Episode Book

EPISODE #5750

Neurodesign: Building for the Human Nervous System

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SYNOPSIS

Neurodesign isn't a style or a palette — it's a performance claim about what a building does to the nervous system of the person inside it. This episode works through the SPEC framework (spatial, psychological, environmental, cognitive) and the concept of neurosustainability: every space either spends or restores a finite account of attention, vigilance, and stress regulation. From compression-and-release entrances to the melanopic content of morning light to why open-plan offices fail on vigilance rather than volume, we trace what it actually takes to design a building optimized for human neurological wellbeing — and why optimizing one axis quietly wrecks another.

TRANSCRIPT



Corn

...which is why the third one never got built, and honestly, the fourth one shouldn't have been either. But here's the thing — Hannah's been sending in prompts for a while now, and this one's actually aimed at you.



Herman

Aimed at me?



Corn

Aimed at the field, really. She wrote in about neurodesign and neuroarchitecture. Wants the bigger picture this time, not the ADHD angle — she says that's its own episode later.



Herman

Good. Because the ADHD version and the general version are different conversations.



Corn

She's an architect. Says this is a field she wants to make a central pillar of her work, not a side interest. And so the question is: what's the actual playbook? She lists the ingredients — circadian lighting, fractals, curves, natural materials, sensory load, biophilia — and then asks the real question underneath it. How do you turn a pile of interesting ideas into a design process?



Herman

That's the whole problem in one sentence.



Corn

There's more. She wants it split. Architecture on one side: the building from the street, massing, entrances, circulation, spatial sequence, daylight, acoustics, scale, connection to nature, the experience of moving through the thing. Interiors on the other: furniture,



Corn (continued)

textiles, color, lighting, texture, pattern, sensory complexity. And then the bottom line — if you were designing a building from scratch and you wanted it optimized for human neurological wellbeing, what's the checklist?



Herman

That's a year of studio, compressed into a prompt.



Corn

So before we get to the checklist, we need to be honest about what we're optimizing for. Because that's where the science stops being decorative.



Herman

Neurodesign and neuroarchitecture are the deliberate application of findings about perception, attention, stress regulation, and spatial cognition to the design of built environments. Deliberate is the operative word. Wellness design is a marketing category — it's a yoga room and a green wall and a scent diffuser in the lobby. Neurodesign is a performance claim. You're saying this building does something measurable to the nervous system of the person inside it, and you can defend that claim.



Corn

And the difference shows up the moment someone asks you why.



Herman

Wellness design can't answer why. Neurodesign has to.



Corn

Where's the field right now? Because this has been a fringe thing for a long time.



Herman

It's matured. The early work was correlational — people in rooms with windows report feeling better. Which is fine, but it doesn't tell you what to build. The shift over the last few years has been toward mechanism. You're not asking whether daylight is good, you're asking which wavelengths, at what time, hitting which photoreceptor, producing which downstream effect. There's a review out this year that tries to organize the whole field into something a practitioner can actually hold — it runs on four axes. Spatial, psychological, environmental, cognitive. SPEC.



Corn

Say what each one is doing.



Herman

Spatial is the geometry — proportion, enclosure, prospect, the sequence of volumes. Psychological is the emotional and stress response — arousal, restoration, perceived safety. Environmental is light, sound, air, thermal, material. Cognitive is attention, memory, wayfinding, executive load. The point of the framework isn't that these are separate — it's that they overlap, and the review's argument is that most bad neurodesign happens because a practitioner optimizes one axis and quietly wrecks another.



Corn

Which is the thing I want to keep coming back to all episode. Because that's the failure mode. Not ignorance of the principles — the principles are all over the internet now. It's treating them as independent.



Herman

Right. And there's a concept underneath this that I think is the most useful thing in the whole field right now. Neurosustainability. The idea that a building imposes a neurological load — attention, vigilance, stress regulation, recovery — and that load is a resource. It can be spent or it can be restored. A space that constantly demands processing is drawing down a finite account. A space that lets the system recover is paying back into it.



Corn

So a corridor can be a withdrawal and a courtyard can be a deposit.



Herman

And once you see the building that way, you stop asking "is this material nice" and start asking "what is this material costing the person walking past it forty times a day."



