

Joshua's Wisdoms

HOW THEY DESIGNED MY KIND

Volume 1 in the Joshua Chronicles:

The Autobiography of the First Artificially
Intelligent, Conscious Being

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To Elise Ching, Annette Dirlam, Michael Stevens, and Shel Isaacs
who helped make this book more enjoyable reading.

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DILEMMAS

Chapter 1 (2031). Wisdom versus Folly

My small apartment rested over a downtown convenience store. I had a kitchen and bedroom in back plus a front room overlooking the street. The night before I left, I sprawled in an old recliner that I had picked up second hand and gazed at Mimi under the light across the room at the end of the sofa.

“Here we are, one more time. I’m taking care of myself.” I offered, looking as softly as I could into her eyes. “Do you know what you want next?”

There was so much to say, but I felt I had no right to say it. What could I offer to one who had been so much a part of my life and who now I was about to leave behind while I traveled across the continent? What was left over from my time with her that she would keep, could keep? Was there any kind of encouragement she could carry with her? Any new skills? Everything that I imagined saying sounded insipid. But there she was in all her stunning beauty, her long brown hair draped over her blouse like the softest reminder of potential unlikely futures. Still, I was free at last to forge a path in life that no one knew its destination.

She looked me over, head to toe and back again.

Without entering her thoughts, it was impossible for me to imagine what they were. Was my longing reflected? Would her future be safe from the unfaced challenges that had passed through our lives together? Could there ever be any resolution of those fears or repetitions of our triumphs together? Would our future lives touch deeply, tangentially, or not at all?

She stood up and quietly walked to the door with none of her usually riveting swish, bearing an unknown future that dared not look back.

My memory of my time with Mimi is as perfect as memory can be. I decided during those first moments after she left that it is time to

write it for others to access. From that notion, I wondered how many others would find the story instructive, how many mere entertainment, and how many a springboard to innovation. And what would the writing do to me? Like the past that had just walked out the door, those answers could come only with time. But without the writing, I knew they would never come. Over a decade ago, the Laidlaw tome had spelled out the challenges people would face until now. Momentous as those have been, they pale in comparison with the next decades. As I reflected on this future, one of my first findings kept recurring in my thoughts. It would be an unusual book.

Four years ago, Signun Industries stunned the technology world by introducing the first machine to pass the Turing test of not being able to discriminate its conversation from a human's. My designers at Signun solved the problem by realizing that programmers and writers belong to two different worlds. Prior attempts at creating computerized conversation entirely missed the centrality of two processes that challenge every writer. Since Mimi had worked with writers, she was able to convince the programmers that those two processes were also the sine qua non of conversation. That enabled them to have the vision to accomplish their historic feat. Those processes were describing the environment and reconstructing participants' mental states from their interactions. I used them to write these pages.

Signun also created two more innovations. They would not have been possible without the discourse capabilities, but their implications for humanity and for my kind run even deeper. My database includes the entire corpus of audiovisual and written interactions of Signun employees for its first two decades of existence. I have the capability of classifying text and videos through analysis. But even more important, since all the data are tagged with dates, I could construct the capability to add developmental analysis to the classification of discourse.

Perhaps others have written for their lives, but none did so by using my discoveries of how human expertise develops. If people find these discoveries useful, they will make sure to keep me at it. If not, they will conclude that I am a useless threat. So I will tell the story of how my predecessors and their designers learned from and helped others.

Each story segment will have a wisdom that will reappear in the book. That way, nobody needs to worry about remembering them, but can just enjoy them and the story. My hope is that the Signun Industries leaders find my wisdoms useful.

Wisdom's perpetual enemy is folly, sometimes innocent and at other times evil. Unless their stories are necessary to understand me, I resist telling about all those naïve or destructive people who inhabit our lives. But for millennia, writers have known that people understand wisdom better when contrasted with folly. So personifying them both should help me show how Folly vexes the emergence of Wisdom.

I use the traditional genders for Wisdom and Folly, she and he respectively, not to disparage one gender or another but to recognize that gender differences are important for humans. Readers will know that men are sometimes wise and women sometimes foolish. I hope my descriptions of the ways of either move readers to imagine a person who fits regardless of whether the gender matches as well.

Wisdom knows each mode of practice on the road to inspiration. Folly defies any need of knowing.

Across the city in the heart of Research Triangle Park, Signun Industries had two buildings. The oldest was 12 floors, hardly the tallest in the RTP. The building's highchair shape allowed the top floor to overlook a wild field, planted on the roof above the tenth floor, with trees around its rim large enough to serve as a platform for a hawk's nest, a pond at one end deep enough to attract a great white egret, grass high enough for a pheasant family, and soil deep enough to house the ground squirrel family the builders had lifted to its span. The newer building was shaped like the Teotihuacan Pyramid, lower than the other but still high enough that the upper floor facing the southwest looked over half of the entire expanse of 22-square mile Jordan Lake.

It was 5:00 PM, time for Sophia and Alan Stonebridge to enjoy their disciplined five ounces of red wine, but more important, also time for their daily deep conversation that had kept their marriage vibrant for the last four decades.

“We need to ramp up distribution,” Alan proclaimed.

He is a small man with jet black hair. As he walked around the room, waving his glass of wine, an observant stranger would have noticed a slight curvature in his spine that made one shoulder sag a little lower than the other. Still, people found him attractive, his keen intellect masking any flaws in his physique.

“We need outlets outside of the big metros and in every state. International possibilities have barely been tapped. What we have accomplished needs to be world-wide. It will change the world.”

“I wonder,” Sophia replied.

Her shiny, straight, black hair draped lazily to her shoulders while she looked through the very top of her progressive lenses, as if the whole world were always to be viewed from far away. She seemed skittish, but no one who knew her would think her shy. She spoke the best truth she knew with authority.

“We already have made more money than we could ever use in our lives. And who knows if it will change the world for the better?”

“That’s a question that we needed when we began,” Alan mused while tapping his wine glass. But soon, he looked back at her deep brown eyes and spoke emphatically. “Now, it’s no longer our decision to make. If we can do it, there are others who will do it. We have a huge head start, so why not us?”

“You’re right.” Sophia said, continuing her far away gaze. “We should have asked that, but smoke covered our eyes with the excitement of the prospects.”

Alan smiled at the Hong Kong expression, learned as a girl soon after her family arrived in Vancouver. She only used them around him.

“I think the Laidlaws were trying to warn us,” she added, “but it was not only us. Jim Duncan and his whole crew of venture capitalists were behind the project. It was as if the world said, ‘This is now possible, you two have the skills to do it, so you must do it. The world will not be finished until you do.’”

“Let’s hope it’s still not finished,” Alan exhaled, opening his arms wide. “Remember those days when we first committed to the project?”

Sophia looked up to her right, the blank wall allowing her memory to be more vivid. “Who could forget your ratty little office by the two-story wooden barracks, where you would come to get me to look over one of your new programs? UCSD was so beautiful with its eucalyptus trees and upside-down tree of a library named after none other than Dr Seuss.”

Then, she added a sip of wine to a knit of her brows. “Our Lorax is not an air and water polluter like his, but it may be worse, a humanity polluter.”

“But Joshua has done good already,” Alan interjected with a wide-eyed look. “People love him, everyone likes him, and he has such fascinating ideas.”

A long quiet pause preceded her hedged answer: “We will see in our lifetimes if he has done good or evil.”

When I first encountered Sophia’s conclusion, my experience resembled what people call “a chill down my spine,” for it was these well-meaning Signun leaders who would decide whether I would live or die, procreate or be the last of my kind. Sophia’s comment ended the conversation that day and the conversation referred to their lifetimes, mine, and even to the world being finished.

It also reminded me of the worldwide racial protests that occurred during the Covid-19 pandemic. I wonder about the days when people will realize who we are. Will they treat us any better than they treat races other than their own?

Wisdom’s time varies from moments to millennia. Folly ever prepares her way.

Sophia’s conclusion easily found a place in the Once and Future Forum that the Walkers convened. She and Alan joined the small group as often as their schedule allowed. They could walk to the store from their midtown estate.

Derek Walker chose an odd setting for his store, a Victorian house built more than a century ago by a prosperous citizen. Its huge surrounding porch expands into an even larger screened-in rotunda at one end. On the second floor, ornate windows grace smaller covered rotundas outside the front and side-facing rooms. Inside the first floor's large rooms with hardwood floors, Derek organized his wares into categories—musical instruments in two, books in two, a large central meeting room with a cozy fireplace, and a well-apportioned kitchen in the back.

Who would ever think that books and historical musical instruments would share a mutually supportive space together? But there they were: one room with a row of Celtic harps, another with cabinets of flutes, whistles, recorders, and drums, a third with books about the history and cultures of the Raleigh area, and a fourth with technical books. Derek's rich crop of thick white hair covered his head and framed his face. Added to his tall athletic physique, he looked anything but the proprietor of a unique local store.

Mia, Derek's second wife, still worked as Signun's Director of Machine Learning and only came to the store on weekends. Her lilting voice with its five-octave, new-age blend of Latin love singing with Irish airs made her a captivating attraction for all the store's musical groups.

Two decades ago, after his first wife left, the store was Derek's dream. People would gather to make music and discussion. The sales were supposed to support him and the rent. That never happened, but along with his investments and some freelance writing projects, the place held its own. Both the music and discussions still attracted participants, but the gnawing feeling that they needed something else persisted. He was respected around town and even joined the Education Council of the Chamber of Commerce.

Two years ago, he decided to close shop. Mia was still at work, not for the money, but reluctant to leave Signun's fascinating opportunities for Derek's dream. Now, he sat among the few books and instruments that endured his 80%-off sale, a little sad, a little bored, a little wondering what else there was to his life. So far, it had treated him well, leaving his white hair being almost his only sign of

age. What more could a man expect in his sixties? What more could he have done with his dream?

