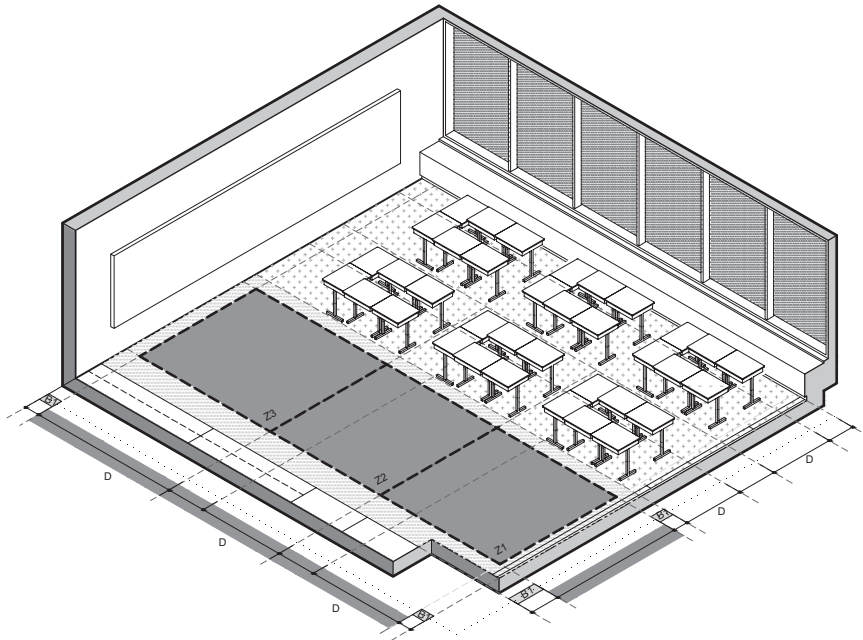


FIGURE 11.68 Zoned Activities: Linear Scheme 1

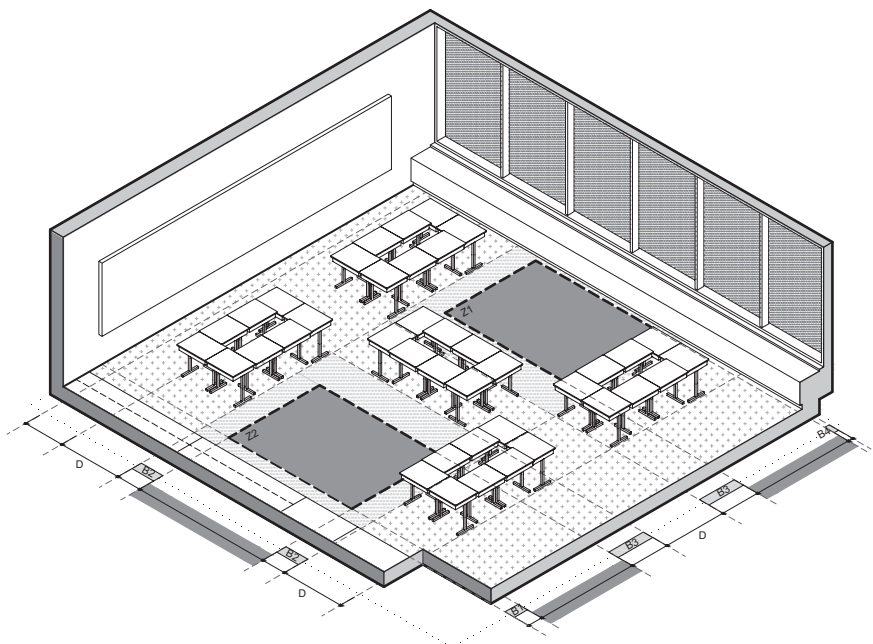


FIGURE 11.69 Zoned Activities: Isolated Scheme 2

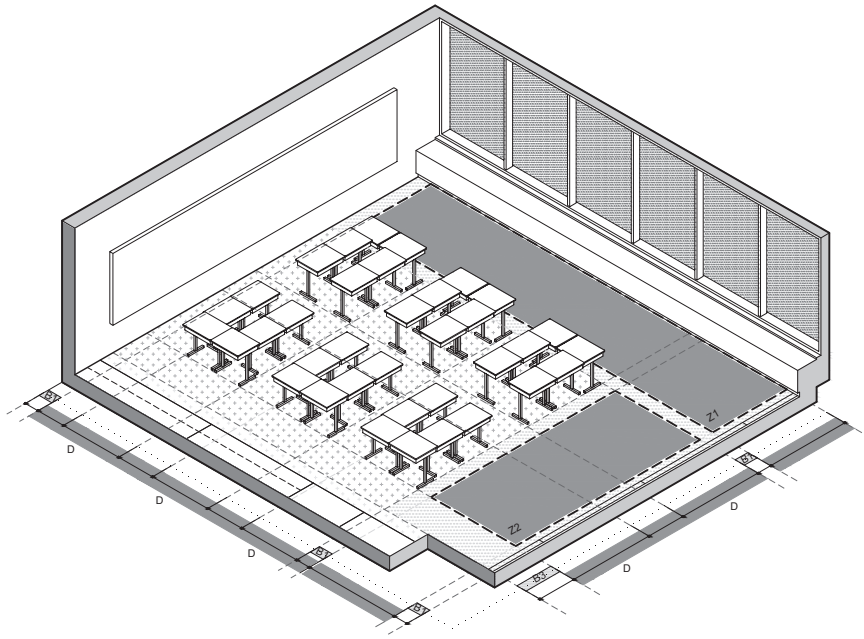


FIGURE 11.70 Zoned Activities: Turning Scheme 2

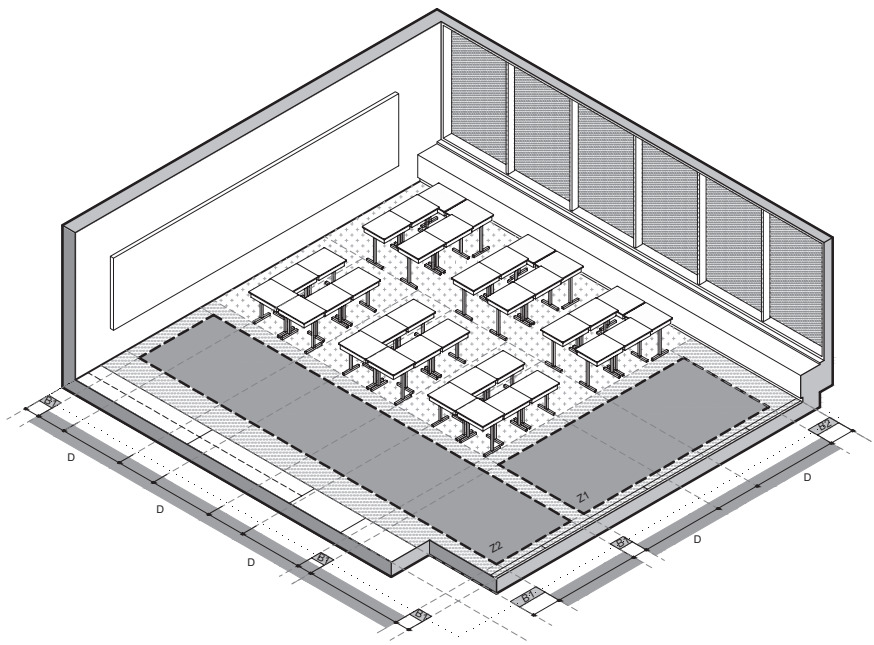


FIGURE 11.71 Zoned Activities: Turning Scheme 1

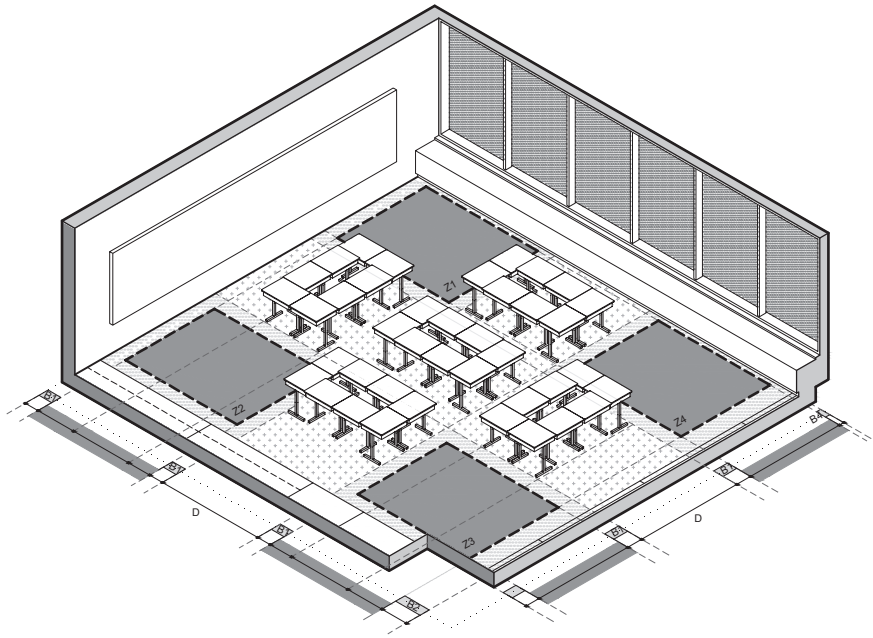


FIGURE 11.72 Zoned Activities: Isolated Scheme 1

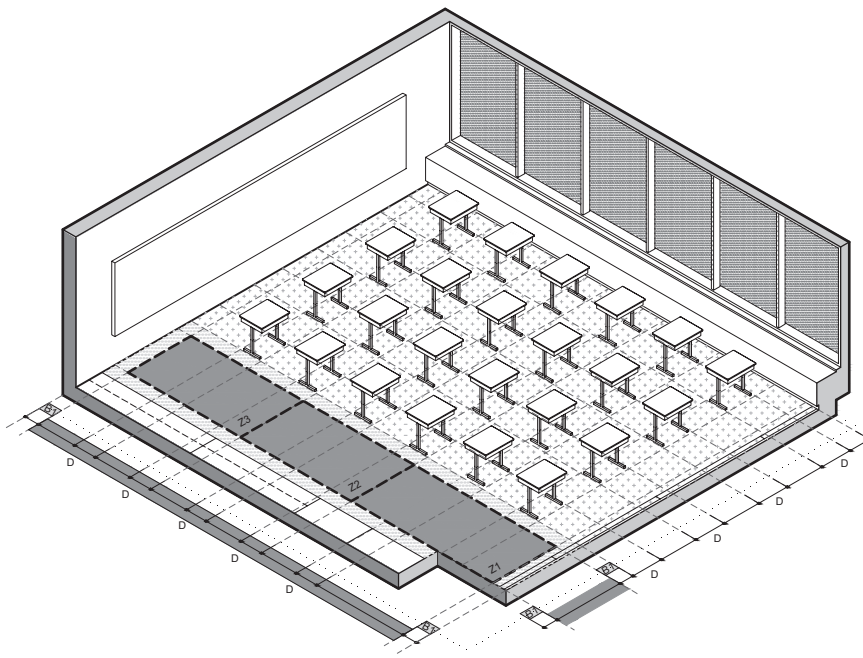


FIGURE 11.73 Zoned Activities: Grid Scheme 1

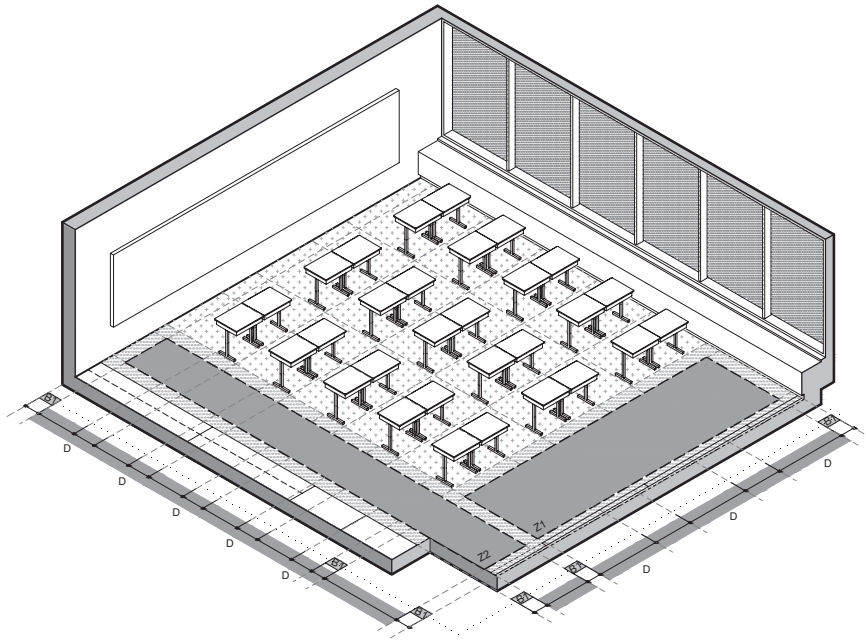