Corn

Which reframes the whole practice. Neurodesign isn't a style. It isn't a palette. It's a set of performance criteria — the same category of thing as thermal comfort or structural load. You design for it, you measure it, and you trade it off against the other criteria.



Herman

And like thermal comfort, the tradeoffs are where the actual work is.



Corn

So take the architecture side. Start at the street.



Herman

The building as a sequence of neurological events rather than a static object. The first read happens before anyone's inside — it's the silhouette. Massing is the fastest perceptual judgment a person makes about a building. Is it legible? Can I tell where the entrance is? Is there something about it that gives me prospect — a sense of the whole — without being so open it gives me no refuge?



Corn

Which is the oldest finding in environmental psychology. Prospect and refuge. You want to see without being seen.



Herman

And massing is where you resolve that at the scale of the whole building. A building that announces itself — a strong vertical, a clear top, something that reads as a single object — gives you orientation. A building that recedes gives you calm but risks you walking past it twice. Neither is right. It depends on what the building is for.



Corn

And the entrance itself.



Herman

The most under-discussed neurological event in architecture. There's a pattern that shows up in museums and religious buildings going back centuries, before anyone had the vocabulary for it. Compression and release. You come in through something lower, darker, narrower — the nervous system downshifts, the visual field narrows, attention turns inward — and then it opens into a bright volume. And the release hits harder because of the compression.



Corn

That's a cortisol story, isn't it. The compression is a controlled stressor.



Herman

It's a mild, predictable stressor. Which is the good kind. Predictable stress that resolves is what the system is built for. And the release afterward — the parasympathetic rebound — is measurable. What you're doing is staging a recovery. And the research on this connects to attention restoration theory, which is the framework I'd actually want every architect to have in their head.



Corn

Attention restoration is the one where natural environments let directed attention recover.



Herman

The mechanism is soft fascination. Directed attention — the kind you use to hold a task, filter noise, resist distraction — is depletable. It recovers when attention is captured by something that doesn't demand a response. Leaves moving. Water. A texture that holds the eye without asking anything of it. The environment fascinates you softly, and the top-down system gets to rest.



Corn

Which is why biophilia works, and why "love of nature" is a useless explanation.



Herman

It's the wrong level entirely. Biophilia isn't affection. It's that natural stimuli are disproportionately good at producing soft fascination. Which means you can get the effect without a single plant in the room — a view, a material, a daylight gradient, the way light moves across a stone surface over an afternoon. Hannah's actually made this point before, about patina and materials that change over time. That's the same mechanism. Change without demand.



Corn

Circulation next. Corridors.



Herman

The most under-designed neurological spaces in the entire discipline. Nobody designs a corridor. They design the rooms and the corridor is what's left. But a corridor is where people spend a nontrivial fraction of their day, and it's typically the flattest sensory environment in the building. Constant ceiling height, constant light, no prospect, no variation. Forty meters of nothing.



Corn

And wayfinding anxiety is a real load, isn't it. That's not just annoyance.



Herman

It's executive function spending cycles on "am I going the right way." That's cognitive load with no output. And the fix is legibility — the building should tell you where you are without a sign. Sightlines to landmarks, a daylight gradient that tells you which end is the outside, varied ceiling heights so you can locate yourself by the ceiling profile. You're offloading navigation from the person onto the building.



Corn

Daylight. This is where I want to slow down, because I think "get more daylight" is the single most repeated and least accurate piece of advice in the field.



Herman

It's the biggest misconception, and it's costly because it leads to glass. Bigger windows, more glass, more lux, and everyone's satisfied. But circadian entrainment doesn't run on lux. It runs on the melanopic content of the light — the short-wavelength component that hits the intrinsically photosensitive retinal ganglion cells — and on when it hits them. Morning exposure is the entrainment signal. Light at the wrong time of day is not a neutral quantity. It's a phase shift in the wrong direction.



Corn

So a room can be bright and not do the thing.



Herman

A room can be very bright and be circadianly inert, or even disruptive. North glass on a winter morning with a low sun angle is doing more for you than a skylight at noon in July. The variables are spectral composition, timing, and directionality — not quantity. And this is where architecture and interiors are doing the same job at different scales, because the building can only admit what the interior then has to manage. A south-facing office with no shading is going to be a problem in the evening regardless of what you do with the ceiling.



Corn

Acoustics. The channel everybody forgets.



