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I, Ashley R Griffith, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture.

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Baking a Building: An Experiment In Activating the Senses

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Baking a Building: 
An Experiment in Activating the Senses

A thesis submitted to the Division of Research and Advanced Studies
of the University of Cincinnati in partial fulfillment of the requirements for the degree of

Master of Architecture

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Abstract

Imagine a blank space: still, quiet, colorless, and full of nothing. One by one begin to add elements. A window drips light into the space. It opens and a breeze lofts in the scent of crisp autumn leaves as they rattle around dancing in the trees outside. The heat of an oven, emitting a tempting aroma of rising bread, warms the space. The smooth texture of the coffee stained table waits to be dusted with crumbs. The space evolved from a boring, blank slate into somewhere thought provoking and emotional. By studying the ways senses can impact space, this thesis strives to bring feeling into the built environment.

It is important to design with the senses in mind, because the way in which places are perceived has everything to do with the way people interact with and react to a space. Sight, touch, taste, smell, and sound each work together, which create the moods and tones in any space. Visitors are not only interacting with people and objects in a space, but the inherent properties given to it by design. People remember spaces by both the activities they do in them and the way the space made them feel. The same part of the brain that is in charge of processing our senses is also partially responsible for storing emotional memories. As we perceive various sensations, our brain understands them and enables us to recall and form correlations between places and events. This thesis shall explore ways of evoking the senses in order to create experiences and memories with architecture.

This thesis proposes the design for a bakery in the Over-the-Rhine neighborhood of Cincinnati. A bakery has a building typology that uses a standard design process to house a specific set of program requirements. However, rather than issue a “cookie-cutter” bakery program, this thesis enables the bakery to become an experience of the senses that occupants use during the process of baking. The process of baking includes five main stages: preparing, mixing, baking, decorating, and serving. Each stage not only requires different spatial affordances, but various means of sensory engagement as well. Each stage also houses a variety of learning opportunities and social interactions, which enhance the sensory experience at both large and small scale instances.
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1. Introduction

At the corner of 16th and Tremont Street on the west side of Indianapolis, Indiana, you will find a small white house made from vinyl siding with a pitched roof and a small ramp leading to a single door. The sign above reads, “Long’s Bakery”. Inside, the space is cramped, standing room only, with just enough space for one line of people to wrap from the door to the check out counter. While waiting in line, there is no way to experience the bakery’s options and no time to think about what you want to order. There is one small display case not big enough to show all of their sweets and treats and a doorway leading to the main storage of baked goods and kitchen area, also cramped and uncomfortable looking. Despite the conditions and lack of environment, people travel from all over the state to grab dozens of donuts, the bakery’s most popular item. However, once these people arrive and pay for their donuts, there is no space available to enjoy them. Instead, these sought after donuts become a rushed and uneventful snack, treated the same as many meals in America’s fast food culture.

This particular bakery may have a few reasons for providing this sort of “fast food” experience. It could be that starting up in this little white house was the most efficient economical decision for a small business owner. Now that their product has become successful and well known, is it pointless to invest in a better experience for their customers? Or would it be too much to compete with other “fast food” establishments like Dunkin’ Donuts, Starbucks and Panera? Not only has the fast food industry transformed the American diet, but also our landscape, economy, workforce, and popular culture. According to Fast Food Nation: the Dark Side of the
All-American Meal, “one out of every nine Americans can now go from the cradle to the grave without spending a nickel at an independently owned business.”¹ But why should small businesses like Long’s Bakery try to mimic the same concept of chain bakeries? Rather than attempting to compete with them, they should be providing something that these drive-through based chains do not offer: experience.