FIGURE 11.74 Zoned Activities: Grid Scheme 2

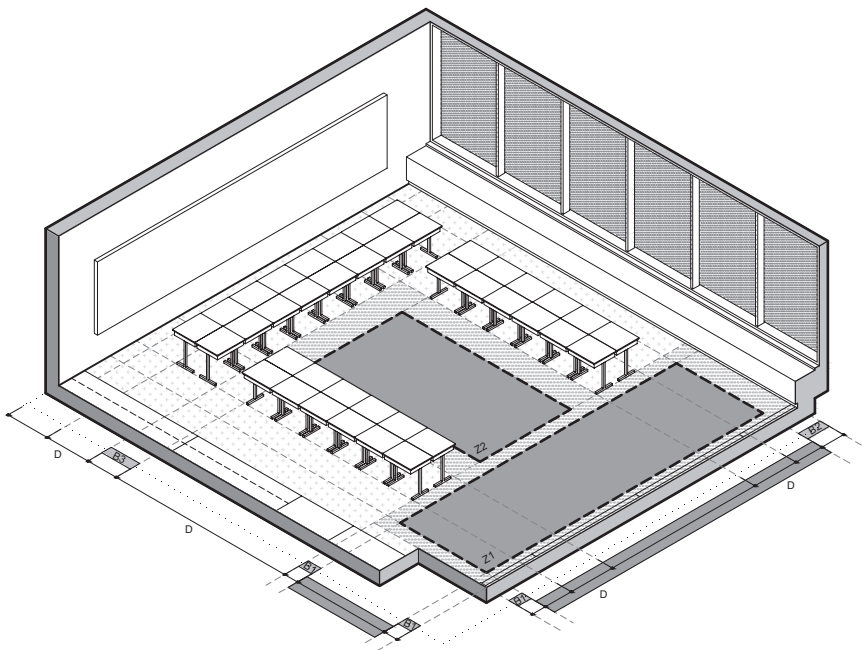


FIGURE 11.75 Zoned Activities: Intersecting Scheme 1

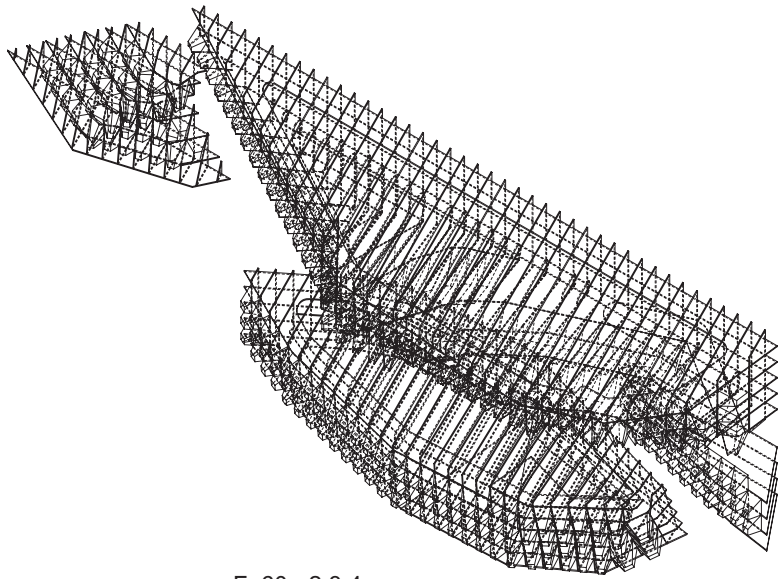


FIGURE 11.76 Wall Study gF_60-2,3,4

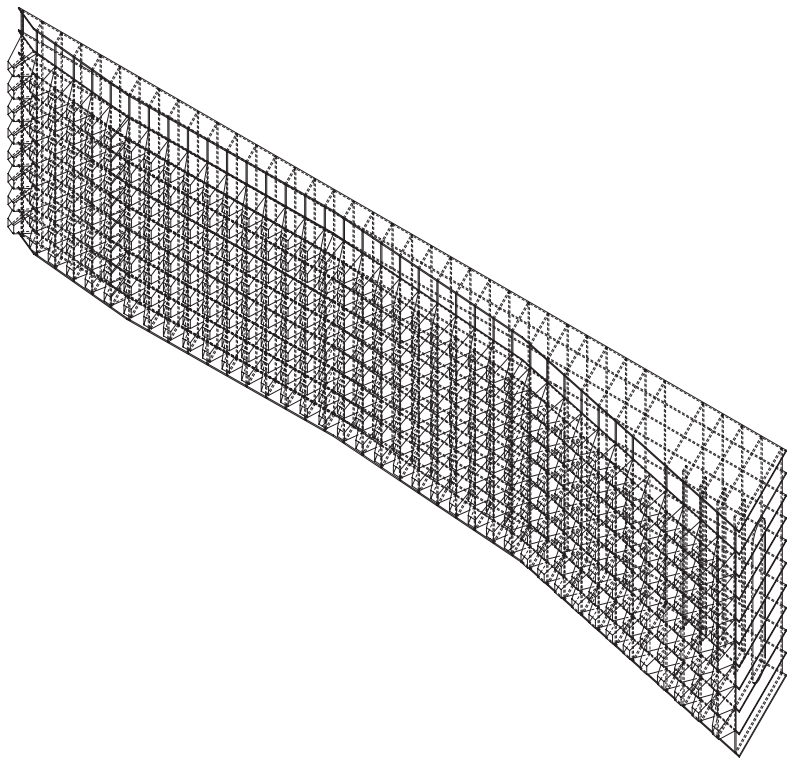


FIGURE 11.77 Wall Study gF_60-8

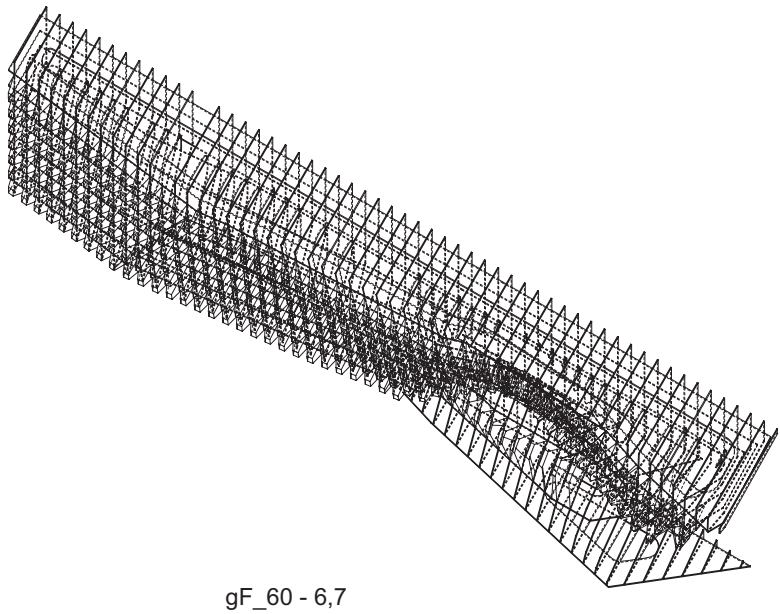


FIGURE 11.78 Wall Study gF_60-67

the setting continually challenge the body to change position during movements to play the game without causing discomfort. The research also interrogated static soft and hard surfaces for the design of controllers by testing the plausibility of kinetic resonance within the same surface while demonstrating methods for high-impact physicality when interacting with the controllers. The wall's design encourages bodily movements by placing suggestive interactive interface positions as instances for contact along a changing and challenging surface. The proposed activities interrogated formal considerations of the handgrip, weight-related displacements in standing and seated positions, weight displacement by handgrip, and displacement by isolated small muscle movements specific to standing or seated positions.