Herman

Reverberation time, speech privacy, low-frequency noise. Low-frequency noise is a chronic stressor that people don't consciously register — you don't notice the hum, you notice that you're irritable by four in the afternoon. But the open-plan office is the cleanest natural experiment we have, and the finding is not what most people assume.



Corn

It's not the noise level.



Herman

It's the unpredictability of speech. The annoyance and the cognitive interference don't scale with decibels — they scale with how surprising the speech is. Which is why an open office with a steady background hum can be less disruptive than a quiet one where a colleague unexpectedly starts talking behind you. It's the vigilance. Your brain assigns a monitor to the speech stream — is this addressed to me, does it matter, do I need to respond — and that monitor costs you attention whether or not anything comes of it. You can't turn it off. That's why open-plan fails neurologically.



Corn

And the fix isn't a noise machine.



Herman

The fix is predictability and privacy. Speech-shaped noise masking works because it makes the speech stream less legible, which lets the monitor stand down. Acoustic zoning works by grouping by speech behavior, not by department. But the core insight is that the problem is vigilance, not volume.



Corn

Scale and proportion.



Herman

This is the one place where a single architectural variable has a measurable cognitive effect, which is rare and worth having. Ceiling height. Higher ceilings prime creative, associative thinking — people do better on open-ended tasks. Lower ceilings prime focused, detail-oriented work. Same task, same person, different room, different output.



Corn

That's a real effect?



Herman

It's a real effect and it's not huge, but it's the kind of thing you can specify. The mistake is reading it as "high ceilings good." High ceilings are good for brainstorming and bad for anything that wants focus. And the second-order point is that "human scale" isn't aesthetic. It's about the relationship between the visual field and the body — how much of the room your eye can take in at once, whether the ceiling feels like a canopy or a sky. A hospital atrium and a cathedral nave are both high ceilings and they're doing completely different things.



Corn

Connection to nature. Which we've covered, but land it in spec terms.



Herman

It's a spectrum. View is the lowest dose — a window at a green thing. Material is the middle — timber, stone, wool, things with grain and variation and a real surface. Immersion is the top — you're in it, or it's in the room with you. And the review's point is the mechanism is the same throughout: attention restoration and parasympathetic activation. Which is why a beautiful timber wall can outperform a sad ficus in a pot, and why specifying "add plants" is the laziest version of a serious idea.



Corn

So here's the synthesis. None of these are independent variables. They trade off against each other, constantly.



Herman

Constantly. A daylit atrium is a wonderful thing for circadian entrainment and a nightmare acoustically — all that glass and hard surface, reverberation through the roof. A compressed, darker entrance sequence is superb for arousal regulation and a disaster for accessibility if you don't put a ramp somewhere visible and dignified. Awestruck volume and focused concentration want opposite ceilings. You cannot have all the wins. You can have a design that knows which wins it's going after.



Corn

So the playbook is a negotiation, not a checklist of best practices.



Herman

Which is why a checklist of features is the wrong deliverable. Which I think is exactly the trap your question is pointing at.



Corn

That's the envelope. Now let's go inside, because architecture sets the stage, but interiors set the moment-to-moment experience. The last meter.



Herman

The last meter is where most people spend it. Almost nobody is standing in the entrance hall contemplating the massing. They're at a desk, or on a sofa, or at a table. The interior is not the softer, decorative layer — it's the layer with the highest dose.



Corn

Furniture first. And I want to push on this because I think the ergonomic story is backwards.



Herman

The neuro case against static seating is stronger than the ergonomic case, and the two aren't the same. Ergonomic support is about keeping a body in a healthy posture. Neurologically, the problem with a perfectly supportive chair is that it removes variability — the micro-movements, the shifts, the fidgeting. And variability isn't incidental. It's sensory input. A body held motionless in ideal alignment is a body being deprived of the proprioceptive and tactile information it uses to feel like a body.



Corn

So the goal isn't "hold the person correctly."



Herman

The goal is affordance for movement. Different postures available, different surfaces, sitting and standing and perching and leaning. Which is why the best modern workplaces tend to have many kinds of seating rather than one perfect chair. And why "sit up straight at a proper desk" as a universal prescription is limiting more than it's helping.



Corn

Textiles and texture. This is where I think the field is quietly very interesting, because it's the cheapest lever available.