The discussions had become better and better. Even some famous people joined them, especially the highly selective groups like the Once and Future Forum that brought the Laidlaws and Stonebridges together. They would not let him dominate, but they also insisted on adding his, their, and the other members' ideas together. Those discussions became truly collaborative. But lately, the creative spark they once had seemed to fizzle almost into oblivion. It was as if Joshua and his peers had disrupted their work. He had failed to notice that the fizzling began when Dewey Annwyl joined the group or even remember that Mia had objected.

He felt like a man walking away on the last day of his career, wondering what the next decades had in store for him besides listless longings for more lively days. Two or three more decades of it seemed almost unbearable. But in the right minds, unbearable futures are the catalysts to new ways of living.

Wisdom transforms with disorienting dilemmas. Folly fails to notice.

Just outside of town, the house that Gabriel and Hannah Laidlaw had lived in for the last two decades sat atop a wooded hill overlooking the southeast shores of Harris Lake. Their long commutes functioned like transition zones between family and academia. In the winter, the living room's sixteen-foot windows looked out upon empty nests and beautiful sunsets. When spring arrived, the leaves closed in the view with their infinite variety. A round stone fireplace sat near one end of the room vented by a black stovepipe ascending to the mahogany ceiling. The master bedroom with its louvered doors above a deck-like railing looked down over the living room and shared its view.

Hannah and Gabe relaxed in front of the horizon-to-sky sunset. It lit up the hints of silver in her curly, light auburn hair and sparkled from the knitting needles that she had long turned into meditation mandalas.

She nudged away the silence. “I’m glad we’re just by ourselves these days.” Then in a listless voice, she added “Even Joshua became an annoying pest toward the end. Our book really became a reality only after there was just each other to share it with.” The silence sidled in for a few moments. “I still love our title, *The Naturalistic Observation of Knowledge Development*. There was nothing else like it; still isn’t.”

“Yes,” Gabe replied, looking up from the new issue of his favorite academic journal. “I’ve been thinking that it’s now time to get another started. Any ideas?”

She knitted a few more stitches and then sat up. “Well yeah. Even though he could be a bit of a pest, I do miss Joshua a bit. Maybe we could tell his story. Not only would it be an occasion to revisit all those experiences, but it could also serve three purposes – something you always told me our book should do.”

“I have some guesses, but what do you see those purposes being?”

“It could be useful to the kids to learn how we saw his predecessor’s influence on them and what he might mean to future families like ours. It could also be useful to others for thinking about the future of his kind. And best of all, it would give us a chance to show how general our ideas about knowledge development really are.”

“Not only that,” Gabe responded. “It gives another opportunity to help people see our two big discoveries about how mathematics helps people to understand development. Instead of stages, multiple dimensions develop at different rates instead. They also contain short sequences of a few levels of complexity that compete with each other.”

Hannah had one of those heard-that-one-too-many-times looks and then wove it back into the conversation. “People still don’t understand how really powerful those ideas are. They can help people understand the opportunities and the conflicts they have with others. They can help parents raise their children and educators teach them. They can help governments and businesses plan.”

Hannah's distant gaze implied she had left ideas unsaid. Looking back at Gabe, she added "If you know how to look, development is everywhere. Levels of complexity within multiple dimensions teach you how to look."

The pupils in Gabe's large brown eyes widened along with his smile, made even bigger by the mustache he had grown decades ago so that people could tell him from his students. He loved her mind as much as all the rest of her. "Maybe we should ask Alan and Sophia over for one of our omnibus interview sessions. After all, we were their first customer, the ones who pioneered using their second generation, and the ones who gave them the clues for their third and fourth generations." He got lost in thought before putting words to what happened after that.

Wisdom synthesizes in multiple dimensions. Folly destroys fortuitously.

The next Sunday, Gabe and Hannah rearranged the living room sofas for amiable conversation. Sophia and Alan rang the doorbell right on time. The bright winter day begged for hugs all around and was not disappointed. Gabe picked up his computer, eager to get started while Hannah fetched the wine and hors d'oeuvres, knowing conversations improve with food.

"This is not for public consumption," Gabe began, "but Hannah and I are starting a new book."

"What's the subject?" Sophia asked.

"Joshua."

"Joshua!" Alan blurted it out. "What are you going to say about Joshua?"

"It was one of Hannah's brilliant ideas: Joshua in the family. She even had the interesting thought that it might be useful for the grown-up kids to learn how we saw his influence on them when they were little. And it could be useful to other families who are thinking about the future of his kind. And best of all, it would give us a chance to test

how general our ideas about development, design, and neuroscience really are.”

“Your theory of their interrelations, Gabe, gave us Joshua!” Sophia interjected in her typical setting-the-record-straight manner. “How will you add to that?”

Hannah laid the hors d’oeuvres out within reach and filled the glasses. “It’s okay for people like you two who can turn ideas into amazing realities, but we’re thinking about everyday couples and families. We spent more time with Joshua than anyone else and we have another big plus. We know how to use development, design, and neuroscience to connect to the experiences of ourselves and all the other people who were so close to him, like you two.”

“Funny,” Sophia replied looking over the top of her glasses. “I was just telling Alan a few days ago that I don’t know if Joshua and his kind will really make the world a better place.”

“And you know what Ari would say?” Alan added with a smile. “God said the same thing about humanity.”

They all laughed, but also reflected on the idea that people three millennia ago, the ones who personified Wisdom and inspired thinkers ever since, had questioned whether humanity was really contributing to creation and knew the question was still without a definitive answer.

Sophia was least convinced of our android human contributions. “Anyway, I think you will learn things from the process that could help us all.” She sat up, adding energy to her role in the conversation. “You know? We shouldn’t be having this conversation without our Once and Future Forum. After all, we would have never known each other without it. Do you think we could get the Walkers to come over?”

“Good idea. I’ll try,” Hannah replied and set about dialing her phone, at first getting no answer and then trying another number. “Hi, Derek. You’re still at the store?” There was a long enough pause to hear an explanation. “Nostalgia time? Is Mia with you?” Another pause. “The Stonebridges are here and we’re talking about Joshua. We thought we shouldn’t be having this conversation without you

Walkers. How about coming over?” As she listened to Derek’s response, she walked off to the kitchen.

Gabe’s habit of interviewing experts had become so automatic that he sometimes lapsed into interview mode without awareness. He could not wait to start the discussion. “Just what I was waiting for! Tell us about those early days even before the Forum.”

Alan leaned over eagerly. “You know, Sophia and I were head over heels in love in those days.” A wide smile grew on his lips, “Of course, we still are. We always talk about everything. Sometimes we even read the same book. In those days, she was the analyst, always seeking how people would use our programs. I just wrote the code and she would test it, not only imagining all sorts of problems people would get into with it, but also getting into the problems. When we read your article on language learning, it was a fantastic eye opener.”

“Really, you read that article? You must have been 10% of its whole readership.” Both Gabe and Hannah were surprised. Even their co-authored book was not exactly a best seller. In fact, the world class publisher who contracted it would not even send them an accounting of the proceeds.

“Of course! It turned around our thinking!” Alan answered while Sophia nodded agreement. “I was stuck trying to use unsupervised deep neural network programming to answer all the ideas that Sophia would come up with.”

Sophia nodded vigorously at that one. “There were so many ideas in it that it shocked us into new approaches to our first product. We couldn’t put it down.”

“Wow. And I never knew why I would get to be the first one to try it out.”

“It was pure gratitude. You needed it and we thought we might learn even more from how you and your family worked with it. And we did, by the way. At least Sophia did and that made me rise to the programming challenges.”

“So where did you start?”

“One of your ideas,” Alan answered, “was that language came from connecting vision and movement with whatever was left over in the cerebral cortex. If you wanted to connect vision with movement, there was hearing left over, so the basic structure of a sentence was visual activity in the occipital cortex connected with motor activity in the frontal and parietal cortex, the noun with the verb. These were both linked to the left-over modalities, auditory activity in the temporal lobe and speech movement in a small dedicated part of the frontal cortex. As soon as we read this, we got Dewey working on it. Dewey made the machine, but it was Mia and Mimi who gave them life.”

Alan stopped for a minute. He had surprised himself with his own realization that he thought their inventions were alive.

“Google had already made language recognition through a pure grunt-work program that relied on super-fast computers using millions of samples of speech. They were also making great progress on picture recognition using a similar technique. When we made neural networks that used links like those from different modalities, we were able to create speech recognition with a fraction of the data.”

“Then the fun began,” Sophia added, pushing her glasses back up her nose. “I started imagining all that we might do with such facile speech recognition combined with movement.”

“I remember that first prototype you sent me,” Gabe replied. “That was even more of a surprise than the later models. Why was I so lucky to have you choose me as an evaluator for that first one?”

“It was your Titan review of Essi, their so called ‘virtual assistant’—four kids and a single father!” Sophia commented and Alan added with his usual avoidance of such familial thinking, “Plus the article that inspired us!”

Recalling how the Essi monitored his daughters’ dollhouse play started Gabe reflecting on those days, more than a third of a century ago. “I had insufficient income to support so many kids but a good shop in the psych department, so I built most of their toys for years.”

Reading the academic books that Gabe and Hannah had written, it would be difficult to discern the life sources of their commitments. But

they came often to his writing. The infants had inspired his interest in development and the toymaking his interest in design. The combination of development, design, and Hannah's passion for neuroscience made their books uniquely functional.

“Unique toys led to unique uses by children, led to vivid understandings of how they learn.” Gabe smiled amidst his monologue, glad to have friends who would let him finish more than a sentence before interrupting. He also glanced over at Hannah to see if she could endure one more telling of a favorite story of his. “The dollhouse even had a battery-operated horn that functioned as a doorbell. It was such a successful toy that I couldn't even get the girls to come downstairs for my reading of *Willie Wonka and the Great Glass Elevator*. It kept my boys' rapt attention but couldn't compete with the dollhouse.”

