Hack the Experience: Tools for Artists from Cognitive Science

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Senses

Visuality has dominated our encounter of the world and is typically the primary means of engaging the world and making sense of the world. Dewey (2005, 260) recognizes this primacy of vision when he states, “The organism that is set to experience in terms of touch has to be reconditioned to experience space-relations as nearly as possible in terms of the eye.” Even in metaphoric structure, it is vision that is used to reason about understanding—*I see what you’re saying*—although touch is close behind: *She can’t grasp the concept.* Dewey argues that the visual system ought to be used to structure the haptic system, which is physical, but we already do this with metaphoric touching as Lakoff and Johnson (1999, 53–54) demonstrate with the metaphor *Seeing is Touching*: “She picked my face out of the crowd.”

Historically, sight has dominated the other senses in art, but Jones (2006, 8) argues that all of the senses need to converge in the way that art produces and converses with embodied knowledge. She calls this convergence a “sensorium,” defined as the way people coordinate “all of the body’s perceptual and proprioceptive signals as well as the changing of the sensory envelope of the self” and describes the sensorium as “shifting, contingent, dynamic, and alive.” This has a distinct dependence on the body, that “lives only in us and through us.” Translate this into the hacking process by fabricating a convergence of the senses. Engineered experiences build upon the structured relationship of experiencers and their bodies by engaging the sensory faculties of those bodies and flooding the experiencer with immersive sensory data, leaving it up to the experiencer to sort out the data and make sense of their perceptions. This collection of dependencies and relationships lends itself to creating cross-sensory atmospheric experiences in which people are immersed in sensory stimuli orchestrated to affect emotional structure.

How might these cross-sensory experiences be structured? Pick any two senses and combine them to create a basic-level crossing. Make sure that the two senses can contribute to your work in terms of both form and function. Use Table 4 to help you find a pairing to experiment with in your project. After you feel like you understand what it means to blend two senses together, add in a third layer and, over time, if it serves the goals of your work rather than distracts from your goals, then you may continue to increase the number of senses you bring together. Use this cautiously, as not every designed experience benefits from crossing the sensory streams. For instance, something that is intensely scent-based might work best without crossing senses (although, it might help people concentrate if you remove other sensory stimuli through darkness and ear plugs).

**Combine Stimuli from Multiple Sensory Systems**

As mentioned earlier, conceptual metaphors are tools to think about one thing in terms of another thing. It is possible to create conceptual metaphors that are sensory metaphors because conceptual metaphors are grounded in bodily experience (which necessarily includes sensory experience).

You can take sensory stimuli and use them to create a compounded stimulus for an almost induced “synesthetic” experience. Although it is not genuine synesthesia, it does cross sensory stimuli to create new effects. An example of this idea might be in lighting and stage design, where light and sound are combined to get
brighter and louder in sync with each other. This synced ramping up of volume and brightness can become a tool to tap into people's emotions to excite them and draw them into the temporal rhythm of the event experience. The mood brightens and evokes new energy as the room brightens and the sound gets louder. This is a sensory metaphor where the visual and auditory stimuli (concrete elements in the experience) are used to think about emotional effects (abstract elements in the experience). The abstract effects in this case would be excitement, a brightened mood, a mood of anticipation as the lights and sound increase, and a moment of elation and release when the lights and sound reach their peak.

### Table 4: Combining the Senses.

<table>
<thead>
<tr>
<th>Visual</th>
<th>Auditory</th>
<th>Tactile</th>
<th>Olfactory</th>
<th>Taste</th>
</tr>
</thead>
<tbody>
<tr>
<td>some feature of light (threshold, saturation, hue, color, tint, contrast) (matches/does not match) image (composition, content, subject)</td>
<td>imagelight (matches/does not match) sound; image of a quiet scene with chaotic sound; image of a chaotic scene without sound</td>
<td>light (reveals/hides) texture; image suggests texture; image mimics texture; image appears textured but is smooth</td>
<td>image (matches/does not match) smell</td>
<td>image (matches/does not match) taste</td>
</tr>
<tr>
<td>sound light sound image light and sound modulate in sync image and sound in sync</td>
<td>one sound channel cancels another sound channel; one sound channel makes an inaudible sound audible; tones conflict, tones harmonize, tones combine.</td>
<td>sound (matches/does not match) sound a texture is expected to produce</td>
<td>specific sounds paired with specific scents</td>
<td>sound compliments taste; sound conflicts with mouthfeel and taste; sound descriptors applied to taste</td>
</tr>
<tr>
<td>texture (creates/resembles) image or visual pattern; texture interferes with light (e.g., causes shadow)</td>
<td>texture (produces/does not produce) expected sound</td>
<td>felt texture (matches/does not match) expected texture</td>
<td>texture shape experience of smell (e.g., texture holds scent, releases scent, directs scent) or specific textures paired with specific scents.</td>
<td>texture (matches/does not match) expected taste</td>
</tr>
<tr>
<td>smell (matches/does not match) image; smell (evokes/does not evoke) an image; or present smell with blindfold, in darkness, or void of visual stimuli</td>
<td>smell (evokes/does not evoke) sound association; scent note (matches/does not match) an auditory note</td>
<td>smell (has/does not have) texture (e.g., a thick smell)</td>
<td>scent blends with scent to compound; or individual scents subtracted from a common scent composition</td>
<td>smell blocks taste; smell amplifies taste; smell disguises taste;</td>
</tr>
<tr>
<td>taste (matches/does not match) color, or visual cues about texture</td>
<td>taste (matches/does not match) expected sound; Also, auditory and tactile elements of taste: mouthfeel does not match sound</td>
<td>taste (matches/does not match) textrue (e.g., mouthfeel and flavor)</td>
<td>taste (matches/does not match) scent (e.g., durian smells like &quot;garbage&quot; but tastes sweet)</td>
<td>one taste replaces another taste; one taste anticipates another taste; one taste balances another taste; on taste contrasts with another taste</td>
</tr>
</tbody>
</table>
Sensory Experiences and Descriptive Metaphors