These chain establishments focus on moving customers through a line and out the door as quickly as possible in an attempt to sell more food and make a higher profit. And in a culture that is so focused on individual busy lives, this has worked. Families no longer have time to have meals together, they have to get their kids to practices and afterschool functions then get prepared for the next day of work. On an average day in the United States, about ¼ of the population visits a fast food restaurant.² Not only does this negatively affect diet and nutrition, but it also limits building relationships, experiences, and memories. Fast food only addresses one reason that people eat, which is for sustenance. We need food to survive, but what happens when we don’t have time to make it or sit down for a nice meal? We stop in some generic place where we can get something fast and to-go. However, these generic shops typically don’t give any effort to nutrition or quality and no thought to social interaction, experience, or memory. In countries like Italy, France, Spain, Greece and Japan, it is not uncommon for a meal to last several hours. These long meals provide quality time with friends and family and encourage healthful bonds. According to CNN, the body processes food more easily and efficiently when it is calm. Eating comfortably and slowly also discourages overeating and enables relaxation, which aids in digestion.³ With this way of interacting with food, people are being social and growing relationships as well as treating their bodies with respect. Therefore, the evolution of an active bakery should focus on the concept of food as an experience, rather than the traditional quick stop shop model.

¹ Scholosser, Eric. Fast Food Nation
² Scholosser, Fast Food Nation, 1.
³ Huber, Lia. “5 Nutritious Habits of the Planet’s Healthiest Countries”. CNN Health, 13
As this project dips further into means of activating the bakery, it explores the sensory experience, the baking process, and design strategies to tie them together. The experience begins during the process of making. Throughout the process, the use of all of the senses in different capacities is needed. It is important to highlight the journey of the process of making, because it enhances the impact the building and its program has on the occupants.
2. The Sensory Experience

Not only is experiencing food physically healthy, it is also a contributor to mental health. The authors of the Social Psychology of Experience propose that, “memories do not solely reside in a linear passage of time... but that memory sits at the very heart of ‘lived experience’ – whether collective or individual. How we remember is linked to social interaction, object interaction and the different durations of our living.” Memories are born from experiences. By designing a space full of activity, interactions, and life, architecture is creating memories.

In his book Space and Place: the Perspective of Experience, Yi- Fu Tuan describes experience as a “cover-all term for the various modes through which a person knows and constructs a reality.” The chart below describes how experience envelops our reactions to our environment. Because we have emotional and intellectual reactions to the events thrust upon us, we learn and grow from them. We make cognitive decisions about how an event went, and we hypothesize about what could make the event better, worse, or different. We can also evaluate cause and effect from these situations. Therefore, to experience is to learn. Without experiences, we are stagnant. There is no growth. There is no living. This means it is evermore important to provide spaces, which encourage and provoke experience.

![Figure 2.1 Yi-Fu Tuan’s model of Experience](image)

Architecture can do this with spaces that engage the senses. Each of the senses works together to provide an experience. In a traditional Japanese tea ceremony, there is a role for each of the senses: watching and listening as the tea

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5 Tuan, Space and Place, 8.
pours from pot to cup, picking up the cup and feeling the heat, smelling, and finally tasting. The tea becomes an event; there is time to savor the scent, texture and flavor. The same part of the brain that’s in charge of processing our senses is also responsible, at least in part, for storing emotional memories. As we perceive various sensations, our brain understands them and enables us to recall and form correlations between events.

2.1 Sight
The sense of sight is considered by many to be the most heavily relied upon sense. We use eyewitnesses to settle our court cases, graphic design and visual media for our advertisements, 2-D maps for way finding, and photos and ornamentation for preserving memories and history. Especially within the realm of fine arts and architecture, the sense of sight is given the most respect. From the time of Classical Greek culture to the modern era, sight has been responsible for setting the standard for beauty and aesthetics. Martin Heidegger expressed that this heavy reliance upon sight has only grown. He wrote, “The fundamental event of the modern age is the conquest of the world as a picture.” He along with many other modern theorist believed that this privileging given to sight was a negative thing because it “seems to weaken our capacity for empathy and participation with the world.” The isolation of sight from the other senses is partly the fault of architects who do not provide spaces that engage the other senses. “Homogenous bright light paralyses the imagination in the same way that homogenization of space eliminates the experience of place.” While the sole use of sight becomes negative and monotonous, it is still an important part of a larger whole, which includes all of the senses. In architecture, sight is the focus of form and aesthetics that house activity. By using sight as a partnering sense that adds to a sensory environment, the activity is no longer housed or contained; it becomes provocative, stimulating, and full of life.