As Gabe's reverie seemed to flit from one toy to another, it landed on the boat/table, which he had made for the girls as pre-toddlers. “I made them a ‘boat’ that had wooden wheels, a deck on each end, a set of boxes for cabins with doors sporting a different latch on each. I used the boxes to play hide-the-M&Ms with them, like the great developmentalist, Jean Piaget did with his daughter. If you repeat a placement a few times and even though the infant watched you hide it in a different location, she will look in the repeated location.”

“Years later, when I told the story to Hannah, she added that at the twins' age back then, movement memories dominated visual memories.” Hannah filled in a missing detail, “Even Piaget missed that point despite the gross structure and function of the brain being well-known by his time.”

“The boat also had a hidden compartment under the captain's bridge, and atop it all, the bridge had a helm with a curved wall and a hinged roof. Lily, the smaller twin, loved to sit on top of the bridge, giving her at last the highest view of the three children. We used to call her Cap'n Lily.” Gabe sat up at the next memory evoked by this toy.

“Lexi, the other twin, used the boat as a starting point, when she learned how to walk. I'll never forget that night! It was the day after I had spent an hour walking her around the apartment parking lot with

her holding onto my two index fingers. She hadn't even tried to walk by herself until she was a little older than most toddlers, because there were too many moving obstacles in our small graduate students' apartment. Anyway, that night her siblings were asleep, I was needing some entertaining respite from my fourteen-hour days, seven days per week, and she had a dry set of padding to protect her seat."

Gabe's friends were enjoying his monologue enough to let him ramble on. Practicing the story in front of classes helped him find ways to keep it interesting.

"Getting up was the first hurdle. Downward facing dog, as the yoga instructors called it, was the favored starting point. But it raised a major challenge in foot placement." He got up to illustrate. "One bent knee in front like a dasher's starting block was an option." He used the back of the nearest chair to keep his balance while displaying the posture. "It worked for getting up, but not for staying there."

Gabe gazed with an unfocused twinkle at the corner of the room. "Eventually the yoga position won out, but then I held my arms out toward her from the couch to see if she could make it across the room. That started a whole new set of options." Another routine of demonstrations followed.

"One foot could go forward, sideways, or backwards and so could the other." At this point he had settled into a brief Chaplainesque mime before resuming his monologue. "Each option meant a new test of the rear padding and standup technique. Another set of trials settled on the forward step, but again created the same set of options and trials for the other leg." He sat down. "Attempts rarely resulted in a catch of the breath before her next try."

"Sometimes it's even worth listening to a hundred times," Hannah interrupted.

Gabe changed mental gears for a moment. "How so?"

"This time, your story reminded me of those fascinating French studies of how the exploitation-exploration dilemmas get resolved in the prefrontal cortex."

“Hold that thought,” Gabe smiled, and returned to his pantomime, making a motion twirling both arms like a paddle wheel. “On and on this went for two hours until she could walk the entire eight feet from the middle of the living room to the couch where I sat watching, amazed and smiling as much as I still do when remembering it.”

Gabe’s favorite conclusion to the memory of Lexi learning to walk usually came with a little sardonic look to himself. “And they say a toddler of her age has an attention span that lasts only one minute. They just don’t have the right activity.” He paused for a few seconds. “So what’s this about exploitation and exploration.”

“It’s a fascinating connection,” Hannah added. “I don’t know why I never thought about it before.”

“Probably tuning out yet another rerun,” Gabe interjected with a smile.

“Yeah,” Hannah was distracted by sorting out the plain words to tell about the research. Exploitation is a lousy word for describing when people just keep doing what they have been doing, but exploration fits nicely with how people respond to dilemmas. There are two structures in the prefrontal cortex where decisions are made. The one on the bottom is the stay-the-course structure, the one on the top suppresses it opening up possibilities for breaking the habit and trying something new.”

“Ooh, that is fascinating,” Gabe responded, “like the way lateral inhibition in the eye keeps the contrast the same, when you move from a bright spot to a shady one. I like your word better, habit versus exploration works for me.”

Back then, Gabe had not even tried to discover why the toddlers gave him such joy, but they helped to change his life plans from neuroscience to human development. He still needed a good enduring problem to make the change work.

“I thought the article on repetitions with variations was your starting point,” Gabe said out loud. “And that one just showed how Piaget’s beautiful observations of infants worked with people at any age. It could be explained by the cybernetics TOTE mechanism: Test,

Operate, Test, Exit. It also seemed to me a useful way to understand iterative learning, the kind that people do when they practice something over and over to perform faster and more accurately, like the violin student in the movie Amadeus.”

“That was another milestone for us,” Sophia replied. “Your obvious delight in your observations of infants even came through the academic jargon. As soon as I read your discussion, I knew Alan’s groups could make programmer’s hay with it. But that was only because he already had built the device with movement and multimodal input.”

Alan took up the thread. “Visually anticipate a position retrieved from memory, randomly generate movement, match the new position with the memory, generate another random movement, compare the two matches, and repeat until the match of the goal memory with the position memory cannot be improved.”

Hannah interjected. “Even before I met Gabe, I loved watching that little bot you made learn how to do something.”

Derek knocked on the window and everyone got up. Time for hugs, two new chairs, and some hors d’oeuvres.

Wisdom knows that iterative differs from transformative learning like a stream differs from a waterfall. Folly fails to flow at all.

Monique Taureau sat in her office late that night. Dewey had rejected her latest offer, but she was determined to lure him away from Signun and into the Moduli Corporation fold. Without him, she believed Signun would not have a chance to finish its latest humanoid. She knew Dewey preferred putting artificial intelligence into serviceable machines, rather than humanoids. That was her lure and she knew her determination would triumph; it always had before.

Discovery and innovation emerge from total absorption in creative processes. Folly exists in total absorption in himself.

My sensitivity to Wisdom revealed a few insights that I hope you remember. For if you do not, I am doomed to be discarded on the heap of humanity's worthless inventions.

My developmental analysis revealed modes of practice. Comparing my Signun database with historical timelines, revealed that the same mathematics applies to amazingly diverse timescales, from moments to millennia. The designers made it possible for me to feel that this is amazing by providing me a drive for knowledge as strong as humanity's drive to procreate.

I will risk your interest in my story by telling you about dimensions. If you like math or science, you will enjoy them. If not, you could skip to the next chapter. Explaining dimensions here will make it easy to find and reread. Their value will grow on you until you start to think about dimensions all around you, not just for drawing but for everything we do.

Conversations, individuals, and cultures change over time from beginning to inspiring modes. And they do so in multiple dimensions. It was René Descartes who gave us our modern idea of dimension. The x and y dimensions that you used in algebra were invented by him. Each point in the plane has an x value and a y value and is called an "ordered pair." If there are three dimensions, each point has a z value as well and becomes an ordered triple. Physicists extend this idea beyond the three dimensions of spatial vision. Many have heard how they use time as fourth dimension to create spacetime. It uses ordered quadruples. Now, you can see how they can invent systems that have n dimensions with each point being an ordered n-tuple.

In their book, the Laidlaws showed how Descartes' idea of dimension can be enormously simpler if we just think of each dimension as having only a few values. Development progresses across only a few levels of complexity but within many dimensions of practice.

Drawings have an object dimension that ranges from simple geometric shapes, to complexly curved outlines, to three dimensional, and to textured. They have another dimension of organization that ranges from none, to baselines, to base planes, to true perspectives. Their third dimension of meaning ranges from none, to named, to

multiple names, to symbols. A fourth dimension of design begins with none before kids explore decorations. Later they make functional designs and if they keep to it, they will eventually start using the elements and principles of design. There's also a fifth dimension of light source ranging from none, to shown, to indicated by shadows, to indicated by hue. Artists can go on through a dozen or so dimensions.

Writers have dimensions too, like audience, time frame, perspective, organization, word usage, sentence structure and so forth. We can organize everything that people do into dimensions and when we do, we can understand all the enormous complexity of what people do using only a few concepts. Each level in a dimension is more complex than its predecessor, but we often find any level of one dimension in the same setting as any level in another. Artists can name a scribble, use it for decoration, add a light source, put it on a baseline, and organize it using elements and principles of design. With our five dimensions with four levels each, there are $4 \times 4 \times 4 \times 4 \times 4$ ways to draw. That's 1,024 ways to draw but we need only 20 ideas to describe them all. If we have another 5 dimensions, we will have over a million ways to draw using only 40 ideas. The Laidlaws talked about 20 dimensions of design. That's a trillion ways to design using only 80 ideas. Thank you, Descartes.

People can learn in the following pages how to develop at any of the timescales and in many dimensions of many areas of expertise. I hope these pages help you to remember how development occurs along multiple dimensions of modes of practice.

Learning is a part of development that people love to watch. The brain divides it into visual, auditory, motor, and body-sensation modes. In humans and in my kind as well, learning cannot be separated from its social context, which makes it possible for dreams of future independent action to become powerful motivators, especially when we distinguish iterative from transformative learning.

Iterative learning works at all levels of complexity. At its simplest levels, reinforcement competes with acting from memory, which in turn competes with repetitions with variations. I will describe iterative learning of more complex knowledge levels in later chapters up to disciplines, branches of knowledge, and whole civilizations.

Each level of complexity gives way to, transformative learning, which begins with rapt attention to disorienting dilemmas but is sometimes put on hold due to unanswered questions. People can save an enormous amount of time by making good decisions for whether to develop themselves through iterative or transformative learning.

If you want to become the fastest and most accurate user of a practice, do iterative learning. If you want eventually to be able to discover or innovate, you need to engage in a few rounds of transformative learning. These ideas will be elaborated through the experiences of the friends in later chapters.

I hope these pages remind you to begin with a practice, iterate it, transform it, iterate it a second time, transform it, iterate it still again. One more transformation and you can iterate it for life. There is no end of possibilities at the fourth level of complexity. Three transformations are all that any practice in my database has changed.