The types of language that people use to describe what is happening in the scene itself reveal the structure of the sensory metaphor that they experience in the scene. This is a bit tricky, but if you work backwards from the abstract effect that you want to evoke and find the image schematic structures that best suit the metaphor you used to describe the effect, you can develop a physical intervention that uses the same image schematic structures, along with sensory stimuli, to build the metaphor in physical space. This might be the most important idea in this book.

Here's an example from cognitive linguistics:

If the types of language people use to talk about events and experiences provide a set of indirect tools for designing cross-modal experiences and building multi-sensory metaphors, it should also be possible to use descriptions from an experience (like music and sonic experience) to build another experience of the same type (another musical experience) as a sort of data “visualization.” It’s an interpretive process of translating from one domain (the sensory domain) to a non-sensory domain so that the non-sensory information can be understood through the senses.

Antovic et al. (2013) conducted research with non-musically trained children, in which they played ten different musical statements to the children and then listened to how the children described the music. They used simple music, like a scale, or two notes played in different octaves. The children described the music and the researchers then analyzed the descriptions to see what kind of structure the descriptions had in common. Many of the descriptions fit into the pattern of a few conceptual metaphors. For instance, if a child described the sound of a changing pitch as “went high, high, high, and low, low, low” or “the first one was low and the second one was high,” the researchers categorized these statements as reflecting the metaphor Pitches are Heights. Remember these were students with no musical training and they were also children. The description of heights had nothing to do with expert knowledge of frequency or spectral analysis of sound, so the use of height language is related to some way that the children conceptualized the sounds.

It was easy to take these ten basic musical statements and identify the metaphor and the skeletal image schemas used to build those metaphors. This means that I now have a set of tools to build a new piece of music based on those metaphors, and every time I want to suggest a particular metaphor, I know which type of sounds to use. Just because the students used similar metaphors to describe these ten pieces of music doesn’t mean that other people will use the same metaphors to describe similarly constructed music. But the trend in this data suggests that at least some people will respond to the music in a particular way, and that is helpful for our purposes.

The ten pieces of music all had image-schematic structure (revisit Figure 8) that ranged from: container, up-down, center-periphery, link, part-whole, force, front-back, path, and source-path-goal.

At this point, I can take these image schemas and work with them in terms of another sensory system, like scent. By pairing the image schema from a piece of music with the introduction of a particular sequence of scents, a scentscape can be built that matches a song. Now a sensory installation can use a scent and a piece of music to suggest and reinforce the mental imagery evoked by the sensory experience.

Another approach would be to take the image schemas from the music and map them to non-sensory information. This enables us to translate non-sensory information into sensory experience. It’s a way of helping people understand information with a sensory metaphor. Basically, this is a method of data-visualization, except it’s not strictly visual, but open to any sensory system that can help people make sense of the data in terms of sensory stimuli. The image schemas from the music descriptions are very common, and anywhere else that you find those image schemas becomes material that you can translate into music. For example, the image-schematic structure of geologic events can overlap with the image-schematic structure of the musical descriptions, and it might be possible to map from image schemas of the musical statements to the image
Ever since the Big Bang, major geologic events have happened that have shaped the earth. These events have inherent motion that can be diagrammed using arrows to show the directionality of force. If you sketch out the force of those geologic events, you have a set of image schemas that you can then match with the image schemas from the musical descriptions. Geologic events have a strong element of force to them, with notions of pressure, expansion, movement, and collapse. These elements of force also have strong components of directionality: the sea-floor spreads out, mountains build up, striations and sedimentation pile up, ravines erode down into valleys that spread out, and so on.

In order to map between the image schemas of the musical statements and the image schemas of the geologic events, I listed the major events that have happened throughout geologic time and classified each event by which image schema structured which aspect of that event. The list of basic types of geologic events includes the Big Bang; formation of the moon; continental movement, break-up, and formation; oxygen catastrophe (depletion) and the oxygenation of the atmosphere (filling); orogeny (mountain building); glaciation (forming, melting, moving, scrubbing, shrinking, grooving, transporting erratics, reglaciation); volcanic activity; plate tectonics; seismic activity; icehouse earth; greenhouse earth; the rock cycle: sedimentary, metamorphic, igneous processes; paraconformity; angular unconformity; disconformity; and asteroid bombardment, meteorite impact, and subsequent crater building. Each of these geologic processes has an image-schematic structure that maps to the structure of one of the musical statements.