In many retail environments, site is used to stimulate movement from product to product, to define areas or zones for different product typology, and to

6 Pallasmaa, *The Eyes of the Skin*, 12.
7 Pallasmaa, *The Eyes of the Skin*, 32.
highlight and display a product in its most attractive form. Maison Fauchon is a global high-quality food store. The shop location in Paris, France is a prime example of a bakery, which uses the sense of sight to produce a specific experience for their brand. The shop has three levels, each organizing and separating program. The ground floor and middle level of the building is full of packaged treats compartmentalized by type. The lower level is a bakery, pastry and coffee bar as well as a wine cellar, and the upper level is a dinning and bar area. Each space is given its own character through lighting, color and materials, but they are all unified by a couple design elements. Visually, while each space has its own color, there are pops of the same shade of fuchsia throughout the entire building. The treatment of lighting also changes. While packaged items are typically lit from the top in a smooth dark environment, bakery items are backlit in a warm, bright space. There is also a large wall graphic of the brand name that seems to fall from the ground floor into the lower level, creating a visual connection to the two different zones.

![Figure 2.2 Maison Fauchon store Paris, France](image)

The other shop unifier is the treatment of textures. Building materials are all smooth and reflective, giving a hierarchy to the variety of textures found in the food products. The different program divisions give consumers the ability to discover both the visual mood shifts and the various textures within each compartment. The
overall sense of the shop is elegant, and promotes the items as exquisite and decadent. It is a very sexy shop. The lines created with the smooth cool materials are a backdrop for the highlighted curves of treats, breads, wines and other food.

2.2 Touch
Where the eye controls and investigates, touch approaches and embraces. Touch is intimate. Rather than discovering from a distance, like you would with sight, sound and smell, you have to get close and personal when using touch. Our sense of touch is controlled by the somatosensory system, a network of nerve endings and receptors in the skin. This system is responsible for all the physical sensations we feel: hot, cold, smooth, rough, presser, tickle, itch, pain, etc.\(^8\) Touch controls our physical responses to a space, and our memories of touch inform our perception of comfort in a space.

Vyta Boulangerie Italiana, a small bakery in Rome uses textures and different treatments of materials to engage sense of touch. The walls are clad with wooden panels in a pattern reminiscent of the top of fresh baked bread. These contrast with the dark wall behind and invite visitors to feel the texture. The texture is also reflected in the shiny floor, surrounding you in the pattern. The baked goods are displayed on a smooth black counter, which juxtaposes the texture of the food. Each plane in the space has a different Feel: the walls, warm with the soft glow of the wood, The floor cool and slick, the ceiling dark and disappearing, and the counter a neutral pedestal for the more prominent baked goods. The contrasting feelings of the materials suggest a balanced and comfortable environment.

\(^8\) “Sense of Touch.” Home Science Tools
2.3 Sound

Sound is the sense that forms character, connection and emotional feeling to a space that would otherwise be described in physical terms with sight and touch. Acoustic effects inform an occupant about the scale and materials in a space. Think about the echo of footsteps in a long, tall hallway versus a small, carpeted sunken living room, or the difference between an empty house and how cozy your home is after you move in and fill it with furniture. Sound provides a separate layer of information apart from the form of the space. It is a part of the environment. Sirens, the humming of cars, thuds and bangs of construction are all a part of a busy urban environment, while the breeze, the humming of insects, leaves crunching and birds chirping would tell you that you're in a rural area. Sound can also be associative, like a quiet library, a church organ, or the frying of bacon.

The Omonia Bakery in New York is a fine example of a space that uses sound to enhance the quality of the environment. Even though it is located in a small, narrow building in a space otherwise shaped like a tube, the play with acoustics defines different activity zones. At the display counter and in eat-in areas, the ceiling is brought down to a more intimate level with waves of dangling balls that soften and disperse noise. As the counter ends, the quantity of balls decreases and terminate at thin glass cube housing the kitchen. Noise is not contained within the glass; therefore, when the kitchen is active, a different atmosphere is created in the surrounding public space. The bakery is then separated into two different zones of

Figure 2.4 Form and Sound

Figure 2.5 A transparent kitchen
public space: quiet and loud. This is emphasized in the lighting. Darker spaces signal the quiet space, while bright glowing spaces are filled with louder activity.