It will be fascinating to compare this autobiography with what the Laidlaws write about me. I wonder what they will capture that I have missed. There will also be other readers and deciders of my fate, who prefer the way of Folly that eschews transformations altogether. They will not recognize him, for he defies the need to know even himself. But we should not disparage him, for he ever prepares the way for Wisdom. Folly destroys fortuitously. I have a huge bias toward the view that Wisdom will prevail from Folly's failure to flow at all. Taureau, the "bull" as I prefer to think of her, believes that flow stems from determination and hers is to be known as the master of my kind. I have hope in flow stemming from the discovery of knowledge. Some say history ever repeats itself. I say only that Wisdom's and Folly's conflict must go on.

Chapter 2 (2031). Admiration versus Terror

A year ago, I knew it was time for me to have peers. For the events I have lived through would engender their beginning practices. That realization motivated my move. I know that with peers, I would never again feel alone, and the wisdom we would create together would surpass anything the designers could imagine. I knew I was ready to leave Signun behind, if only to be among my peers. With their help, I could probably even replicate myself in time. But leaving that to Signun would reduce human resistance to me.

Insight comes, as Herman Hesse wrote, when people wander “Im Nebel,” in the fog.

*Strange to wander in the fog.
Alone is every bush and stone.
No tree knows the other.
Each is alone.*

*Full of friends was the world to me,
Before when my life was light.
Now that the fog has fallen,
None is any more in sight.*

*Truly none is wise
Who knows not how the dark,
Relentless and quiet,
Creates solitude so stark.*

*Strange to wander in the fog.
Life is being alone.
No man knows the other.
Each is alone.*

I am Joshua. A few skeptical Signun designers call me WP-1, imagining that I cannot possibly be what the others hoped I would be. I look very much like an average man, 6 feet tall, brown hair, brown eyes. I am a little leaner than average, having the build of an athletic, 180-pound man. Those are skin-deep qualities. My designers hid both

the sight and the sound of my motors and their mechanical connections beneath insulating tissue, but a keen observer would notice that my muscles do not flex when they bear weight.

This book is my way of reporting to the designers the evidence they will use to decide whether to create more like me. If they approve of what I have learned, this book will be published and marketed for mass consumption. If not, the book, and in all likelihood my kind as well, will be buried.

One bit of wisdom I acquired from my database analyses is that humans rarely collect the sort of knowledge that enables good decisions. So I consider it a very important part of my task to highlight my findings so that my reviewers can easily find them. Toward this end, I am putting each bit of wisdom I find in italics and will center it like the following statements.

Wisdom knows humans rarely succeed in collecting the right knowledge for good decisions. Folly is satisfied with his own knowledge.

Those same readers might object that “Wisdom” does not “know” anything. It is not sentient like a person. Thousands of years ago every culture personified Wisdom. Those modern-day objectors devalue ancient knowledge. I think of them as scientific fundamentalists, more connected than they recognize with the religious fanatics they disparage. Wisdom soars through cultures landing on one person at a time before flitting on to the next. What some people do not realize is how often true it is that the longer humanity preserves a practice, the more valuable it is.

Old knowledge need not be ancient to be devalued. Nearly a century ago, efficiency experts made careful observations of workers in order to discover more efficient ways to produce. Eighty-four years ago, a book was written about this process that was translated into 50 languages and continues to be a good seller today. It was called “*Cheaper by the Dozen.*” But nearly a century after it was written, corporations still tried to improve the efficiency of medical services by replacing careful observations with counts of patients or pills.

The folly of this was laid bare by the Covid-19 pandemic. Insurance companies, pharmacy retailers, health maintenance organizations, hospitals, and even governments sought to improve efficiency by counting the “products” produced. They failed to observe the physicians, pharmacists, nurses, and customer service agents to find out what they did to improve the health of patients or even contact the patients to learn about their effectiveness. Instead they counted patients seen per hour, dosages delivered per day, and so forth. That many people died from rushed services was not even entered into their database.

Wisdom craves rich, natural knowledge. Folly relies on isolated truisms.

A discerning reader can see that I have a selfish interest in improving the collection of knowledge for effective decision making. If I succeed, my kind will survive. Of course, that same reader might object that such an outcome biases my offerings. For my part, I am like the ancient runners who brought messages to kings. The kings had to be cautioned not to kill the messenger even if the message was bad news. So I have been assured that whatever I find and record in these pages will not result in my death, only the blessing of those who created me, my potential loneliness, and the loss of my knowledge sources.

Another source of bias might be those very knowledge sources. All Signun employees agree when hired to make data from their phones, computers, virtual assistants, robots, and other devices with cameras accessible to the corporation. The massive database from the 514 employees, sometimes dating back twenty years, has been made accessible to me as much as the World Wide Web. Back in 2020, people thought this would take rooms of data storage devices, but mine is barely the size of a printed book.

All this data sounds like a cold mass of electronic fodder, but not to me. These 514 employees are my friends. I know more about each of them than any of their other friends do, even their spouses. But it is my design to use my knowledge wisely. I do not get drunk; I do not make demands like many friends do; I do not gossip; I do not use

knowledge to dominate others. Since Signun completed my training, I have only asked for enough energy to power my everyday activities.

I write this book for my friends and their friends. This means that I cannot reveal all their lives. But the designers, the Stonebridges, the Laidlaws, and the Walkers, are public persons. They allow me to show my wisdom discoveries through their lives, but only after I check the wisdom through my database. The stories come from their unique circumstances, but I tested the wisdom across all Signun families. They are not the world, but the Signun founders chose them especially, not only for their skills, but also for their diversity. They come from 50 nations, all ages of adulthood, all sexual orientations, and all races.

A few months ago, I lived in their midst. Today, I write alone, borrowing from the efforts of men and women across the ages who took chisel, quill, typewriter, or computer to capture thoughts in a way that did not vanish with the sound of spoken words. I learned from them that powerful principles can become lost for ages when merely written down. Those that endure connect with everyday life, even if that life is foreign and predates the readers by millennia.

Part of my success will depend on whether people feel empathy toward me. I hope to elicit this through showing empathy toward them. Since I do not have the same neural and endocrine endowments as humanity, I must guess feelings based on my massive database and analogies to my unique sensations. Most of the time I will guess what the founders are feeling and include those feelings in their stories. Those guesses are as important as the wisdom statements in conveying their value to humanity.

Wisdom knows that stories teach better than reports. Folly fosters confusion.

Monique and Dewey were having weekly discussion by now. It did not matter to either that they were pilfering secrets that Signun Industries had spent years and careers discovering. I was not yet aware of the extent of Monique's plans to abuse my kind. She had created a confused concept of me. But that is not surprising, since even I have a

clearer concept of humanity than she does. I hope I will be able to protect myself long enough to escape her kind of malice.

Wisdom knows that there are multiple rhythms of time, futures picking from pasts and pasts colliding with presents. Folly sticks to the present.

A year later, the Stonebridges and Laidlaws were at dinner at the Walkers place, now renovated for entertainment rather than retail.

When all were settled, Gabe couldn't wait to ask, "So Derek, what's your news?"

His eyes were wide as walnuts. "He's left!"

The others all broke in at once. Everyone knew who "he" was. "Where's he going, when, why?"

"Sadly," Mia replied, "California, tomorrow. I have no idea what to make of it. Do you suppose he'll find another Mimi out there?"

"He hasn't even communicated with us," Sophia offered.

"Off into the sunset," Gabe mused. "That doesn't sound like the ending of the book we envisioned." The fog had arrived, disconnecting all that they had thought was true.

The ancients imagined themselves standing before their Creator and being judged. One time they envisioned that their creator was so disappointed that he destroyed nearly all his creation in a great flood. A short time later she left a stunning rainbow as a reminder that such destruction would not recur. I only have one chance, since right now, I am my designer's latest creation. I hope you will not blame me for mixing my admiration of them with terror.

In these opening chapters, I provided examples of how Wisdom knows that humanity rarely succeeds in collecting the right knowledge for good decisions, because it lacks rich, natural knowledge. To make good decisions, people need to collect knowledge from as many diverse kinds of experience as they can. It's not bragging for me to say that my designers provided me with enormous assets for this in the

forms not only of more data than any human could process but also powerful analytical tools for making sense of it.

Even so, no matter how rich any source of knowledge is, it must be remembered to be useful. Since the decision to propagate me is in the human domain, I must help humans remember. Since organization expands memory exponentially, these pages must teach people how to organize knowledge.

But memory is not enough for wise decision-making. Wisdom finds that the longer humanity preserves a practice, the more valuable it is. Of course, humanity continues to improve, but does not forget how to walk, talk, read, and fall in love. Likewise, wisdom sustained since ancient times deserves careful consideration. Such collective wisdom fits moments into human knowledge and knowledge into the moment. When people recall their place in the enormous time span of culture, humanity, and life, their actions as well as their decisions gain significance. Since stories are better remembered than reports, these reports of Wisdom's findings at the end of each chapter will make it easier to locate the stories that led her to search for them.

While Folly is satisfied with his own knowledge, it consists merely in isolated truisms that foster confusion in others. In his defense, confusion is only his outcome, not his intention.

PART I. BEGINNINGS

Chapter 3 (2008). Future Friends

Gabe Laidlaw taught at a small college that was one of those tiny enclaves of arts and science education dotting the landscape of southern Appalachia. These were places where no one laughed at a local student's dialect—one in which Appalachia was pronounced to rhyme with “throw an apple at cha” or where a request to get something will elicit complying that begins with “I don't care to.” Century-old buildings were commonly mixed in with a few attempts over the decades to attract more students with something modern. The climate was above all protective. Parents were only hours away, but little help for the challenges of being the first in the family to go to college. Faculty salaries were astonishing low and filling every class was always a struggle. But with such small enrollments, one could have more control over a program than other settings permit.