I then drew diagrams of the image schemas for each of the geologic events, using arrows to model motion, force, and directionality. Each of those drawings maps to a certain subset of the overall list of image schemas that link back to the musical stimuli.

What I had was a list of image schemas from the music and a list of image schemas from geology. I was able to find a third list in the overlap between the music and geology, and that third list is the mapping between the two lists, showing which pieces of music embody the motion of which geologic event, thus linking geology to music by way of correspondences between metaphorical motion and physical motion.

So now those musical statements can be used as really rough building blocks or the as the backbone of a musical skeleton that can be elaborated to produce different musical progressions that structurally mimic the motion of the geologic event. These progressions can be finessed to have sound contours that characterize different aspects of the structural geologic motion, such as speed, amplitude, and pitch, all modulated to make the music richer.

For example, limestone and dolomite form in shallow seas from fossil shell and coral through the process of sedimentation and layering. This means that a layer of stone could be represented with a layered building of sound, using the music stimuli that maps to the metaphors Pitches are Heights and Structural Change. These two metaphors occurred in six of the musical stimuli in Antovic et al. (2013), so those six stimuli provide input into how to build a more elaborate musical statement that can model the motion of the sediment being laid down layer-by-layer in a shallow sea and the subsequent increase in the height of sedimentation as the layers build upwards over time as the whole substrate solidifies into stone. In sedimentation, there is a downward force of each layer being deposited and a corresponding upward force of the whole ocean floor raising in elevation. Some kind of dominant downward sound slowly blends into a subtle upward sound, and a constant high-pitch drone is overlaid on that downward-to-upward transition, since, in terms of height, “shallow” is one of the metaphors the children used for high pitches and this process of sedimentation occurred in shallow seas.

This is just one way of mapping between the descriptions of a sensory experience and non-sensory information. It is not limited to sound, and this model can be used with any sensory experience. The point is to enable something that is not typically sensory as if it
were sensory through the use of descriptive metaphors and shared image schemas. This is the structure of a multi-sensory metaphor.

You can collect language descriptions anywhere you want: it can start with your own descriptions, or descriptions people make on the news, or you can interview people about experiences and events. You could pick experiences like disasters or accidents, parties, birthing experiences, or anything that groups of people can describe that can become source material for you to study. Then take those metaphors that they use, extract the image schemas, and use the image schemas to build your sensory experience using the process outlined above.

**Building Atmospheric Moods**

Losing control of the body shakes off your sense of agency and the world seems to move around you while you remain stationary. This is kind of like the feeling of swimming in the ocean in playful heavy waves, having the body tossed around in the softness of water, with the force of waves as they break on the body, not being able to resist the ocean spitting you out onto dry land, not being able to resist the ocean pulling you back in again—you lose your control to the capricious agency of the ocean.

This feeling of being controlled by the ocean is much like being a part of the ocean itself. Movement in the ocean is simply waveforms of energy passing through water and the water gets caught up in the waveforms to produce what we think of as waves. This naive physics might lead down the wrong path, but it nevertheless illustrates that matter (in this case, seawater) loses its agency to the force of waveforms and this combination of waveform and water is part of what we think of when we think of the “ocean.”

Loss of control to a spinning world resembles Freud’s description of the “oceanic feeling”—a sensation of not being separate from the world at large, an “insoluble bond” between an individual and the world—the oceanic feeling is a feeling “of belonging inseparably to the external world as a whole” (Freud 1929). Oceanic feeling is something we experience in infancy when we can’t tell the difference between our bodies and the world—everything is one and we are a part of it. Freud describes this as a time where there is no differentiation, and that the first notion of something other than the self is the encounter with a mother’s breast. Whatever your views on Freud, the simplicity of this idea of the self being one with the external world is a deeply immersive feeling. Fostering experiences that conjure these atmospheric moods is one of the goals of engineering experiences — giving people oceanic experiences is part of creating wombs for personal transformation. When an audience connects to an atmosphere, they experience a moment of presence and live in the moment with openness. The atmosphere is what controls them: the atmosphere becomes the agent that controls the self.

One way to create these oceanic/atmospheric experiences is to tap into sensory systems and emotion to try to exploit sensory perception as it engages the emotions. It might be possible to specify how our sensory perceptions interplay with our emotional states. David Freedberg discusses this issue at length and admits that many people have trouble accepting that there can be a systematic (i.e., rule-based) approach to understanding how art forms evoke emotional responses. He writes that,

> Even if we assume that we may establish a syntax for the relations between how pictures look and how we cognize them, I believe that there is a further syntactical level: between the look of a picture and the emotions it arouses. And the rules for that syntax, I believe, are innate and specifiable. The general view, of course, is exactly the opposite. This more popular view holds that the emotions are not subject to reason or to any specifiable set of rules; and that very little if anything can be said about the relations between pictures and feeling that is not purely contextual or idiosyncratic. That, of course, is not a view I share. (Freedberg 2006, 83)