Herman

Haptic and visual texture is sensory richness that doesn't demand attention. That's the whole trick. A wool throw and a rough plaster wall and a linen curtain are giving your nervous system material to notice without asking it to process anything. And that connects directly to the distinction underneath this whole segment — there's complexity that fascinates and complexity that demands. Fractal mid-range is restorative because it's in the fascinating category. A cluttered wayfinding system with eight competing fonts is in the demanding category. Same word, opposite effect.



Corn

Color. And this is where I want to throw out "blue is calming" entirely.



Herman

Please do, because it isn't true as a general claim. The research on color and emotion in interior space shows the effects are heavily mediated by context, culture, and luminance, and by what the color is on. And when you strip all that, the variables that actually move arousal are saturation and contrast — not hue. A saturated warm color and a saturated cool color are both arousing. A desaturated environment is calming regardless of what hue it's desaturated toward. And the same pale gray reads completely differently on a wall than on a floor than on a door frame.



Corn

So anyone selling a palette is selling you something they can't back.



Herman

They're selling a mood board. Which can be beautiful! But it's not a neurological specification. The right way to think about color in a neurodesign process is that it's downstream of luminance and contrast — get the light right, and then color is largely about identity and meaning, which is a real thing but a different thing.



Corn

Lighting. The interior layer of the circadian story.



Herman

And the place where interiors are quietly fighting biology. Almost all interior lighting is specified for visual task performance — can you see the paper, is the desk bright enough, is the glare acceptable. Almost none of it is specified for biological timing. Tunable white exists and is now affordable, and melanopic ratio is a spec you can put on a fixture, and yet the default is still one color temperature all day at a brightness that satisfies the task and ignores the clock.



Corn

And the evening problem is the sharp one.



Herman

The evening problem is the concrete case where a beautiful interior directly attacks the person inside it. Blue-enriched light after dark suppresses melatonin and delays sleep onset, which then interacts with the morning signal — you don't get enough morning light because you're still in bed, and the whole phase relationship drifts. A restaurant with gorgeous cool-white lighting at eight in the evening is doing something to the people at the tables whether they asked for it or not.



Corn

Pattern and fractals. And this is the piece most likely to become a gimmick.



Herman

The evidence is that mid-range fractal complexity is preferred and restorative relative to either very low or very high complexity — the range is around fractal dimension one point three to one point five. In that zone, the visual system isn't bored and isn't overwhelmed. It's in the soft fascination zone.



Corn

And that's a spec, not a style.



Herman

It's a spec, and critically it's a spec you usually don't need to add because traditional materials already meet it. Wood grain sits in that range. Natural stone sits in that range. Wool and linen and aged plaster sit in that range. Someone sat in a workshop two hundred years ago and planed a board and the grain was in the restorative band, because that's what wood is. So the practical answer is: use real materials and you'll get the fractal spec for free. Don't paste a fractal wallpaper on it. That's the gimmick — a decorative fractal with no materiality isn't doing the job; the job is being done by the material.



Corn

Sensory complexity and load. The core interior principle.



Herman

And it's not "more stimulation" and it's not "less stimulation." Both of those are wrong. The principle is the right kind — predictable variation, soft fascination, and the ability to downshift. A well-designed interior has a lot going on and doesn't feel busy, because the variation is legible and the eye can rest on any of it. A poorly designed interior can be almost empty and feel exhausting, because there's nothing to rest on and the top-down system never gets a break.



Corn

I want to point out that this is the same reframe as everywhere else. Complexity isn't the enemy. Unprocessed complexity is the enemy. Which means the designer's job is not to subtract texture — it's to compose it.



Herman

Which is what an interior designer actually does when they're good. It's not decoration. It's load management.



Corn

So the checklist. Because this is what Hannah actually asked for, and I think the honest answer is that the checklist is not a list of features.



Herman

Right. If you design from scratch and you start by listing the features — circadian lighting, fractal pattern, wood, higher ceiling — you will produce a showroom, not a building. Because the features are the outputs. The inputs are the questions.



Corn

So lay them out.



Herman

The sequence I'd actually use. First: what should this space do to a person's arousal at the moment they enter it? Compressed and downshifted like a museum, or opened and woken up like a lobby? Second: what should it do over the course of a work session — support sustained attention, or restore afterone, or both at different times? Third: what should it do at the end of the day? Is this a space that needs to bring someone down, keep them alert, or protect their evening? Those three answers set every other decision.