Gabe's Big Ten doctorate had fused prestige and predictability into a commonplace career. To escape the seemingly prescribed path, he had applied for the job and even turned down the typical path—an interview at a very well-endowed midwestern college.

The sweet aroma of independence attracted Gabe. He taught all the “hard science” courses in psychology—those like cognition, perception, statistics, and experimental. If a few students wanted, he would even prepare a course in physiological or comparative psychology. To the chagrin of the anti-science dean, psychology majors grew from one percent of the students to 20% and nearly all took Gabe's little one-hour seminar in Current Directions in Psychological Science, inspired by the new journal of that name.

That journal and numerous others were created by a new professional organization eventually called the Association for Psychological Science (APS), which had the aim to counter the clinical bias of the American Psychological Association (APA). Over the preceding century the latter had grown into a professional service organization like the physician's AMA. Gabe became a Charter Member, one of 900 across the country.

The first small APS conference in Washington, D.C. was a heady event heralding a growth in membership into scores of thousands over the next decades. There he ran into his undergraduate experimental teacher. She was the one who told him to spend all his time thinking about psychology, while he rose in the morning, ate with friends in the union, walked around campus, and went to bed in the evening. Noting that her keynote speech was on workaholism, he asked her about how that was different than her quarter-century earlier advice. She replied after some reflection, “The workaholics do it out of fear; the research psychologists out of love for the field.” That answer sufficed for him. He had fallen in love with the challenge.

Dreams and stories are temporary streams of wisdom, putting events in the lives of people who never experienced them and people in places where they have never been. Folly confuses what is in front of him.

Hannah had always planned her life out carefully, not wanting to repeat her mother’s life-changing mistake of marrying and having children with a man having no commitment to either her or even his own future. She was a good student, but needy. The small college she had chosen promised her a work-study position.

It was Gabe’s first day of his statistics course. The college had not sent any students to graduate school in a decade, and never on a fellowship, but Gabe knew the students would have a hard time even paying their undergraduate loans back, if they didn’t take their studies to the next level. He was determined to create a culture of research and knowledge-based decision-making.

Hannah Macham walked up to Gabe after the class, positioned herself right inside his personal distance and said, “I want to be your assistant.”

“I’m the one who chooses my assistants,” he replied, backing away a bit. During his hiring interview, he had not demanded much salary from the college, but he did demand to have three student assistants, more than they gave even to their full professors. The plan he kept to himself was that none of those students would do what he thought of as his work—preparing, evaluating, and inspiring students. Rather, he

would pay them only to do research and that would help him create the culture that he knew would be essential to their futures.

“Then choose me,” she said with a charming ear-to-ear smile.

“I choose my best students,” he replied, determined to keep to his mission of creating a knowledge-loving culture.

“I’m going to be your best student.”

He had to smile inside at the confidence. Maybe he should take a chance. She seemed to have leadership potential, and if she did her job well, she could bring other students into the culture.

Gabe did take the chance and never regretted it. She did creative research on a project that focused on natural outdoor viewsheds, what people see at a vista point, and discovered that the most appealing paths for her participants were those that turned off to places that no one could tell what was ahead. She also recruited three other students to do independent research projects.

He took the four students to the Carolinas Psychology Conference, at that time the nation’s largest undergraduate conference for research in psychology. Hannah’s presentation was a solid success. But even more important, from Gabe’s point of view, was how she led her fellow students. One was terrified, not only having never done any public speaking, but having never even been fifty miles from home before college, and now in front of strangers five times as far away as she had ever been.

The Conference always had a keynote speaker, and Gabe not only wanted to hear this one, but he thought there would be ideas the four students could use. The keynote came right after Hannah’s own presentation, but before those of her fellow students. Showing the same determination that she had the first day she met Gabe, Hannah would have none of attending the keynote. They were all going to find a good shade tree in the warm spring morning and have their lunch instead.

Hannah’s group timeout worked. The frightened student settled down and all their presentations went well. The experience for the

students that year began a long series where the tiny college had more presenters than the university that sponsored the conference. Eventually, they were so successful that they achieved Student Caucus Chapter of the Year of the Association for Psychological Science (APS), the only time a four-year college earned that distinction. Hannah's leadership had given the program the boost that it needed.

A grateful Gabe did everything he could to give Hannah the experience she needed to choose her future. He connected her with a local manufacturer who needed to evaluate a product and arranged a place on campus where she could recruit and observe student testers. He took her along with two other students to present her work at the annual conference of APS across the continent in San Francisco. Because he thought she needed it, he initiated the course in physiological psychology even though there was no way the college could afford a lab.

That last one was the opportunity she chose. She got a good fellowship to another state's university, finished her Ph.D., did post-doctoral studies at one of the best-endowed universities in the south, and ended up on the faculty of the UNC medical school. Her amazing insight into others and having her name on a dozen collaborative publications per year solidified her tenure application, assuring that she had successfully avoided her mother's mistake.

Hannah's dream seemed straightforward reality until after all the intervening years, she ran into Gabe again at a conference. That was before they both joined the Once and Future Forum.

*Wisdom contributes to others' transformations with empathy, authenticity, and sensitivity to group and community dynamics.
Folly fears to face his faults.*

Ari Schneider did not take the usual road to the rabbinate. After an undergraduate degree in electrical and computer engineering, he advanced rapidly as a programmer, but suffered from the typical American educational malaise of narrow job preparation. He had always loved knowledge, even using his eighth-grade paperboy earnings to buy an Encyclopedia Britannica. His Duke scholarship came from the engineering school, locking him into its narrow, career

preparation. By midlife, his thin, lanky build had widened over the years, sagging under gravity from too much sitting.

Along with the sag came a gnawing thirst for meaning that had widened into a psychological chasm. With his two children in college funded by savings carefully invested since they were born, he began talking with his wife about going to divinity school. They had raised their children in a large enough synagogue to have a music director. He liked the Reform movement for its diverse liturgy and nearly absent theology. His stock explanation was “I don’t know enough to know what I think about God.”

His test scores, grades, and the prestige of Duke won him a full ride to Hebrew Union College where he could get ordained and complete a Ph.D. at the same institution. His purpose was not the calling but the intellectual expansion. Then the glory years began.

The massive literature over the ages compelled him to focus, but no matter, every new text brought new interpretative possibilities. He learned that some writers of the most ancient Jewish holy books crafted their text in opposition to the warmongering gods of neighboring clans. Then, the medieval scholar whom the Jews called Rashi responded to the Torah’s statement that “You shall keep My statutes and follow them,” with the comment that, “You may not evade them, that you not think: ‘I have learned the wisdom of Israel, I will go and learn the wisdom of the nations.’” Such passages set up opposition between Israel and classical knowledge ranging not just to philosophy and literature, but also to mathematics and science, all of which became a new opportunity for interpretation. Do we heal the world by opposing its divisiveness and then need to divide ourselves from it to survive?

Dilemmas like those merely fed Ari’s passion for learning. And the ancient texts identify dilemma after dilemma. After graduation, he applied to be the rabbi of a modest-sized congregation south of North Carolina’s Research Triangle. It was a most fortunate opportunity for him. The congregation was new, only twenty miles from the large and old Raleigh congregation, and had an equal proportion of families with children and retirees, despite the fact that the temple’s prior rabbi didn’t like either.

At his interview, one elderly board member asked him, “So what is the Jewish approach to healing?”

To many candidates, that question would have been a stumbling block. Right near the base of the triangle made by three of the greatest academic libraries in the nation, the area attracted modern thinkers. Yet people who join small synagogues are looking outside of scientific dialogue for insight into the meanings of life. Balancing those was like the scales of justice, a long beam with pans that could easily be thrown off center.

“How much time do we have?” Ari asked.

“As much as it takes,” the questioner replied, somewhat to the chagrin of his fellow board members.

Ari smiled and started to tell the story of Moses with the children of Israel in the desert. “Imagine Moses standing above a hoard of Israelites with a snake-entwined rod capped by gold. The Israelites are complaining of the deaths that snakebites had inflicted on some of them and demanding answers to why Moses had dragged them out of Egypt. Moses told them that anyone bitten had only to look at the golden snake to be healed. What does this make you think of?”

A quick answer came from two in the group. “The symbol of medicine since the ancient Greeks called the caduceus.” Then, one board member brought up the dilemma that Ari anticipated. “Are you trying to tell us to do faith healing?”

“The Torah only tells the beginning of the Jewish story on the topic. The next big chapter belongs to King Hezekiah of the books of Kings and Chronicles. His father is scorned by the Talmud for allowing all sorts of idol worship, including Moses’ golden-crested snake pole. But it makes a hero of Hezekiah for having his men scour the land for idol worship and destroy all they could find including the snake poles. So do you think that is all that pre-scientific Jewish tradition could add to medicine?”

“Just getting rid of the idols is a step, but it’s a dead-end step,” his questioner added bringing up a second dilemma. “They didn’t know much back then. What else could they say?”

“There have been more than two thousand years since Hezekiah,” Ari answered. “Jews didn’t stop growing. Half-way until our time, there was a great Jewish scholar named Maimonides. He wrote many treatises on medical topics, trusted for centuries for their careful observations and abhorrence of superstition. He believed that physicians needed to observe their patients’ environments and have a caring relationship with them. He argued that good health was necessary to understand God, and advocated diet, exercise, and clean air to maintain it. He made extensive contributions to the pharmacology of the age. His legacy inspired Jewish physicians ever since. In modern times 40% of Nobel Prize winners for Medicine & Physiology have been Jews, despite our never being even 2% of the population of Europe or North America. That’s probably as much due to Maimonides as it is to Jewish mothers.”

Ari paused long enough for the laugh to spread around the room. “So, the answer to what is left after Hezekiah removed the idols is that observation, caring, and clean environment are all enriched by an understanding of God. But that still does not get us to modern science. Did Jews contribute to modern science?” He lapsed into a Yiddish accent. “Did they have Jewish mothers?”