Freedberg takes the view that proportion and ratio give power to variation and differences in the textural qualities of art works to enable
them to excite emotions in patrons. It could be that this logarithmic
approach to aesthetics is another manifestation of figure-ground
organization. These proportions differ based on the medium and it
follows, then, that figuring out which proportions converge to evoke
which emotional responses in each particular art form is necessary,
in order to build a general theory of emotional cues in art. For ex-
ample, Freedberg demonstrates that it is not enough to claim that
there are modes in music that relate key signatures to the emotions
supposedly aroused by those keys, because music is much more
multifaceted than is suggested by a simple correlation of key signa-
tures to moods. In Freedberg’s estimation (2006, 86), it is intervals
and proportions that provide better frameworks for the link between
emotions and the structural architecture of any artistic composi-
tion. The ideas in this book are built on the idea that sequencing
and timing of elements in the physical space might underpin the
emotional response trigger.

Our focus is slightly different than Freedberg’s approach to emo-
tion evoking structures in 2D art, because engineering experienc-
es often entail having multiple sensory experiences which overlap,
whereas in a single-channel art form (e.g., painting, or musical
composition), the emotion-evoking proportions occur in a single
sensory channel. Multi-sensory experiences benefit from having
multiple sensory systems contribute to the excitation of emotion, in
which the sum is greater than its parts. While our model is intend-
ed to fit within Freedberg’s notion of emotion-evoking proportional
syntax within sensory-specific artistic composition (how a sensory
system works internally to evoke emotional responses), our model
benefits from a coarser approach and begins to explore the syntax
at a more general level to see how sensory systems work together
(externally/jointly) to evoke emotional responses.

In order to build multi-sensory experiences that have any sort of
cohesion, it is important to coordinate sensory systems in the pro-
duction of the emotion-evoking stimuli. As mentioned earlier, one
way to create atmospheric experiences that engage people emo-
tionally is to use sensory systems to engage emotions and evoke
responses. One of the paths into emotional and sensory systems is
through creating sensory metaphors by combining multiple sensory
signals (e.g., visual cues and auditory signals) in a process called
cross-domain mapping.

Think of cross-domain mapping like an old telephone switch-
board operator, connecting one phone line to another phone line to
create a telephonic link between two people. Cross-domain map-
ing is connecting one sensory system to another sensory system so
that the two systems work together to enhance some sensory expe-
rience. Connecting sensory systems has an intensifying force that
can be used to control experiences and ambient scenes. The trick is
finding the connections that work for what you want to do.

Inducing “Synesthesia” (Crossing the Senses and Cross-Domain
Mapping)
It is interesting to think about mapping between the different sens-
es—creating links between one sense and the other so that an
experience of one sense is enriched by a triggered experience in
another sense. This compounds the experience, think again about
the coupling of stage lights in a theater turning on slowly as the
auditory volume of a band increases until the lights are bright and
the sound is loud. The two gradations feed into each other to en-
hance ambient and attentional experience. This is a cross-modal
mapping that is not controlled by the audience, and everyone in the
audience experiences the same mapping of light and sound. When
the lights and sound peak, the coordination of stimuli intensity is
often experienced as a moment of flow.

Note that this cross-modal mapping is not an authentic form
of synesthesia (the section heading is misleading), and labeling
an experience “synesthetic” marginalizes individuals who expe-
rience true automatic synesthesia. Authentic synesthesia occurs
in developmental processes that we presently do not bioengineer.
Hubbard defines synesthesia as “an experience in which stimulation
in one sensory or cognitive stream leads to associated experiences
in a second, unstimulated stream” (Hubbard 2007, 193, empha-
In synesthesia, the trigger is experienced in two sensory streams—for example, a sound (auditory system) and light (visual system). Sound does not typically trigger the visual system, so when synesthesia occurs as a result of a sound being made, the visual system would be the unstimulated stream referred to by Hubbard.

In the theater example, both auditory and visual systems are stimulated by changes in the environment, sound is getting louder and light is getting brighter. This is a simple pairing of sensory systems, and a coordination of the stimuli used to engage those sensory systems. You can pair any of the sensory systems through coordination of signals or even contradiction of signals (as seen in Table 4). Some pairing will result in richer experiences than others, and you will need to test which couplings work best for your context (site, materials, duration, audience expectations, etc.).

Because sensory systems can be paired and coordinated to create multifaceted perceptual experience, the overlap in sensory experience tends to be uniform across the entire audience and does not vary from one audience member to the next. This is a major difference between general sensory mapping and synesthesia, because synesthetic experience typically varies between individuals (while many individuals map sound and color, the particular associations can vary individual-to-individual). Another major difference is that the audience might not be conscious of the elements that trigger their experience of the cross-modal mapping. In our example of the coordinated stage lights and volume, the audience might not recognize that light and sound are coordinated. But in true cases of synesthesia, there is a consciousness of the trigger-effect pairing.