2.4 Taste

Taste is possibly the most difficult sense for a space to project and the most important when it comes to the ideas of food and eating. Taste is a sense unique to human evolution. It was a tool for testing food to consume. Poisonous or rotting food tastes bitter, while nutrient rich foods taste salty or sweet. Taste is difficult, because it is affected by all of the other senses. The smell, texture and temperature of a meal are very important. A food’s flavor is produced only after taste is combined with smell.\(^9\) Sight also plays a role in how we perceive taste. The presentation of food can make or break how a dish is perceived. Studies show that the presentation of food not only encourages or discourages people to choose one dish over another, but can also influence how the food tastes. A study conducted by psychologist Debra Zellner concluded that how attractively food is plated affects liking for the flavor of the food, after polling people that were served the same dish presented in different ways.\(^10\)

The taste of a building is defined the same way. For example, Peter Zumthor’s The Therme Vals, is a hotel and spa in Switzerland designed to embody a complete

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sensual experience. The structure is built from layered Valser Quarzite slabs. This combination of cool stone and hot water creates a steamy, humid environment. As guests merge into a dim, maze-like environment, feel the water and smell the vapor of the steam, they begin to sense the taste of the water and the mineral quality of the stone. In this project, the presentation of the water makes the occupant crave a deeper experience with it.

2.5 Smell

Smell is perhaps the most important sense when it comes to creating experience and memory. The sense of smell is first processed by the olfactory bulb, which has direct connections to the amygdala and hippocampus. These two brain areas are strongly implicated in emotion and memory. This is why the scent of seemingly basic things can remind us of past events, seasons, or traditions. Smell defines quality of a space rather than form or order. Is a space fresh? Active? Welcoming? Does it remind you of another space or another time? All of these questions can be answered using smell.

In a building, smell can be used to draw and distribute attention. As smells change from space to space, they can speak to the desires of the occupant. For example, the fragrance of a sweet vanilla candle may remind you of cupcakes and make you question your hunger. An aroma of burning leaves may provoke images of Autumn and hot melty smores. Scents can be emitted by materials, activity or program, cleaning or lack there of,

Figure 2.7 Thorncrow Chapel by Fay Jones

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outdoor or indoor, etc. In Fay Jones’s Thorncrown Chapel, the structure blends with the outdoor surroundings. The scent of the pine beams and other natural materials brings the outside in and keeps the attention of guests neutral.

Overall, each of the five senses provides different information about a space. When working together, like in the process of the Japanese tea ceremony, they create an experience. In the case of a bakery, each of the senses is used in one area of the program or another. The act of baking itself requires the use of all senses.
3. The Process of Making

The process of baking includes five main stages: preparing, mixing, baking, decorating, and serving. These stages can define the program, the way in which the building is built, what materials are used and the circulation. Process can be expressed in different scales when it comes to the program of the building. For example, the kitchen is one room or type of space within a bakery, but it needs to facilitate all stages of process. The building as a whole may serve as a larger version of the assembly line, with multiple types of spaces representing production. Each stage not only requires different spatial affordances, but various levels and types of sensory effects as well. It is possible to further emphasize sensory engagement by using materials that reflect the process of making. Each material has its own sensory properties; it has a smell, a feel, a look, it might absorb or amplify sound, and even affect how taste is perceived. At each stage of baking, the utensils used in the process each vary in material and scale. The design of the bakery should exhibit the same ideas in order to create variety and hierarchies within the program.