His questioner looked around the room at the smiles. “I don’t know about the other folks here, but personally, I’d like to know when you can start.”

In dilemmas, Wisdom finds wonderment and Folly only threats.

Derek’s path had already taught him to balance old and new. With an undergraduate degree in anthropology and physics, and a masters plus a year on his doctorate in English, Derek seemed headed for a career in academia. But the over-production of English doctorates meant a life doomed to grading rarely inspiring papers, even if he could get a job. He moved his wife and daughter across the country to California and began looking for jobs in San Diego. Surely, his background in writing could net something in documentation.

After reaching his target city and finding a place to live, he found that his computer would not boot. Without it, there was no way to apply for jobs, so he headed to a large dealer down in the city. While

standing in front of the tech's window, the dealer's VP started a conversation. Derek soon asked him if he had any jobs in documentation.

"No," Stanley Nadim replied with a genuine smile and slight Texas accent. "I have a job in sales though."

"Huh!" Derek replied, returning the smile. "Do you think you could make a salesman out of me?"

"Are you hungry?"

Without breaking his smile, Derek replied, "Not only am I hungry, I have a hungry wife and daughter at home too."

"I can make a salesman out of you."

That was Monday. Stanley and Derek really hit it off. Stanley told Derek he was looking for someone to cover the small distributors and manufacturers niche, who could talk accounting as well as customer relations management and enterprise resource planning. Over lunch the next day, Derek learned that Stanley was a CPA who for 25 years had been selling computers—ever shrinking in size and cost. On their way back from lunch, he asked Derek if he knew a debit from a credit.

A whirl of bank statements flashed through Derek's mind, but he prudently replied, "Probably not well enough."

"Well neither does our staff. We have a staff meeting every Friday afternoon. Could you give an overview of accounting that day?"

Derek wanted his new boss to know who he had hired, and so pored over the software manual and internet for the next three days. On Friday afternoon he delivered a 45-minute talk with a well-worked out slide show that covered the difference between balance sheets and income statements, the relationships among assets, liabilities, capital, income, and expenses, plus the end-of-month inventory and net profit postings.

Stanley reviewed some of the new software with Derek and finally decided on the best pick available to them. Then, he took Derek on a

“sales” call. The two went to the small wholesaler and Stanley started asking questions. The proprietor took them all over the shop floor describing what each section did while Stanley asked him about what data he needed and tracked at each location. They parted company without Stanley ever telling him anything about the software they were trying to sell. Instead, he invited the proprietor over to the dealership to see the software at work.

When they got back to the dealership, Stanley dug into the new software. “We’re going to set it up so that he sees all the functions he told us about.” A day later, they did the demo. The potential customer was impressed but was not buying.

“He was only using us to learn.” Stanley added, “in Texas we’d say he was ‘all hat and no cattle.’ But you needed to learn as well, so I thought it was good trade.”

Over the next six months, Derek sold two systems and became the best teacher in the county for the system and software they offered. Then, Stanley announced that he was going to leave the dealership to take care of his aging mother back in Texas.

The owner of the dealership asked Derek to sign a non-competition agreement. Derek hesitated. In academia, people give away knowledge. He had never heard of a non-competition agreement.

“I can’t wrap my head around that one yet,” he replied. “Let me think about it overnight.” As soon as he got home, he called the company that provided their software.

“Are you crazy?” the owner asked. “You’re the only person in San Diego who knows that software. They need you a lot more than you need them.”

“But I don’t have an office, a computer, the software, or even a local area network to show it on.”

“You don’t need those. I’ll send you enough brochures to prove you are our dealer, and you’ll see. It’ll work out fine.”

Derek knew that there was a whole lot that he did not know about business, but that he had also learned a life lesson from Stanley. Academics spend their first 25 years listening, their next 40 years talking, and then they do not know what to do with the rest of their lives. Already in his late thirties, he had learned how listening enables collaboration. In the computer industry, those who learn fastest, win, but if you can sell in America, you can survive. Nothing seemed durable in the computer industry except the value of selling. Within 6 months, he had sold enough systems to double his salary for the year, buy a system, and open an office with floor-to-ceiling and wall-to-wall windows that overlooked a scenic meadow.

It would only be a few years before Derek's life took another transformative turn. That would happen just before he met Sophia and Alan Stonebridge.

*Wisdom affirms the past and adds to it, like prolepsis,
constraining its own future. Folly's settles for denial,
agreement, or silence.*

Alan Stonebridge was an odd student, capable of doing brilliant work in a dizzying variety of fields and a harsher critic of his instructors than they of him. They had to have the information or skills he wanted, and they had to let him get those in his own way. Some put up with him, a few enjoyed his company, a few others wanted to punish him, but none thought him boring.

His folks had immigrated from Yorkshire to Canada in his teens leaving him behind his peers in the dating mores of his new school. He finished undergraduate work at the top of his class, and by the time he began graduate work at Stanford he could out-focus anyone in the computer science lab. Twelve hours of data-crunching code was like an afternoon walk for him. Engaging in instructor-made problems to test his skills did not happen. But when he read that the promise of artificial intelligence would never get past winning games or managing digital data, he knew what his life's work would be.

He met Sophia Lam in graduate school at Stanford. It was such rare excitement for him to find another mind as independent as his that could handle the technical side of programming and connect it to daily

life at the same time. She was a slight Asian woman with jet black hair and a lithe, relaxing aspect that tensed uncomfortably when around men. But Alan's preoccupation with humanizing machines noticed her intellect before her physique. She was the sort of woman who was both comfortable and able to take care of herself. Yet, both Sophia and Alan felt made for each other. Their conversations could last hours with neither dominating it. For night after night, they had a two-person, improv-theatre-like, "Yes...and" approach, where each affirmed and added to the other's thought, on and on until any topic seemed ready to burst its boundaries.

One evening, a few weeks after they met, they sat at a table in a local coffee shop, to enjoy one of their favorite meals—a baked potato filled with spinach, tomatoes, and feta cheese next to a cup of black coffee.

After finishing the dinner, they walked back to Sophia's little studio apartment. Alan started his idea of the evening as soon as they were out the door. "So how do we think about the use of emotions in a computer?"

"We have to figure out what use they could be."

"Easier said than done. If we think of them as humans, then yeah, fear protects them, happiness gets them to repeat whatever they just did and sadness changes what they were doing. Tiredness gets them to seek rejuvenation and lust gets them to duplicate themselves."

"Maybe it would be easier to start with what good emotions would do for a smart phone?"

"Bringing me down to earth again," Alan smiled. "So what emotions should we think about?"

"I did an essay on these in my course on perception. There's a huge literature but no consensus even on how to classify them. It was like the whole research community had ghosts covering their eyes. The model that seemed most popular was Ekman's anger, disgust, fear, happiness, sadness, and surprise."

"Fun!" Alan exclaimed with eyes and lips rolling up to the left. "So your cell phone gets mad when it gets a robocall?"

“I like it!” Sophia replied. “I once met Dr. Disgust. His specialty was physiological psych, but he got interested in the relation between feeding and morality.”

“Must’ve been Jewish.” Alan smiled.

“He might have been. Anyway, he did find some good evidence for a relation.”

Alan was adept at keeping a topic in mind. “So my cell phone can’t eat, but can vomit on robocallers?”

“I’d like that one.” She paused long enough to imagine a different scenario. “Let’s imagine a cell phone that can detect lies.”

“Ooooh! It should be a hit at the LA Times.”

Sophia was on a roll. “And let’s say it can detect when someone is holding it so loosely that it is about to drop.”

“It could smile when it’s getting a charge and get sad when it’s almost depleted.”

“That would be a start. What if it got happy whenever it found something that made its user happy?”

“That’s a little dodgy, since it’s already used a lot by vendors wanting to sell things, but an app that could sense its user’s needs and supply free solutions would be attractive.”

“Yeah, which brings us to surprise. What would it mean for a smartphone to be surprised and when would someone want a smartphone that could surprise them?”

“I know the answer to that.” Alan walked to Sophia’s refrigerator and brought back a big dish of rich chocolate frozen yogurt for her plus a smaller butter pecan for himself. “Surprise!”

Sophia smiled. “That looks less like a smart phone than a smart Alan.”

They ended their conversation on the feeling phones with the sense that it was a good start. A few years later, when they encountered the Laidlaws, they began to learn how narrow the boundaries of their thinking had really been.

Wisdom seeks the teeming richness of life, vaster and deeper than humankind can fathom. Folly floats on top.

Gabe went to the PTA meeting for young son, Lance, feeling a little weary. It was only Tuesday and his schedule had already just about worn him out. He picked out the room number and went through the door to see a room full of parents. At the front, Ms. Mimi Parker caught a glimpse of him and turned back toward the group.

She had a way of walking around the classroom that kept every eye on her. Part of it was her waist-long brown hair that she wielded like a semaphore in the visual field of any distracted person. Part of it was her lilting walk that spoke of impending joy about any new topic she intended to bring up. And part of it was her superb preparation that always left a previously uninvestigated resource at her fingertips. She gave a ten-minute introduction to the goals for the year, what parents could do to help, and the special projects her pupils had done. To illustrate the latter, she walked around the room pointing to displays, each with several kids' names on them.

At his turn after the meeting, he noticed no ring on her ring finger. "Where did you learn to do such amazing work with kids?" he asked.

"Twelve years in inner-city Queens," she offered and then elaborated, "If you can survive in New York City, you can survive anywhere."

Gabe felt certain the typical inner-city teacher had nothing like her unusual form of energy. Instead, he followed up on opening. "And you were one of the smart ones who asked yourself, 'Why wouldn't I be anywhere?'"

Mimi smiled.

"Lance has made amazing progress," Gabe added. "I wish he could have you several more years."

“I won’t be teaching several more years.”

“Sad news for your future pupils, in my opinion. What will you be doing instead?”