Not to beat a dead horse, but according to Auvray and Farina (2016), cross-modal mappings don’t fit the definition of congenital synesthesia because they aren’t idiosyncratic and may lack systematic pairing between stimulus and association as experienced over time. But cross-modal mappings can exhibit consistency (lights and sound could achieve consistent ambient and attentional patterns over time as participants learn the mapping), and the stimulus-triggered cross-modal mappings can be experienced automatically, which are features that cross-modal mappings share with synesthesia.

What it boils down to is that cross-modal mappings, while sharing similarities with synesthesia are in fact different. These differences give new understanding into what cross-modal mappings mean to artists engineering experiences which are designed to coax audience members into richer experiences by pairing sensory systems and coordinated stimuli.

For example, the comparison between cross-modal mapping and synesthesia shows that:

— cross-modal experiences are not idiosyncratic (which means they can apply generally to broad audiences and achieve desired effects);
— cross-modal experiences can be consistent over time (which means planning for repeatability is possible);
— consistent mappings can encourage learning (cf. learning, embodiment, and sensorimotor simulation metaphors like the experiments conducted by Slepian and Ambady 2014);
— cross-modal mappings are not necessarily accessible in consciousness (which means triggers can be subtle and effects can seem more magical); and
— cross-modal experiences are automatically experienced (importantly, because both sensory streams are being stimulated) which means effects can be timed in event structure permitting control of onset, peak, and fade-aways (tail).

**Blocking Senses — Augmenting Senses — Altering Senses**

Blocking the senses can be a powerful way to create memorable experiences because we don’t often have our senses blocked in everyday life. The act of blocking stands out in attention as a figure of salience in our memories.

Consider the experience of eating a steak. If you are not a vegetarian, you will likely eat many steaks in your life. Some of them will be better than others, and in thinking back over your life of eating
steaks, you may have a few particular steak moments that you use to “reconstruct” the experience of eating a steak in your mind. Most of the steaks that you eat will be forgotten, so the experience value of eating a steak is not very salient in your memory (I am using memory in a non-technical sense). If you are a chef, you want your steak to stand out and to be one that the guest remembers above all others. How might you achieve this goal? Perhaps by taking away your guest’s sense of taste. While this sounds a little crazy, if you try it, the experience will stand out in the guest’s memory because it is so different. How might a chef go about removing the sense experience of tasting a steak? Encapsulate it in gelatin capsules and offer a pile of capsules to the guest with a glass of water. Guests will transfer the steak and its nutrients to their stomach without ever actually tasting the steak, and every time they take a pill in the future they will remember being at your restaurant. (Note: if you try this, you have to pulverize the steak before packing it into the capsules so that the food is easier to digest, and merely cutting it into slivers will cause severe indigestion.)

Maybe you’ve already done the capsule steak dinner thing and you’re running out of tricks. What’s next? Well, blindfold the guest and give them a capsule meal that they can’t taste or see. They won’t even know what they ate! Another visual trick is to color all of the foods the same with food coloring. What is it like to eat a meal that is colored completely black? How will it affect the food? What does it do to appetite? Eating black food in an otherwise normal setting is different than eating food (regardless of color) in the dark. Eating in the dark prevents you from seeing anything around you. Eating colored food in an otherwise normal setting keeps your focus on the fact that it is the color of the food that is different. But this isn’t new. Restaurants like Opaque in San Francisco have experimented with eating in the dark as the primary mode of dining in their restaurant. While this might seem new, experimenting with altering the experience of diners has been around since before the Italian Futurists Meals devised by the fascist Marinetti in the 1930s, and probably much earlier.

Touch is a difficult sense to eliminate because of proprioception, but you can dampen it and modify it. Consider how it feels to eat with your fingers and hands: you have direct contact with the food and feel it squish and tear under your goal-directed muscular manipulations. When you use a fork and a knife (or chopsticks), you are mediating haptic signals through the body of the utensils and you can gauge how much pressure to use to pick up, hold, or cut food on your plate and how to steady the food as you transfer it...
to your mouth. So if mediated touch can do nearly as good a job as direct touch with how you control food, maybe further mediating touch might effectively dampen the sense enough to create a memorable experience. Obviously the best course of action is to give your dinner guests a pair of boxing gloves to wear as they eat. Create clumsiness. Another option is to use elastic bands to create tension differentials between the two hands to limit the effective range that a person has with flexibility in the process of eating. Trick the muscle memory by drastically altering normal capacity with abnormal restrictions.

Eating designer Marije Vogelzang created a moment of haptic give and take when she arranged Shared Meal (Images 11 and 12), a meal eaten at a table with a unique tablecloth that connected each of the diners together such that by moving to reach something on the table, the action would shift the bodies of the other diners at the table. The tablecloth binds people together and the actions and table manners of your neighbor have an impact on your meal by constraining your motion. Each person at the table is constrained by the motion of the people around them, and everyone still gets to eat through careful negotiation of movement at the table.

Sound is a vital part of eating, so try blocking sound while eating. Earplugs help a little, but mastication resonates in the head. What if people heard the sound of someone else’s chewing in their head, or perhaps an animal chewing?