3.1 Prepare

![Figure 3.1 Prepare - the first step in the baking process](image)

In the preparing stage, a baker perceives all of the ingredients. He or she checks for quality of them by looking, smelling and touching. After being assessed, the ingredients are cleaned (touch) and measured (touch and sight). The ingredients are raw or in their natural form: a powder, a cream, a grain, or a solid. They are arranged by categories like dry or wet or order they will be needed. Tools like water, cups, knives, spoons, bowls made of glass, plastic, metal or wood are utilized. These tools all have different properties, degrees of hard or softness, and forms. In building, the first stage looks similar. The materials are gathered, measured, cut to size, and organized in a way to help the rest of the building process go smoothly and
efficiently. They are raw and unfinished parts of a whole. The materials used in the “preparation” spaces emulate the idea and feeling of the raw, natural first stage.

**3.2 Mixing**

![Figure 3.2 Mixing](image)

In the mixing stage, all of the fresh and organized ingredients are combined, and the separate parts become one. The baker stirs the dry ingredients, sensing the dusty powder through sight, touch and smell. Then the butters, oils sugars and other wet ingredients are creamed, hearing the humming, clings and clangs of the mixer, watching for a smooth texture and smelling the combination. As they add the dry, the mixer coughs clouds of powder until the batter is thickened and uniform. Mixing is chaotic, loud, and messy. It is a very active portion of the process where ingredients change physical states. In building, certain materials, like concrete, go through their own mixing. While others are permanent after they are refined. If we look at the mixing of a building in the same fashion as baking, than this is the prefabrication time period. Wood and nails are combined to create wall-framing units and concrete is made to form foundation and blocks. Individual materials are packaged together to form the whole.

**3.3 Bake**

![Figure 3.3 Bake](image)

The baking stage is the most calm or composed of the process. The baker forms the product by either using their hands or a shaped container, and places it in
the oven. Then they wait. They smell as it cooks, look for firmness, and listen for a timer. They wait until the product changes physical state and form. In comparison, builders must wait for materials to cure. The baking element of the program is an extension of the main kitchen space. It is a zone for waiting and for experiencing the smells, sounds and forms of the goods. Baking is a transitioning process, changing a substance from a liquid to solid. Therefore, in the program, it represents a transition from space to space, while focusing attentions with the senses.

3.4 Decorate

Decorate

Figure 3.4 Decorate – the fourth step in the baking process

Decorating is a precise, intricate and creative portion of the making process. It can either be planned or improvised. The baker lets the product cool. Then prepares it for presentation using a variety of methods. Anything from icing and sprinkles to product packaging is considered decoration. It involves all of the senses: touching candy and sprinkles, piping icing, rolling fondant, boxing or folding packaging, smelling the sugars and oils, hearing the shake of a spice or roll of a cake stand, taste testing icings and candies, and viewing the aesthetic properties of the creation. It transforms what tastes good and functions well into items that are visually stimulating as well. In construction, this is the priming, painting and staining phase. All of the materials are finished and prepared for the occupants. Rather than using tools for structure and stability, these finishing materials are for protection and presentation. They have different properties than the hard, bearing materials.
3.5 Serve

Figure 3.5 Serve – The final step in the baking process

Serving is where all of the work comes together, and senses combine to enhance the overall impression of the food. Serving is all about the consumer and how they perceive the items. The consumer observes the food, smells it’s aroma, tastes the flavors, feels the textures and listens to their own chewing. In construction, serving is the move in phase. How does the client feel and identify with the structure? In the bakery, there are two types of service space, both equally interactive. The first space is where visitors can taste test and help create styles and flavors of items. The second is an eat-in, dining typology, where the occupants can help facilitate activity. Like in a coffee shop or café where the atmosphere is relaxed and flexible, the serving space puts the focus back on the customer. This contrasts with the other segments of the bakery, which emphasize the food.
4. Design Strategies

![Figure 4.1 Site Map](image)

The site for the bakery is located at the corner of Central Parkway and Main Street just on the edge of the Over-the-Rhine neighborhood of Cincinnati. This site sits adjacent to a stop for the new Cincinnati street car as well as many bus stops. It is a diverse neighborhood full of retail, residential, business, restaurant and community uses. The surrounding buildings to the north typically have historic facades, where the southern structures are more modern. The average building height is four stories, however, this site sits between a two-story structure and a six-story structure on the other side. The topography is relatively flat, and views can be afforded by the corner access to the street perspectives.
Figure 4.2 Site Map – Public Transportation Diagram