The research also tested a variety of polymers for flexibility, resilience, strength, and durability in withstanding repetitive activities related to compressive and tensile displacements. The research task was to test the performance criteria for embedding sensors into prototype control pads, testing their ability to receive information dependent on the thickness of the polymer setting and its flexibility. Applications for the tested sensors and their polymer settings are in pliable and wearable technologies that monitor physical activity, displaceable objects within a room, and surfaces within a room that monitor and react to levels of engagement by physical displacement or activity.

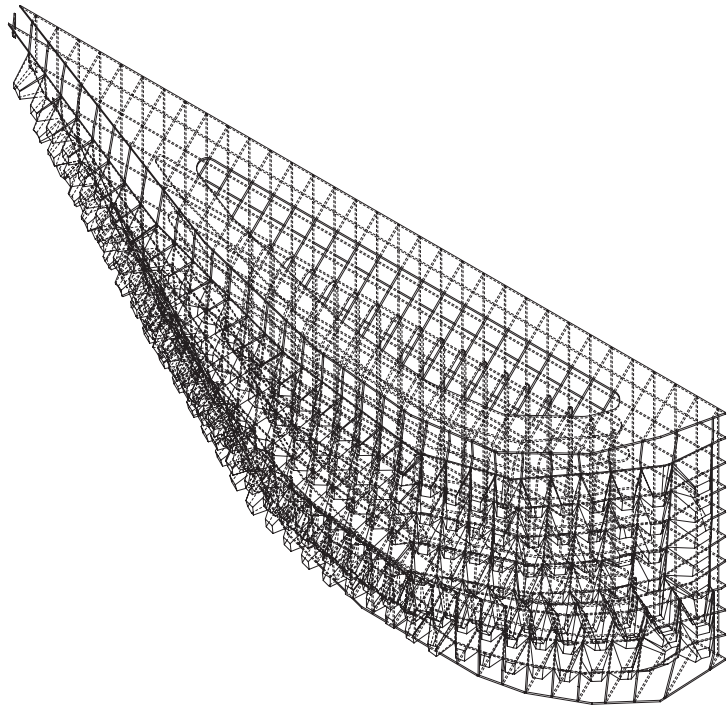


FIGURE 11.79 Wall Study gF_90-1

Questions:

1 What are the affordances in the designs that facilitate reach and range of motion based on the motility and mobility of young persons?
2 How do these architectural interventions influence the interaction of prototypes and speculative furniture using speculative materials?

Methods:

1 Constructability of stacked Play Units in creating an interactive wall element for testing prototype silicone controllers with embedded sensors.
2 Rigorous analysis of the configuration of a wall as a prototypical play element.