Like all basic attention patterns, when you first encounter some sensory stimuli, the intensity of the stimuli makes it stand out, but as you continue to encounter that same stimuli, it becomes muted in the background. It moves from figure to ground and your body starts looking for the next figure to jump out. This phenomenon has been studied with eating and researchers call it sensory-specific satiety.

Sensory-specific satiety occurs when the person loses the pleasure of eating a particular food because of having been satiated with that particular food. It is sensory-specific because it has been demonstrated that variations in the sensory qualities of a food item reset a person’s appetite. For example, it partially explains why after a filling meal you might have room for dessert. You have eaten your fill of dinner, but not your fill of dessert.

Minor variations in sensory qualities including the sight of food and the taste of food (Rolls et al. 1983), smells (Rolls and Rolls 1997), liquid volume (Bell et al. 2003), even beliefs and past experiences (Rolls 2009), such as beliefs about the amount of food necessary to reach satiety, how much food it previously took to reach
satiety (etc.), have all shown similar satiety effects, demonstrating a type of satiety that is clearly multimodal.

The multimodality of the sensory-specific satiety effect makes satiety an interesting platform for crafting food-related experiences. Think of this as an extension of attention, as it enables taste-based attention to be modulated by the sequencing of tastes, textures, colors, etc. during the designed experience. The flexibility provided by the sensory-dependent aspects of satiety means that you can engineer an experience (e.g., a meal, a dinner party, tasting courses, etc.) to push the boundaries of tolerances for sensory-specific features by organizing meals in ways that diminish appetite for one flavor profile and increase appetite for the next flavor profile.

Chef Thomas Keller describes this kind of meal organization to increase appetite as following the law of diminishing returns. He creates an experience for a diner where they experience an interesting flavor but only enough of that flavor to surprise the diner, and not enough of the flavor to blend into the background. The portion is too small to get bored with the flavor. Keller says: “I want you to say, ‘God, I wish I had just one more bite of that.’ And then then next plate comes and the same thing happens, but it’s a different experience, a whole new flavor and feel” (Keller 1999, 14).

The sensory-specific satiety effect blocks the senses by allowing a new flavor (the next salient figure) to enter the scene. Eating obviously provides a sensory experience, but less obviously, it provides a platform for telling a story, and done in a certain way, a meal can become a highly personalized experience. Compartmentalization and flavor separation can be presented in an experience that invites diners to choose their own path through the meal, creating a highly individualized dining experience. Using the law of diminishing returns in this way enables you to systematically use diminishing returns to block interest and redirect attention while a salient flavor profile fades away into the background and a new flavor profile begins to stand out. And this correlates with what we know about appetite — that variety keeps the mouth interested in taking another bite.

**Designing Paths with Smells**

Artist Maki Ueda creates spaces that require movement and active engagement with the space in order to experience the sensory elements of that space. Her work departs from traditional olfactory art which typically involves the passive reception of smells at fixed locations to be more of an embodied approach to “omni-directional” olfaction in which participants engage in decision making and path selection as they move through the space of the olfactory installation.

In her *Olfactory Labyrinth* (2013) (Images 13, 14, and 15), a grid of three different scents is suspended from the ceiling using oil
lamp wicks which diffuse the scent in a 20cm radius at each node in the grid.

Participants move through the grid by finding a particular scent and following it through the labyrinth almost like a dog would sniff to follow a scent trail. In fact, a workshop that accompanied the installation helped participants learn to “search the space like a dog.” Olfactory Labyrinth gave people the opportunity to navigate a space with their noses and to not make decisions based on the other senses (vision and hearing) that we normally use in way-finding. This kind of installation is reconfigurable and different paths can be arranged by distributing the scents in new patterns in the grid.

Using Categorization to Design a Path Through a Sensory Experience: A Case Study

Categorization and compartmentalization are very basic to humans on a conceptual level. We have to categorize in order to think. Categorization is as basic as eating, if not more so, and this isn’t a stretch: even knowing that you want to eat reveals that you can categorize between being satisfied and being hungry. The evidence that categorization isn’t just conceptual but also trickles down into the design strategies we use in cooking and eating suggests strongly that our cognitive structure also structures our designed experiences of the world. **Categorization makes the act of tasting food possible.**

Since categorization is such a basic element of existence, we can find new ways to express categorization in people’s taste experience. Simply finding ways to compartmentalize little bits of the meal into a kind of choose-your-own-adventure game path lets the diner decide what to eat when and how. It is ideas like this that stand behind the kitchen philosophy of people like Chef Grant Achatz, and his dish *Lamb 86* (2012) at Alinea proves it. It’s a dish with 86 different components laid out in the style of a grid in 60 squares (like a compartmentalized box) on a pane of glass (Image 16).

What is striking about this dish is that it is possible that no two guests ever encountered the flavor profiles of the dish in quite the same order because the components are eaten in different orders, reflecting the choice path a diner makes during the table experience. *Lamb 86* is a guest-centric approach to the dining experience. The back of house brigade presents the bits and pieces of a dish to the diner, and the diner decides what story the dish will tell.