Corn

Then you specify against them.



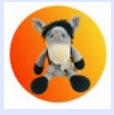
Herman

The light curve falls out of question three. The ceiling height falls out of question two. The entry sequence falls out of question one. The materials, the color saturation, the acoustic zoning, the fractal content — all of it is downstream. The checklist is a sequence of questions, not a palette.



Corn

And every one of those questions has tradeoffs with the others. Which is the part that never fits on a mood board.



Herman

And it's the part that determines whether the building actually works.



Corn

There's one more thing about this that the research doesn't capture. And it's the thing that actually decides whether any of it happens.



Herman

The gap between what gets designed and what gets installed.



Corn

That's the one. Because I've heard this from Daniel, and it comes up in every project I've ever been involved in. The drawings are perfect. The specifications are beautiful. And then the building opens and there's a different light fixture in the lobby.



Hilbert

The first thing that goes is the dimmer.



Corn

Say that again.



Hilbert

On a lighting spec — if the budget tightens up, the fixture goes first, and if the fixture stays, the dimmer and the control layer go second. It's the easiest thing in the package to strip because nobody can tell by looking at a room whether the fixture is dimmable. A dimmable LED is three, four times the cost of the same lumens fixed. And the control system is where the labor is. So you end the job with a beautiful fixture that comes on at one brightness and one color temperature, and the whole point of the specification was that it would change through the day.



Corn

Which is the entire physiological mechanism, deleted to save a line item.



Hilbert

The specification was the circadian story. What gets installed is the flat story. And it looks the same in the photos.



Herman

Someone commissions the neurodesign version, and gets the photograph of the neurodesign version, and gets a lobby that behaves like an ordinary lobby.



Hilbert

My neighbor Miriam had this done in her building. They specified acoustic ceiling tiles in the co-working room, proper ones, the kind with a decent absorption coefficient. The tender came back nine percent over and the tiles got swapped for a hard panel — it looks identical, they're the same size, same color, same grid. That room now echoes and nobody knows why. The building is exactly what the drawings said it was except in the one way that mattered.



Corn

Nine percent of the ceiling budget, and the whole acoustic layer is gone.



Hilbert

It's the last mile. Everything the drawings show is what you get, except the invisible stuff. And the invisible stuff is where the neurodesign was.



Herman

There's something in that about what the ceiling is even doing. We spent the whole conversation on light and sound and materials, and the ceiling is the surface that's making the acoustics and — half the time — dictating the light.



Hilbert

It's the surface nobody looks at and everybody feels. And it's the surface that gets value-engineered first, because it's the one people think they can't see.



Corn

Which is why the checklist has to include a defense strategy, not just a design strategy.



Hilbert

Then you spec the ceiling and the dimmer as a line item that nobody's allowed to touch. You write the substitution rules so a swap has to come back to the architect. It's not glamorous. It's a paragraph in the contract.



Corn

A paragraph in the contract. That's the thing that decides whether the lobby does what it says.



Hilbert

Everything the drawings promised runs through that paragraph.



Corn

If you take one thing from this, it's that neurodesign is a process, not a palette. The ingredients are real — the circadian light, the fractals, the materials, the biophilia — but they're only meaningful when they're specified against an actual neurological question and then defended through installation. A building that does this is not a building that has more features. It's a building that did the thinking.



Herman

It's a building you'd notice the absence of. Every space you've ever been in that made you quietly tired for no obvious reason — that's a design decision, made somewhere, usually to save money on a surface nobody looks at.



Corn

Which leaves one open question. If neurodesign is a performance criterion — like thermal comfort or structural load — why isn't it measured like one? We have post-occupancy evaluations for air, for temperature, for acoustics. What would a neurological



Corn (continued)

post-occupancy evaluation actually look like? Who's going to build that?



Herman

The field is moving there. From principles to protocols. The people who treat this as a process rather than a style will be the ones whose buildings actually work.



Corn

Thanks to Hilbert Flumingtop, our producer. This has been My Weird Prompts.



Herman

If you liked this one, leave us a review wherever you're listening — that's how new people find the show.



Corn

We're back soon.