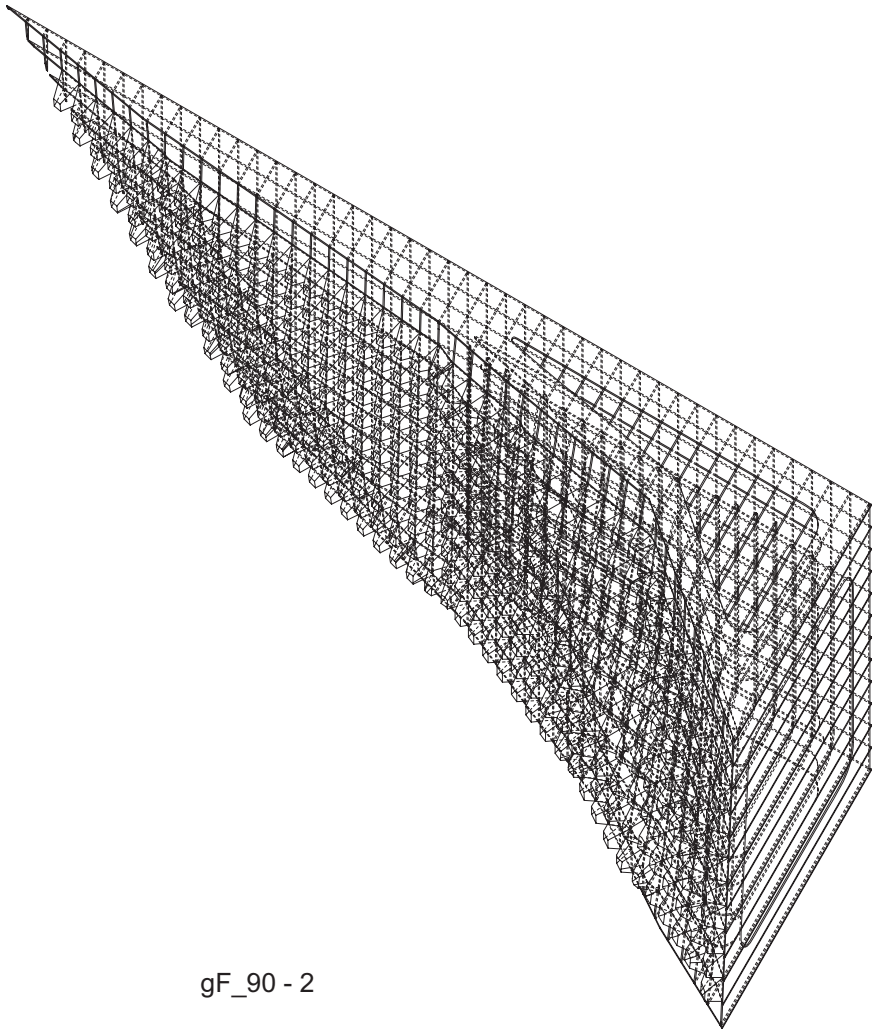


FIGURE 11.80 Wall Study gF_90-2

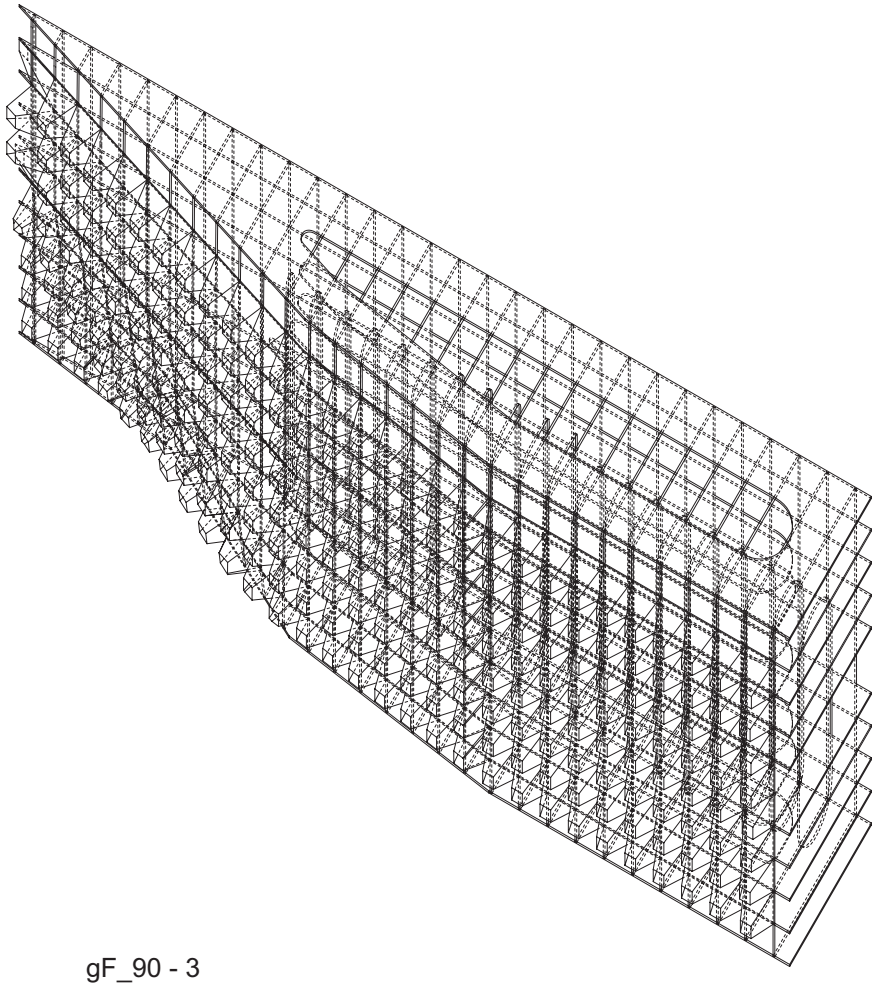


FIGURE 11.81 Wall Study gF_90-3

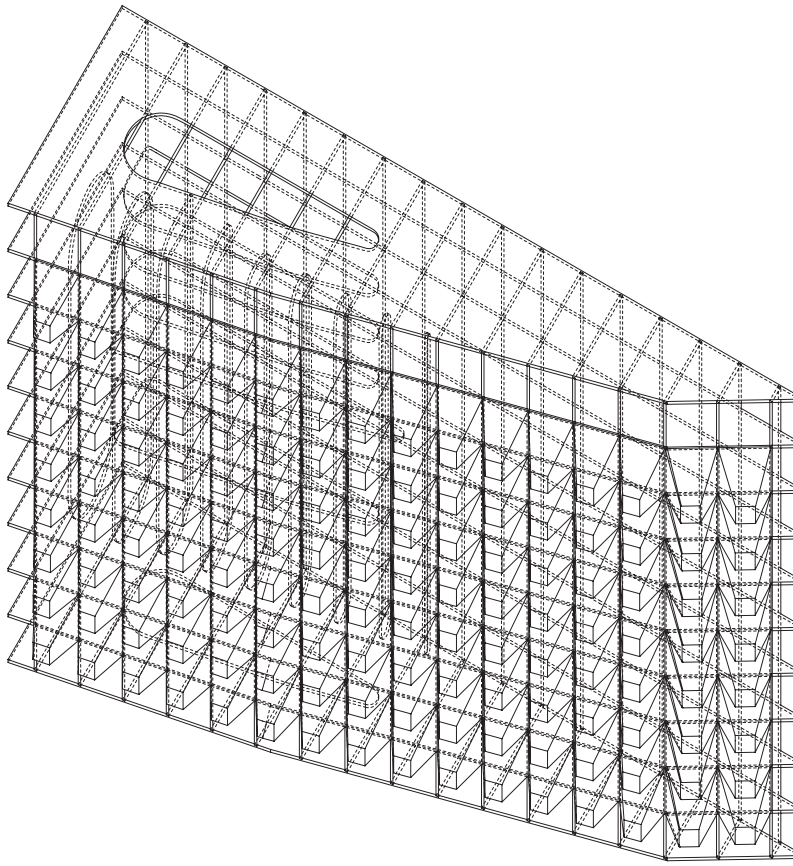


FIGURE 11.82 Wall Study gF_90-4

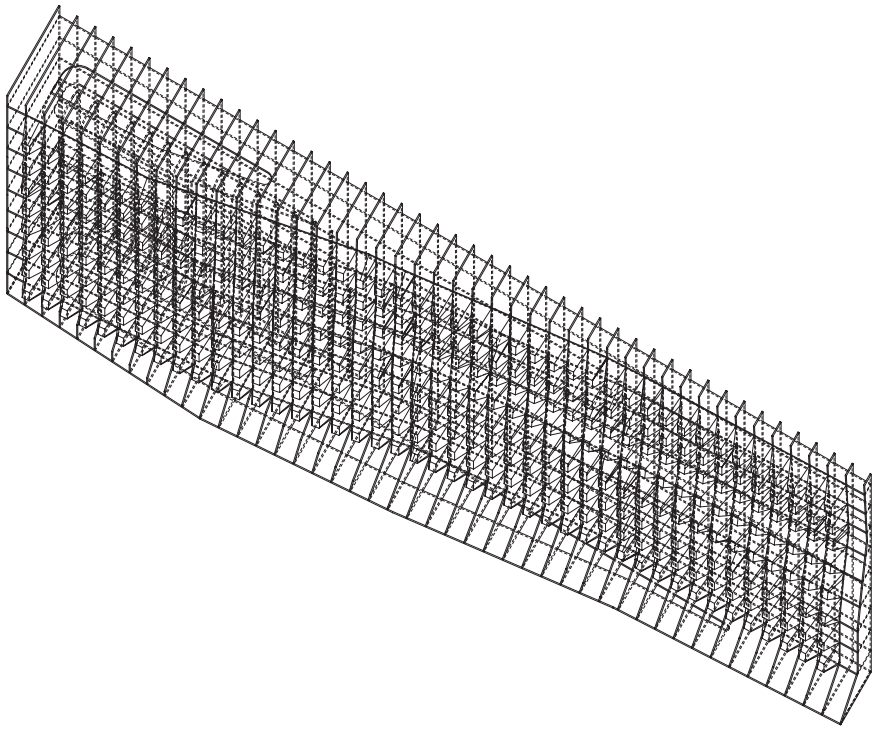


FIGURE 11.83 Wall Study gF_120-1

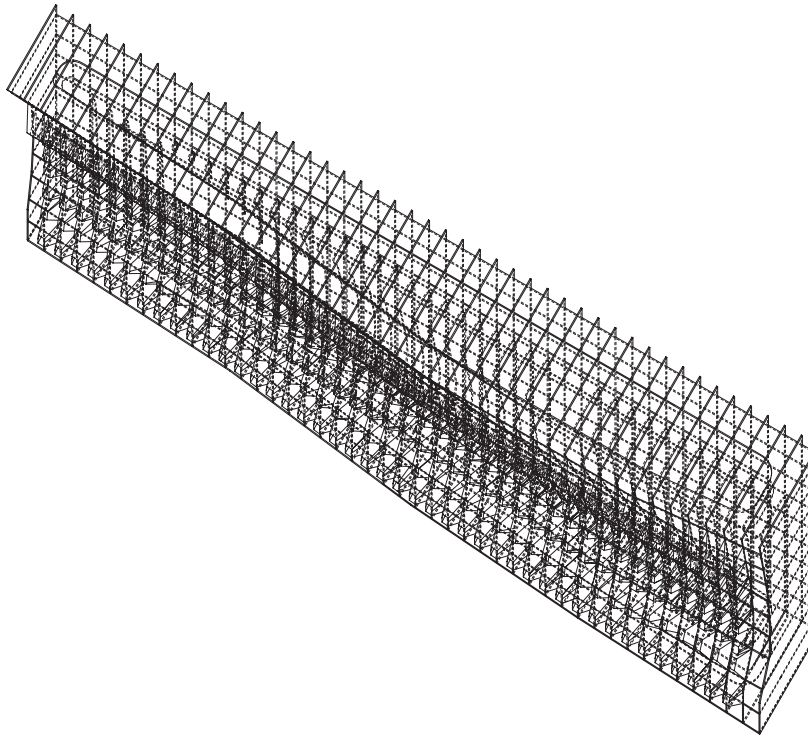


FIGURE 11.84 Wall Study gF_120-2

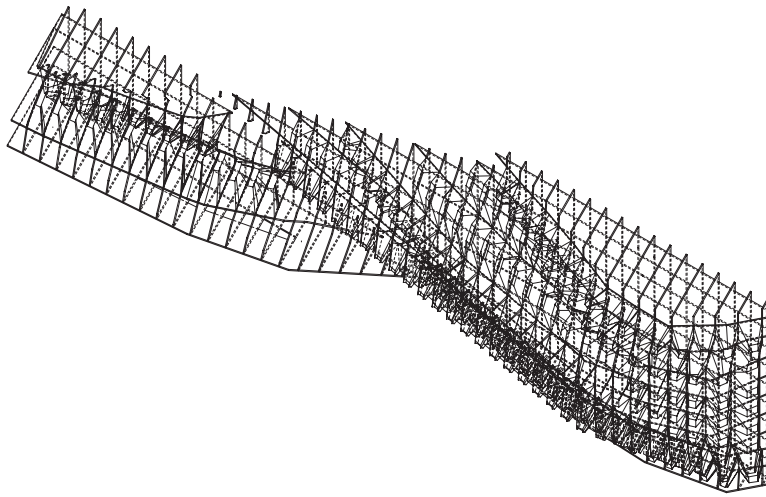