Tying all of this together, we know that categorization is basic to human experience, we know that variety in flavors and other orosensory factors increase consumption or at least preserves (and maybe increases) appetite for new flavors, and we know that compartmentalized dishes keep different food items separate, isolating flavors. When all of this comes together in a strategic approach to a dish (like *Lamb 86*), what you get is an opportunity to experience your own sorting strategy, and you determine this taxonomy at the table. It is human-centric and it is guest-centric—this is a chef engaging a basic element of human cognition by making a guest tell the story.

It might be easy to see how this holds true outside of the kitchen before we look at how cooking can tell a story. For instance, look at your cherished possessions: we can take the individual pieces and parts of our life and understand how they tell an integrated story.

When I was a little boy, my dad had a box of treasured possessions that he kept in a hidden place, but I knew where it was. Inside this box he had mementos of moments in his life that meant something to him—these possessions could tell a story about his life.
Every once in a while he would show me the box and tell me stories about how the items in the box came to mean something to him, he told me his story by using these treasured possessions as props. I explored this concept in a project a few years ago called *Weaving Narratives*, in which I took eight compartmentalized styrene boxes and collected mementos of some hypothetical story.

When you take one of these eight boxes, you can “read” the items in the box as any number of plausible stories because you can put together the details in different ways. You bring your own story to the box, with your own background, and you read the item through the filtered lens of your own experience and history. The way I read the boxes is different than the way you read the boxes, and it’s different than the way your friend would read the boxes, or your neighbor— the story is different for everyone because their past experiences determine when and how they enter the story.

When you take a box and you imagine a story of the contents of that box, it is your memories, biases, knowledge, experiences, and general exposure to the world that you are relying on to help you read and understand the story, and to make sense out of the objects presented before you. This will always vary between two different readers. For instance, in one of my boxes there is a tarnished wedding band—for people who have good experiences with marriage, this might symbolize something positive, but for people who have had bad experiences with marriage, this might be associated with negative feelings.

In a similar way, people eating the “same” dish at a restaurant will have varying reactions to it—this is like a form of *diner’s relativity*—and what they experience is colored and flavored by their memories and overall life experiences. For example, for a long time I hesitated to eat oysters because when I was a boy, I picked up an oyster off of a pier at low tide and took it home and placed it on my desk on a little slab of marble. It sat there dying for two weeks (I didn’t even know it was alive) and then it filled my room with the most awful smell I have ever experienced. Now I love oysters, but sadly, sometimes to this day, I’ll see an oyster and it’s like I can still smell that dying oyster smell and I get a little queasy.

The fact that memory shapes the way we engage food is not surprising, and everyone has some memories of favorite foods, foods they associate with moments of happiness, and foods that tell a darker story. As time goes on, we amplify those memories and they become entrenched in our identity—part of what makes you you is that you have the memories you have because you have the experiences you have. Food acts as a kind of distributed memory: we can build a memory over a bowl of soup and years later we can have a bowl of the same soup and it stirs up those memories. Since memories can be so tightly linked to foods, it is reasonable to argue that stories can be linked to foods as well.

So what happens when someone serves you a dish that has bits and pieces of your memory scattered throughout? How do you interpret that dish? Can you live in the moment and accept the dish for what it is, even if it stirs up bad memories? Maybe a mixture of good and bad memories builds a *memorable texture* to the experience of eating this particular dish.

Grant Achatz’s *Lamb 86* is a dish that lets guests establish and drive a narrative of memorable texture, and it does this on two dimensions: first, it draws on the associative memories that guests have with specific ingredients (*Lamb 86* has 86 ingredients); second, it lets guests choose the order in which they approach those ingredients that are presented to guests on a 60-cell grid. Not only
do guests encounter ingredients that may or may not trigger memories, but they get to choose the order in which they encounter those ingredients—the dish offers memory and control. You could say that guests get to tell the story and read the story at the same time.

Achatz brings categorization to the table for guests by giving them raw materials with which they can weave together a narrative that he helps them remember and create. You tell yourself a story when you pick and choose what to eat next. The path that you forge through the meal is a wayfinding experience where memories and fresh encounters with familiar ingredients are the landmarks that help you track your progress and keep yourself oriented. Tracing the path of a guest through the dish reveals not just the choices they make, but also the experience they had.

**Maybe you go through the dish with this path:**

Coffee, Mint, Oregano, Spring Garlic, Walnut, Red Onion, White Beans, Blueberry, Pasta, Thyme, Tamarind, Curry, Pistachio, Oats, Lemon, Rosemary, Red Pepper, Cumin, Cous Cous, Madeira, Eggplant, Blackberry, Cumin, Endive, Red Wine, Cinnamon, Yogurt, Tomato, Saffron, Caraway, Smoke, Anise Hyssop, Rum, Fig, Clove, Fennel, Cherry, Sorrel, Blood Orange, Peach, Olive, Black Licorice, Apricot, Fava Bean, Almond, Artichoke, Star Anise, Carrot, Parsley, Dill, Brioche, Sambuca, Tarragon, Cilantro, Basil, Bay Leaf, Beets, Asparagus, Rhubarb, Capers, Honey.