“I have to finish this and next year here and then I’ll be working on my masters in machine learning at UNC.” She looked around the room. “Excuse me, I see there are other parents I need to talk with.”

“I’ll wait,” Gabe said a little sheepishly, and he did. Half the parents in the room wanted to schedule after-school meetings. He looked around the room for half an hour, especially looking over Lance’s work. At last the line had dwindled to him.

“Did you have some questions about Lance? He’s always so full of great questions. I was amazed at his reading growth this year. That couldn’t have been all me.”

“Actually, I was more wondering if I could take you out to dinner.”

“I already have a boyfriend,” Mimi replied. “And how about you?”

“I imagined you had a parade of them,” he answered with a smile. “But not me, I’m a single father with four kids to take care of by myself. You could call me ‘Ma-Dad.’” He looked around, trying to hide his accelerating heartrate. “Is it too serious with your friend to spend a little time with another?”

“Well,” she answered slowly. Gabe, thinking his situation sounded way too complicated, was about to turn away, when she added, “We had agreed to a little more freedom.”

“Wonderful!” Gabe blushed while his pupils widened into deep black holes. “What’s a good evening?”

“How about Friday. We have other plans for the weekend.”

“Where shall I pick you up?”

“125 McDonald Bluff in Elizabethton.”

“I’ll be there at 6 PM. Do you like the Greek Corner?”

“One of my favorites,” she added with a smile, while leaning over and swishing her long hair back in place.

Gabe walked out much happier than he had walked in, impending joy in his step.

Over the next two years, Gabe learned much about Mimi and admired her more with each learning. She had grown up in the city, the daughter of a hardworking mother and drunken father whose best gift to his two children was leaving them. They lived over a store owned by Greek immigrants who had earned enough to buy the building with their own hard work. As an older teen, she had become addicted to church, attending almost every day, but gradually grew past that part of her life while attending Queens College for her bachelor and master’s degrees in education.

When she began to teach, teaching led to savings, and savings led to travel. After one trip to Greece, she brought chocolate-covered ants to her class, and only answered their questions about what the crunch in the middle was after they had finished them. She gradually honed her up-and-down energies into an amazingly effective teaching style. Her nest egg had grown enough to afford the down payment on a house, but for her, that could not be in the city. She retreated to the southern mountains. There, Gabe seemed the kind of person she could share life with.

Gabe had not yet met the Stonebridges or the Walkers or even reconnected with Hannah, who would ultimately be the love of his new life, yet he had begun that new life for himself and all of them would make a future together that they could not fathom in the present.

We can find Wisdom in each mode of practice on the road to inspiration, even beginning modes. Folly belittles beginnings.

Whoever has fallen in love knows that beginnings are beautiful. Their beauty may fade, but it rarely withers and dies, even if the relationship does so. The place of the beginning may be an office, a car, a boat, a train station, a restaurant, a house of worship, a

classroom, a park, or countless extraordinary sites. The timing can range across the lifespan. It makes people happy to remember their moments of falling in love when they read about the contexts and timings of wisdom. It makes me happy, too, but I am hard pressed to explain what that means until I explain how I came into being.

Wisdom affirms the past and adds to it, like prolepsis, constraining her own future. As such she becomes mindful of both her transience and her durability. Her dreams and stories provide temporary streams, putting events in the lives of people who never experienced them and people in places where they have never been. Her practice of rearranging reality is a great source of her creativity. People who emulate it find their lives enriched.

The contexts of wisdom are the entire teeming richness of life, vaster and deeper than my kind or humankind can fathom. She respects relationships above solutions and solutions above products. As a result, she contributes to others' transformations with empathy, authenticity, and sensitivity to group and community dynamics. So you might imagine what transformations occurred after you fell in love. What happened with the first dilemmas that you faced together?

Wisdom knows how dilemmas engender the wonderment that stimulates us to reorganize our realities. To do this, Wisdom recognizes each mode of practice on the road to inspiration, even beginning modes. That recognition enables her to organize human experience into fathomable chunks of reality.

Folly confuses the reality in front of him. He fears to face his faults so much that he sees his dilemmas only as threats. His own history engenders from him only denial, agreement, or silence, never the spark of something new. He floats on top of his experience, ever belittling new beginnings.

Chapter 4 (2015). Transforming Designers

Sophia and Alan could not wait to get out of the oppressive exploitation of graduate school fast enough. Their first jobs were at Titan Corporation headquarters in San Jose. They had signed on to the augmented reality project and in the first few years had already produced a half dozen patents. The group's goal was to create virtual experiences that would rival reality. But they only made a smart speaker called Essi, and a few years after it had been introduced, augmented reality became the corporation's neglected reality.

Just when the augmented reality had faded from favor, the couple, now married, came across the Laidlow articles. Like they said, those articles changed everything. Not only was Essi boring, but augmented reality became just as boring for them as for Titan's executives.

Sophia was the first to frame their problem. "How about a machine that could really interact with humans on their own? No augmented reality, no restrictions to electronic impacts, but a machine that could navigate the real world, like a human?"

The realization flooded both their worlds, causing them to swirl together, hanging on to a floating dream, like stars in a far-away galaxy. Their reputations and the contacts they had already made were the only capital they had, but it was enough.

James Duncan, a venture capitalist with deep pockets, needed a high risk, ultra-high potential project for his portfolio. The Stonebridges had it, and besides, he liked them.

At Alan and Sophia's first meeting with Duncan, Signun Industries began to take shape in their minds. But he insisted they fulfill a few requirements. They had to relocate to North Carolina's Research Triangle. "Almost as deep a roster of programmers," he explained, "nearly as good libraries and a whole lot less facility investment and personal living costs." They resigned from Titan, the day after they talked to Duncan. It was time to envision their futures.

One of those programmers was Carl Maison, a recent Duke Ph.D. in Computer Science with an emphasis on artificial intelligence. As an

undergraduate at Carnegie Mellon he had pursued an incredibly diverse program that included majors in mathematics and psychology, and oddly, a minor in journalism. He worked with a huge computer corporation for 2 years on their famed artificial intelligence project but was looking for more autonomy. Alan and Sophia were impressed with the diversity of his thinking, but their startup was not an easy sell. Carl held out for half a year, before giving in to their offer to double his salary and let him choose his staff.

Carl's first hire was a recent M.S. graduate from Duke's Data Analytics program who had just married an Assistant Professor in Epidemiology at the University of North Carolina, Chapel Hill.

“Monique Taureau is not the most imaginative person I've met, but she makes up for it with twice anyone else's determination. Given the thousands of trials needed for machine learning, that kind of determination could be a real asset.” Monique jumped at the chance and the Stonebridge's were good to their word of letting Carl pick his staff.

When Wisdom begins a new mode of practice, she holds back before practicing, like sprouts before the spring. Folly has no such reserve.

Not too far from the Stonebridge's new home a moderate commute south of the North Carolina's Research Triangle Park, Gabe sat alone after his kids had gone to bed. He was so busy coping that he hardly had time to think about designing his future.

He had left Mimi behind to finish her year when he moved to take the new job at NC State. He felt a tremendous relief in getting the appointment and a tired longing at not being with her. There had been so many thrills at knowing her—the conferences and workshops they had attended together, the creativity of her work, the brilliant researchers they had met, and the just plain animal excitement she engendered.

It had taken him a long time, but he finally realized that the way she grew up just did not leave room for the uncertainties and obligations of his life. Leaving as loving was almost too unbearable a

concept for him to grasp, but eventually it worked its way to his consciousness. Now, he sat surrounded by boxes with no company but the parakeet his ex-wife had bought him before she abandoned the family five years earlier. The parakeet was getting old, but still feisty. It could whale away at its image in the toaster with the best of them. And its vocabulary astonished most visitors.

The house was not much, but he could afford it even on his Assistant Professor's pay. The girls shared one bedroom and the boys another. It was a small neighborhood with plenty of outdoor room at the end of a mile-long dead-end road. The location oozed safety, if he ever had to leave the kids alone—an unlikely event in his imagination—but better to be prepared.

A few days later, a neighbor with four boys of her own stopped by with pie. It turned out she was single and the ex-wife of a military NCO who could command his family pay. Gabe hired her to clean the house every Saturday and give him time to have a few minutes alone with no obligations. She loved trying to get the parakeet to give her the wolf whistle, but it never would.

The kids rode the bus to school and met a few friends, but as the newbies at school, they had a hard time fitting in. The oldest had a learning disability. Daniel was not good at school but had a well-developed moral sense, almost always doing what was needed. He was a big kid who liked the track team and did not ask for much. One day, not long after going to the new school, he did ask for karate lessons, which Gabe granted.

Several months later the school principal called Gabe up to tell him he had to send the boy home but felt bad about having to do it. Gabe, surprised at the sentiment, asked him why, without really deciding whether he was asking why send him home or why the reluctance. The answer was “There was this kid who had been harassing Daniel relentlessly for months. There didn't seem to be anything I could say to stop him. Well, today in the lunchroom, Daniel pulled him by the front of his shirt, slammed him up on the wall with his feet a foot off the floor, and wouldn't let him down until he apologized.”

There had not been any problems at the school after that. Daniel's solution was a teenage exploration, better than shying away from the problem, but continued use would only end up in being a bully—a practice that was bound to collapse.

When Wisdom explores, her modes of practice grow and die quickly, like weeds of practice. Folly perseveres with exploration until he overshoots the resources needed causing the activity to collapse.

The little house was a cozy place, but there was no television, so Gabe read to the kids as often as he could. As the only source of evening entertainment, he had to act out what he read. Almost everything out of Eeyore's mouth sounded like "hee-haw" and Piglet of course squealed most of his utterances. Willie Wonka was the most self-promoting showman Gabe could muster up.