FIGURE 11.85 Wall Study gF_120-3,4

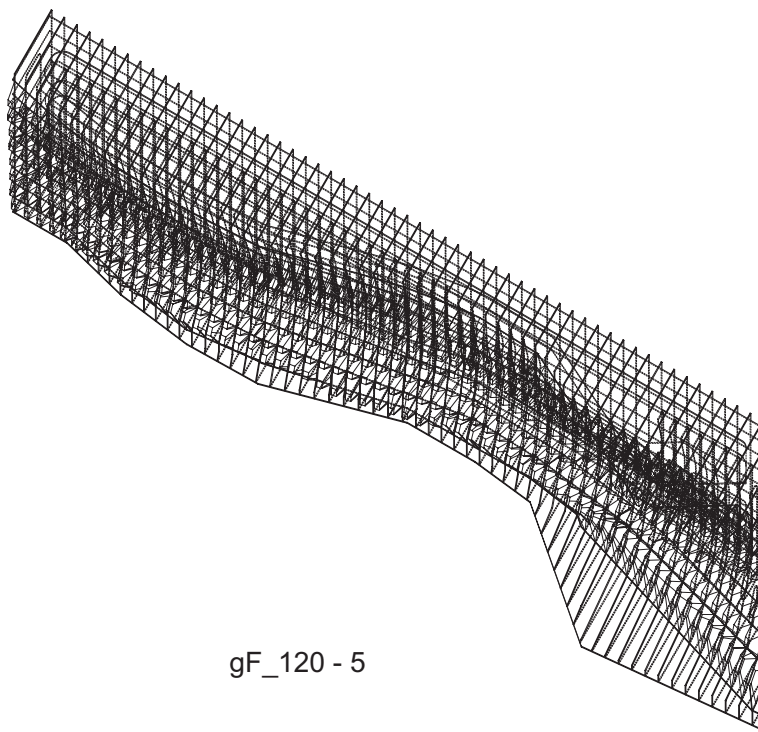


FIGURE 11.86 Wall Study gF_120-5

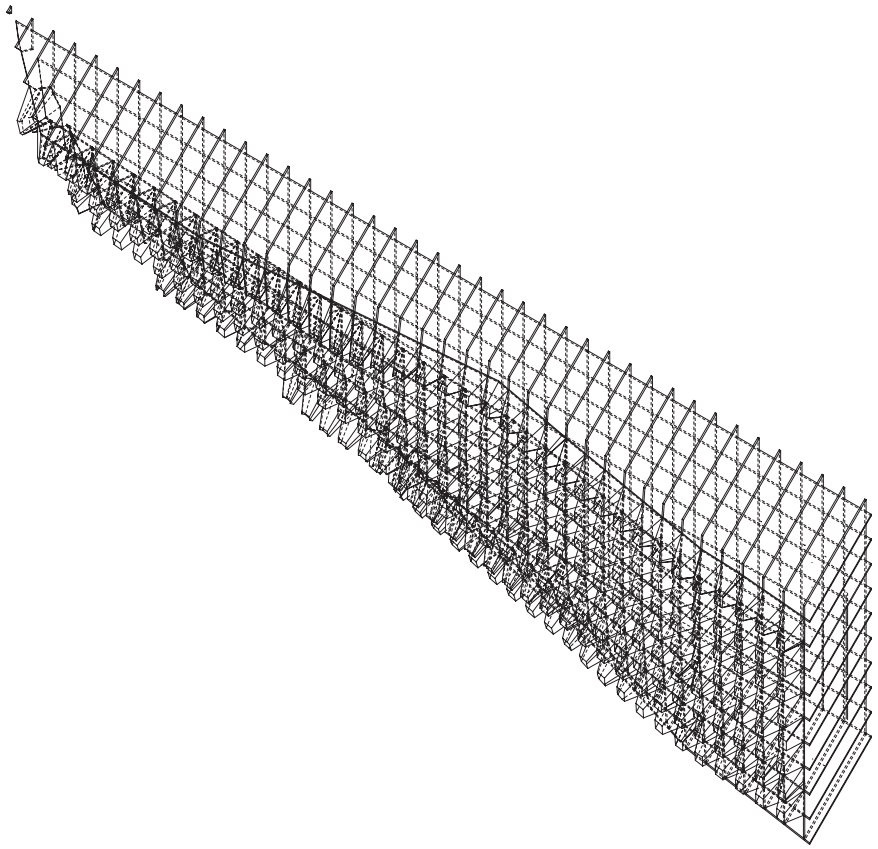
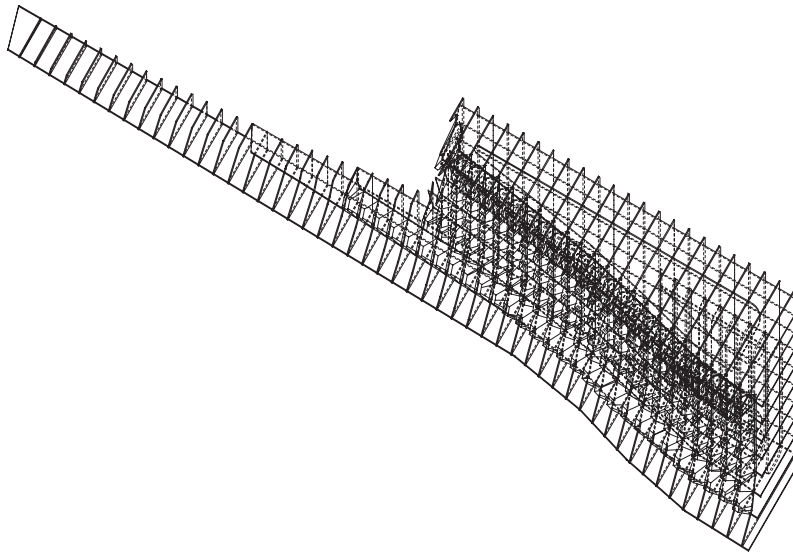
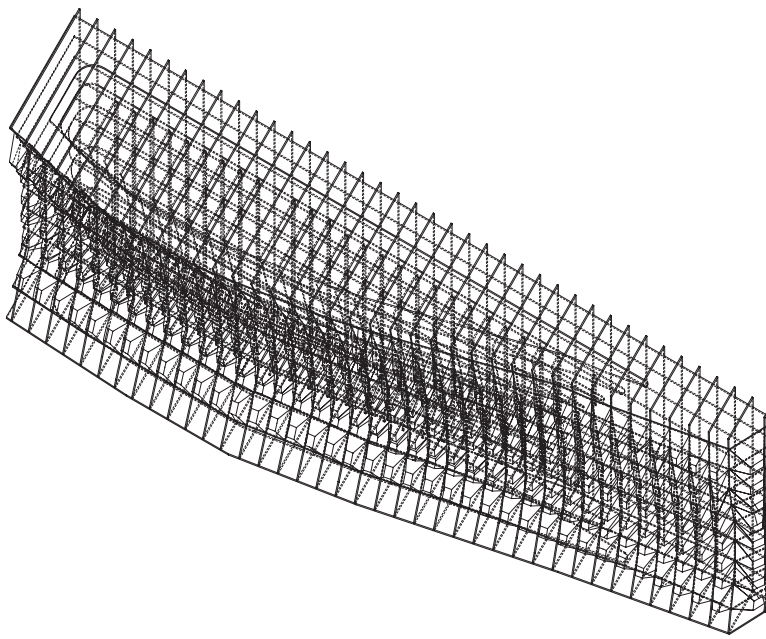


FIGURE 11.87 Wall Study gF_120-6



gF_180 - 4

FIGURE 11.88 Wall Study gF_180-4



gF_180 - 5

FIGURE 11.89 Wall Study gF_180-5

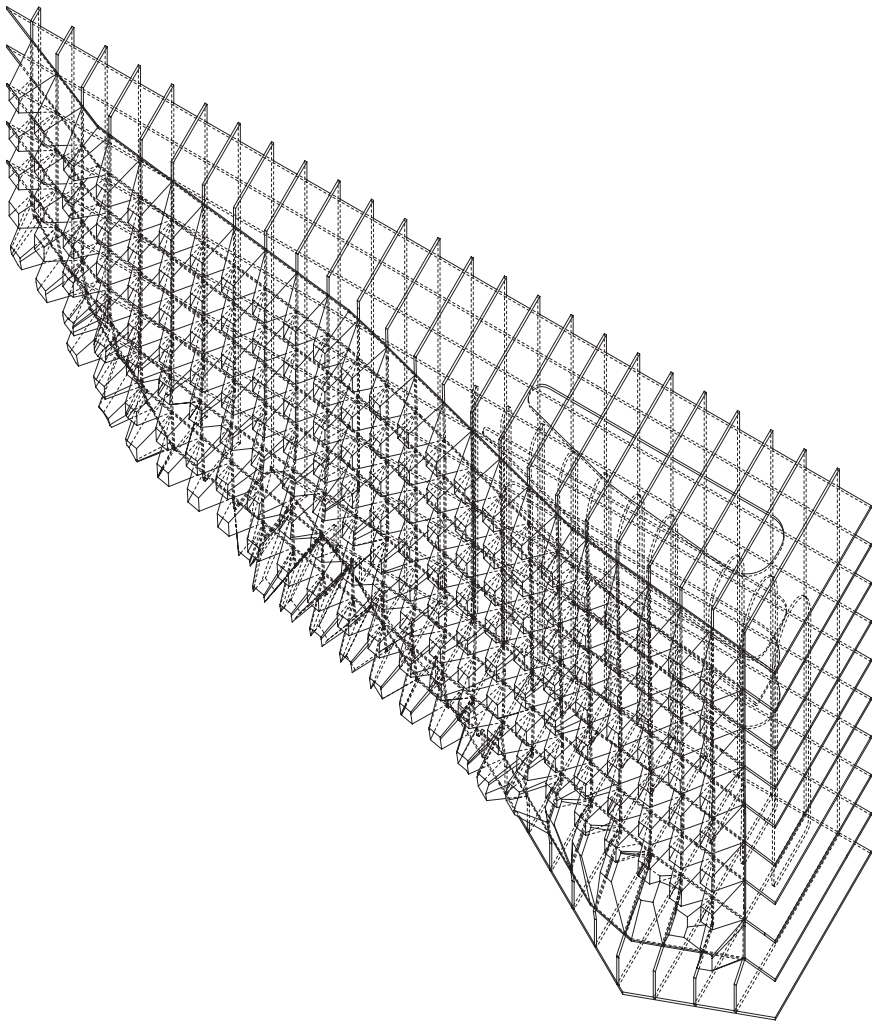


FIGURE 11.90 Wall Study gF_180-6

The following illustrations are diagrams depicting the wall construction of the Drop, Kick, Push, Pull Project, which interrogated the range deviation from a vertical wall to afford physically touching a silicon control pad as an interface that controls a light-based game. Investigating play as a means to encourage physical activity through interactive Building Elements (Figures 11.76–11.94).