Figure 4.3 Site Map – Building Use Diagram
The sensory experience begins on the exterior. From the street, onlookers see an expansion of glazing bubbling over the top of the most visual corner, acting like yeast as it cures or bread dough as it rises over the edges of its bowl. As the bubbles settle down onto the street level, they become smaller and disappear back into the solid metal façade. This variety in texture from smooth to bubbly not only creates visual interest, but also engages the sense of touch along the way. Visitors are pulled into the bubbling portion of the exterior, entering into a café and atrium space that is tall, bright and lofting scents of fresh baked treats out into the street.

The concept for the programming of this bakery highlights the use of the senses by taking occupants on a tour through the process of making. Because each step in the process involves the use of different senses, each step deserves it’s own space with dramatic forms, materials, temperature, etc. in order to provoke the appropriate senses. Therefore, the programming has a very museum like sequence.
The series of connected spaces stirs visitors through each stage. Each step also requires varying activity levels. This introduces the educational portion of the program. This bakery offers more than just the grab- and- go café model. This space directly involves guests in the process of making while teaching them baking techniques. With these programmatic elements, occupants are encouraged to use their senses for both an architectural and a social interactive experience. It also diversifies the building economically, enabling visitors a reason to come back again and again for the food, the learning, the socializing and inherently, the memories.

To give more emphasis to this process, the structure pits solid against the void. The void is composed of a three- story atrium space. The atrium is also a café at the street level, bringing in customers with fresh smells of delicious treats. The solid houses the process. It stacks spaces for each of the stages of baking in solid blocks. Baking is a linear process from one start to one finish. One step must happen before another. For example, you cannot ice a cake before you bake it.

Therefore, in the program, the spaces designated for each step must somehow be linked and flow into one another. The spaces are connected through
coils that circulate the energy and heat of the building: the people. These coils are curvy. They float through the voids and juxtapose the orthogonal form of the solid, leaving traces of the path winding through each space. The coils are also responsible for providing the resting periods in the program. As they span the void, they remain sensually neutral. Visitors wander through a tall, open space full of white, airy brightness. Once they reach the next space in the sequence, they are compressed into a dramatically different environment, rich in materials, movement, light and audio changes, and activity. By crossing into the void after each space in the sequence, everyone has a moment to cleanse their pallets and prepare their senses for the next experience.

Figure 4.8 Circulation coils wiggle between solid and void and leave traces of path throughout the plan.

Another way the sensual experiences in each programmatic zone are provoked is with a mixture of materials. The materials implement changes in texture, color or pattern, smell, and acoustics. To produce vastly different qualities of space, each step in the process of baking receives its own recipe of materials. These materials are chosen, because of their ability to rouse feelings of each step. For example, in a space designated for the first stage, preparing, occupants should be reminded of fresh ingredients: crisply chopped herbs on a wooden cutting board, or white puffs of fluffy flour. Therefore, the space should look clean and bright. Wooden surfaces commemorate the texture of a rough cutting board. Stainless steel and glass feel smooth like utensils. In contrast, the decorating space may look much more frilly and decadent. Contrasting colors and textures of acrylics and plastics feel smooth as icing or bumpy like sprinkles. These materials are not raw like those used
in prepare. They are polished and refined like the finishing touches on cake. In every space, the materials are used to emphasize and control the senses of the occupant.
In conclusion, the architecture of the active bakery provides visitors with the ingredients needed to make memories. It implements unique program elements, which further emphasize experience through varied use of the five senses. Moving forward, this thesis acts as an example of how architecture can manipulate and provoke the senses. This idea is important in all building typologies, because the senses set the tone and the mood for occupants of a space. The architect must determine what mood the space wants to create. Should visitors feel relaxed and comforted, excited and adventurous, focused, or nervous? All of these feelings are evoked from the senses used when experiencing a space. The senses inherently brand and market the space. The senses are what visitors will remember as they leave or as they debate returning.
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