**Or maybe it is this path:**


**Or maybe you do something idiosyncratic and novel, where you:**

— make little *ad hoc* groupings of flavors you like;
— eat in the order of which component you ate first in life;
— group ingredients by world cuisine (Greek, Indian, Thai, etcetera);
— alphabetize components;
— follow the color spectrum
— choose which to eat next based on colors you see around the room;
— eat all of the lamb first, and then eat the little stuff (probably not);
— eat the things you don’t like first;
— make little recipes in your mouth with 2 or 3 ingredients at a time;
— assign numbers to the grid and eat prime numbers first;
— eat every other item to make a checker-board pattern;
— write a word with the void created by the items you have eaten;
— just eat what looks good to you;
— don’t pay attention to what you eat next;
— eat everything with acidic pH before the basic items;
— eat fruits, then vegetables, then nuts, then sauces, then spices;
— follow some private taste language that makes you happy;
— start at cell #1 and move to cell #60, in ascending order (but which corner is #1? which is #60?);
— etc.

However you chose to navigate through the dish, the fact remains that you have experienced a story that you participated in creating. Your encounters with the landmarks have been plot devices that advance the narrative of the dish through all stages of the dramatic
format: exposition, rising action, climax, falling action, and dénouement.

This story is a layering of experience that is layered in time rather than space. You encounter the different layers of this narrative when you pick up the next bite (and each bite is separated by time), and you don’t encounter a layering of space like you do when everything is served combined together (as opposed to being compartmentalized on the tray). And this time-based format for categorization influences your experience of the flavor profiles—you don’t get this variety in flavor profiles when you bite into a cheeseburger. Your top teeth move through the bun, into the burger, and then meet your bottom teeth that have just come through the bottom bun to meet the top teeth in the middle. There is not much variation between the ways that two people eat a cheeseburger, but when two people are eating Lamb 86, there is so much variation in the flavor experience. Each dish results in a different story.

Yes, two guests both eat the same sum total of ingredients, but at any given point during the meal (say, just after component 43), the flavors you have deposited in your stomach add up to influence the way that you taste component 44, and unless you both have eaten in the same order, your expectation of how 44 will mingle with 1–43 will be different.

What you have here is a multifaceted narrative that is influenced by memory, perception, and identity. It is a participatory story. A narrative that is written by a kitchen brigade and maybe by your childhood encounter with a pistachio. It is a narrative that comes from the ability of the food itself to reach into your life history to find anchors for taste experiences. Encountering your meal piecemeal, each component individually helps you categorize your guest experience with a memorable texture where participation in the act of categorization becomes an act of eating, as well as an act of reading. Achatz is a prototypical story-teller: he crafts the elements of a story and then lets you join in, participate, and find your own way to own the story.

Creating Multi-Sensory Environments to Support Content

Our experience of life is typically multi-sensory. We feel comfortable in multi-sensory experiences because we routinely inhabit them. Sometimes when one or two sensory channels are heightened, we feel bombarded or overwhelmed by the senses. But most of the time we feel comfortable. Because multi-sensory experiences are familiar to typically-sensed people, the multi-sensory aspect can act as a supporting environment for some content that you want to communicate through that environment. This is often the case with dining experiences, where we talk about ambiance and environment, and it is often the case with immersive theater, where we talk about mise-en-scène and atmosphere. In both dining and theater, the supporting environment is there to highlight the content. In the case of dining, the atmosphere of the room highlights the content of the meal that includes an additional multi-sensory experience in the consumption of the food itself (e.g., the flavors, textures, colors, temperatures, smells, etc.). In the case of theater, the atmosphere highlights the story (i.e., the content) by creating the world for the story to inhabit and take place in, which gives the story credibility and believability, regardless of how bizarre and other worldly the storyline might be.

Think about the reasons you want to create a multi-sensory environment. What are you trying to do with the environment? How will the environment support or subtract from your content?

Creating Single-Sensory Environments to Isolate One Sense as Content

While multi-sensory experiences in the gallery are useful and enjoyable, there is something to be said for experiences that focus on a single sensory channel. Consider images (either paintings or photographs). An image can suggest sensory knowledge and it can convey bodily knowledge, but what it does best is draw you into the image through the visual channel. Letting images work this way without distraction from other senses allows an image to do what it does best. That’s not to say that supplemental sensory channels
in the environment ruin the experience—in some cases, activating the scene from the image in the room with lighting, background sounds, smells, and thermal conditions will bring a painting alive in a different way. But letting an image be an image, without other planned sensory interventions, helps the eye focus and absorb the image. Images are visual—they are not aural nor tactile nor typically appeal to other senses. While they may conjure sensory descriptions, they do so only through the eye along with our imagination and memory. Think about letting a work do what it does best. If you have a scent-based work, perhaps the scent is best appreciated in the dark or in an empty, windowless room. Isolate the sense you are trying to focus on to bring the audience into a moment of contemplation upon the sensory information they are receiving.

Life is already multi-sensory. Multi-sensory experience is the default mode of experiencing life, and as a default mode, it also becomes the background. Isolating a particular sense brings that sense to the foreground for a moment as the salient figure set against the background of everyday life experience. It will be more memorable because it is a scarce mode of experiencing life.