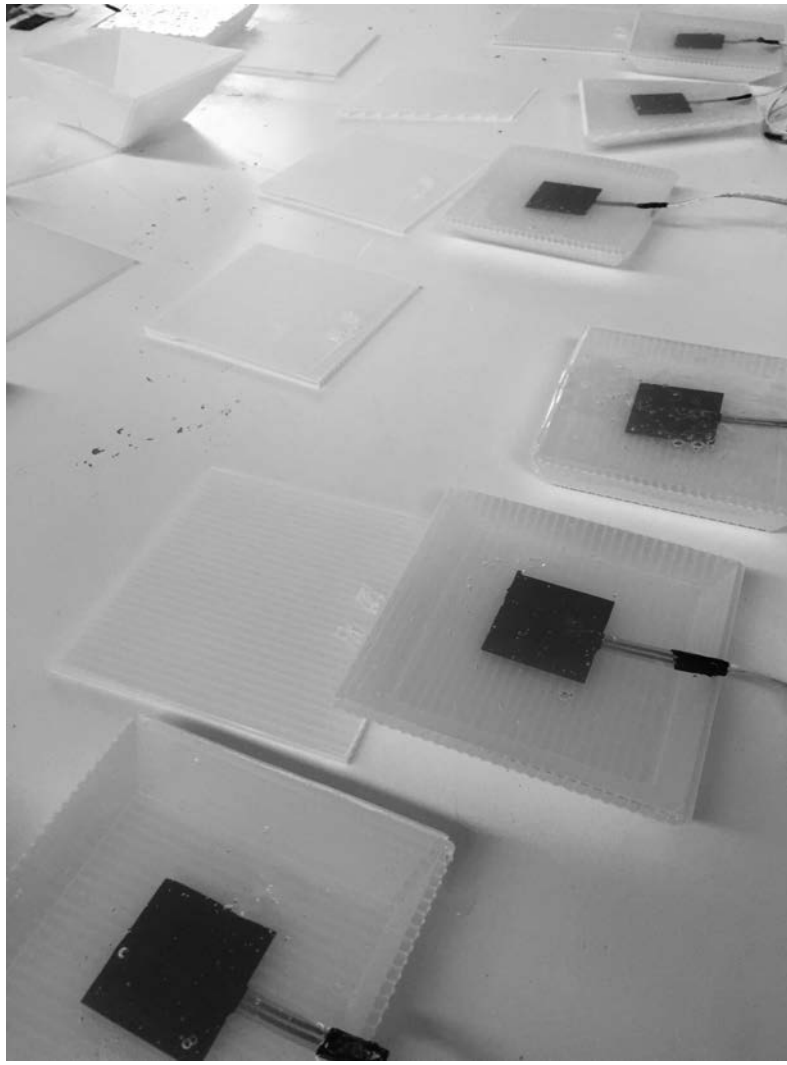


FIGURE 11.91 The embedding process, placing touch sensors into the silicone cast of the interface controller units

FIGURE 11.92 The geometry of the silicone controller completed

FIGURE 11.93 Active color lighting test of a wall segment. Lighting was controlled regionally through Arduino units installed within the waffle frame structure. The Arduino units collectively synchronized to control the game simulation. The wall segment was taken from a section of gF_120-5 (Figure 11.86)

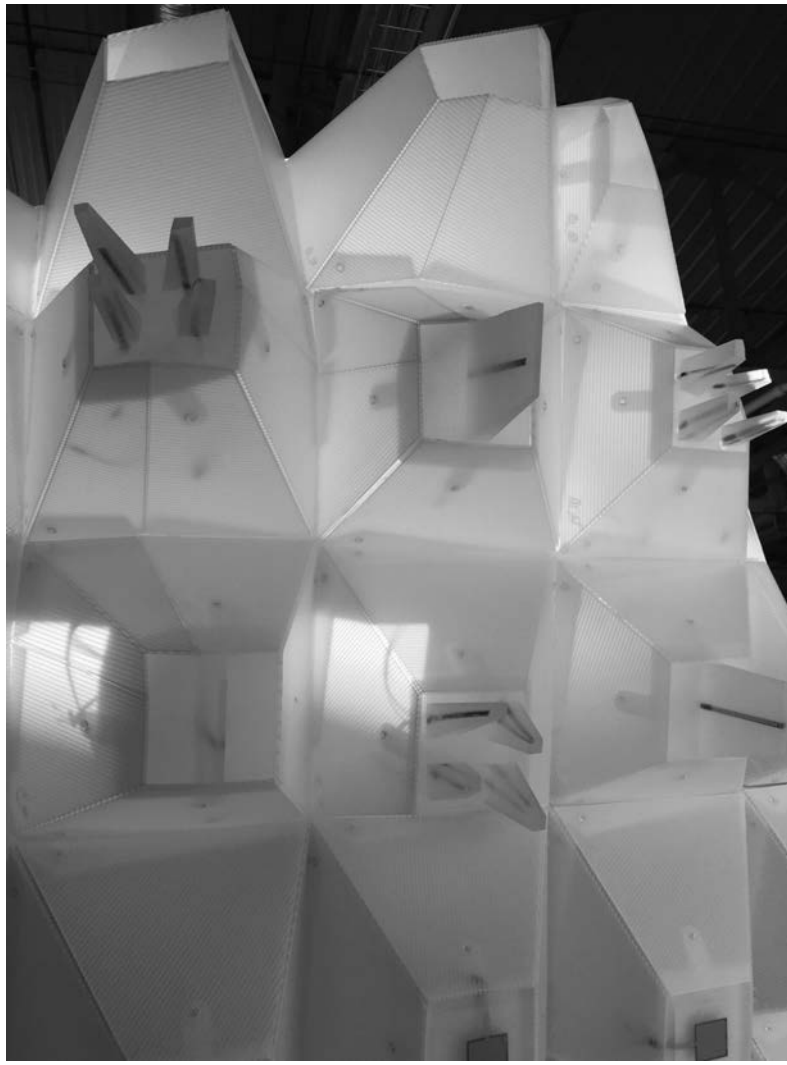


FIGURE 11.94 Silicone controllers in place within the waffle frame wall system

Notes

1 Ulysses S. Vance III, Noel Hernandez, O. Tabor, I. Donaldson, and M. Elliott, "Acts of Spatializing Healthy: The Adolescent Body in Motion" (Paper presented at the 8th International Conference of the Arab Society for Computer Aided Architectural Design (ASCAAD): Parametricism vs. Materialism: Evolution of Digital Technologies for Development, SOAS University of London, London, UK, November 7–8, 2016), 309.

2 Beemer, Lexie R., Tiwaloluwa A. Ajibewa, Molly P. O'Sullivan, Matthew R. Nagy, Ben Ransier, Darin Stockdill, U. Sean Vance, Natalie Colabianchi, and Rebecca E. Hasson. "Feasibility of the InPACT Intervention to Enhance Movement and Learning in the Classroom." *Translational Journal of the American College of Sports Medicine* vol. 3,18 (2018): 136–151.

INDEX

Note: *Italic* page numbers refer to figures and page numbers followed by "n" denote endnotes.