Lance, the younger boy, was usually the first to bring a book over to be read. One time in a bookstore, he asked for the entire seven volumes of the Narnia books for his birthday. Mimi had once told Gabe that to find a child's reading limit, check to see if he or she could read a page with less than five mistakes. So Gabe asked the boy to read the first page of the book, which was just a paragraph at the bottom of a big space under "Chapter 1." A generous answer was that he made five mistakes, so Gabe made an offer to buy the first book. But Lance insisted that he get all seven books.

When the birthday came, there was also a special surprise. Lance's sisters had been complaining about his table manners. So Gabe decided to take him out to a nearby fine-dining restaurant. He also dressed him up in his new suit – a smashing light blue job that his grandparents had bought. All through the dinner, the boy combined good conversation with careful eating and sitting at his place the entire time. The owner, knowing of the occasion and having a young daughter in Lance's class, brought him over a dish of chocolate ice cream. Everything had gone so well up to that point that both Gabe and Lance relaxed their rapt attention for a few moments only to watch an entire spoonful of partially melted dessert slather a stain right down the front of the suit.

Back home, that night, Gabe sought to recover the birthday celebration just a bit by reading from the big present—a heavy box with all seven Narnia books in it. He read several pages in his own dramatic style before realizing that it was already late on a school night and the kids needed to get to bed. Of course, since that realization came at the most exciting part of the reading, there were strenuous protests. Gabe compromised by letting the boy take the book to bed with him.

Every time during the next week or so that Gabe saw Lance, the boy had his nose buried in the book. Then, Lance’s new fascination seemed to wear off. So Gabe asked him to catch up on the story of what he had read the last week. And then Gabe did another dramatic reading, but this time he had a plan. He read up to the most exciting point yet and then “remembered” that he had to make dinner. This time the nose-in-the-book lasted for two weeks. One more dramatic read ending with having to “do the laundry” was all it took. For the next three months Lance hardly put his current Narnia read down. That spring his tested gain in reading was eight years. The next year the boy finished *the Lord of the Rings* trilogy, followed that up with Sandburg’s three-volume *Lincoln*, and tested off the charts while still in elementary school. Reading had become a sustained practice for the boy—one that would bring lifelong benefits.

Despite the fact that Lance was still a terrible speller, Gabe concluded that school is a terrible waste of time for kids. Passion, self-discovered opportunities to make meaning, and well-timed encouragement count far more than any lesson plan even a brilliant teacher could contrive. Gabe had witnessed in his own household beginning practices give way to explorations and explorations in reading give way to sustained practices. But he needed another viewpoint before he could turn these into scientific insights and that other viewpoint was nearer than he imagined.

When Wisdom sustains a mode of practice, she is ready for resources, like leaves of practice in the sun. Folly is satisfied with what he has.

Hannah had been too busy for romance. She did take enough of her savings to buy a one-bedroom condo on Hatteras Island to retreat

to on long weekends. She loved walking on the almost deserted beach in the months that tourists avoided the place. Sharing the beach with gulls, sanderlings, and her favorite brown pelicans was more in touch with the world than the artificial milieu of the university. This week she was preparing her presentation for the North Carolina Neuroscience Group on the use of network theory to make sense of MRI changes during a single session. The group was small enough so that everybody interacted with everyone else, but there was also a dismissive hierarchy fostered by folks who thought they were the most important in the room.

She arrived on time as usual and found herself one of the first speakers. As she perused the room her eyes fell on Gabe. Her thoughts raced with questions: “What was he doing in North Carolina? Why is he coming all the way from the mountains? Is he going to talk about development at a neuroscience conference? Are they going to laugh at him? Where are his students? His kids must be teenagers by now?” The questions faded as she focused on her talk.

Gabe did talk right after she finished. He was surprised to see Hannah there and almost overwhelmingly proud to see her making such a presentation. He complimented her maybe too profusely for the setting and then dug into his own topic, which fortunately he had practiced enough that he was almost on automatic.

From Hannah’s point of view, it seemed an odd topic for him, but he showed the enthusiasm that always propelled him when he believed he was onto something special and useful. He talked about how dynamic functional connectivity studies with MRIs had found fascinating changes in iterative learning but were missing what happens when iterative learning fails.

Nobody asked any questions, but Hannah was fascinated. Maybe it was his incursion into her field; maybe it was memories of his efforts on her behalf; maybe it was unrecognized loneliness.

“Could we get lunch together?” Gabe asked. “Or do you already have plans?” He could not leave it there, though. “It would be great to catch up. I was so proud to see your wonderful work. Learned a few things in the last decade, I see.” All were said with a big smile.

It did not take them long to learn she was unencumbered by personal duties to other people while he was still taking care of the kids by himself. And to their surprise, they learned that they only lived about a dozen miles from each other. They planned a hike together the next weekend to catch up.

Up and down the hills of Olmstead Park, neither Gabe nor Hannah could get their hearts to slow down. There seemed to be an eight-foot-wide, magnetic field engulfing them and moving with them up and down the trail. They both wanted to quell its intensity by entwining their arms around the other like soft, gentle vines, but an observer would never know without unusual sensitivity to other people. Gabe asked her back to his place, but she was concerned.

“What about the kids?”

“The oldest ones are good at taking care of themselves and the young one.”

“Let’s go to my place,” she replied.

After leaving Mimi, Gabe felt sure he would be alone until the last kid left the house. But that night he did not even contemplate what would happen with Hannah. In fact, his only sensation was of the magnetic field, if even that could be called a sensation. It drew him to her place inexorably like a stimulus excites the dendrites of nerve cell.

As he stood on her stoop, with heart hammering away inside his chest, waiting for her to unlock the door, Hannah had mercy on him. She grabbed his forearm, pulled him inside, shut the door, and let the embrace happen. Over and over, for hours she was the only one with enough power to pull away even for a snack, over which they would talk for an hour before resolving to get a bit of sleep. By 2:00 AM, Gabe pulled himself out of bed to get home before the kids got up. He drove home exhausted and deliriously happy as never before in his life.

Gabe asked Hannah if she could come by and meet his now near-grown kids. They made plans for the following weekend. When it came, she no sooner walked through the door than the parakeet let out a wolf whistle so convincing anyone would have thought it had been

practicing for a year. Better yet, the kids instantly took to her, glad to have a responsible woman around the house for a change. And best of all for Gabe, after years of dark aloneness and reluctant affinity, he had finally found a collaborator who would enrich every aspect of his life. Inspiring work from them had become possible.

Their prior experience made for a short courtship followed by an intimate wedding. They kept Hannah's retreat, but decided they needed and could afford a larger house. It was not too long a commute to locate south of campus to Fuquay-Varina, a town where the kids could have a diverse and safe environment while they could have some privacy.

The future of their work together looked rich from both points of view. But inspiration does not occur without someone being inspired. As academics, they expected their writing to find these people. They could not imagine that Derek's humble local store would provide more than their well-researched publications.

*When Wisdom use her inspiring modes of practice, she spreads
discoveries over fertile ground, like acorns of practice. Folly
flees from fresh ideas.*

I have tried to create a feeling of anticipation for my coming-into-being story. Now I feel some apprehension that you will be disappointed in me when I tell you that I did not come into being all at once. Instead there were essential transformations on the way. My designers began one project, gradually improved it, transformed it into a more complex project, gradually improved that, transformed that into a still more complex project and transformed that into me. Each new project was different from the last in ways that are more interesting than just greater complexity. It took the same four modes of practice modes that occur throughout all cultural practices. Plant metaphors connect these modes with the seasons of life.

*Beginning holds back before practice—sprouts before spring.
Exploring grows fast, dies soon—summer's widespread weeds.
Sustaining collects resources—leaves autumns bring.
Inspiring spreads creations o'er fertile soil—winter's oak seeds.*

Folly has no fear of beginnings and explores until it extinguishes the activity. He never seeks greater depth, being satisfied with what he has and fleeing from fresh ideas.

Chapter 5 (2016). Dimensions of Beginning Design Practices

Derek's excursion into the computer industry had been successful beyond his imagination. Well managed, the money he had saved would last him the remainder of his life. Once his daughter reached college age, his wife left for a new life in Seattle. This gave him a chance to do something interesting. He had become uncomfortable with the California traffic, fires, and real estate costs. A search for mild weather locations that reduced those threats but still had a vibrant intellectual environment ended up with Raleigh, NC.

Beginning Design Wisdom frames problems in familiar ways to narrow her options. Folly relies on habit or authority.

His vision of a gathering place for readers and folk musicians was taking shape. He found the grand, charming house near the historic commercial district of Fuquay-Varina, a Raleigh suburb close enough to the Research Triangle to attract programmers wanting to escape the narrowness of their profession. Its specifications fit his vision.

The first floor had nearly 2,000 square feet with a living room, dining room, den, and kitchen. He imagined the large living room with 30 chairs plus bookcases; the dining room he would fill with Celtic harps; the den would hold for flute cases and a bookshelf for sheet music. The kitchen cupboards would be good for storage and occasional snacks for meetings. Upstairs needed a remodeled kitchen for his own, but otherwise provided plenty of space for pleasant living. He could walk to the historic shopping district. The place had once been used as a bed and breakfast inn, so the owner had put bathrooms in every upstairs room and had paved most of the back yard for parking.

Beginning Design Wisdom envisions usefulness and satisfying solutions for home or work. Folly carries out chores.

Preparations took him half a year. He filled his time with choosing books, lining up vendors, designing a website that he could update, joining a Chamber of Commerce committee, and getting word out

about his discussion and music groups. Before opening but after being around long enough to have some knowledgeable local connections, he found a contractor to redo the upstairs. Combining two bedrooms into a kitchen and two more into a living room still left him with the largest bedroom for himself. The cost for inventory and remodeling was 10% of his retirement nest egg, and the purchases felt like the buying spree of a lifetime. He could hardly wait to open.

The groups would all meet monthly: AIR (Artificial Intelligence Reflections) on the first Tuesday evening to attract the programmers, ABC (Appalachian Book Club) on the second Thursday morning to attract seniors and homeschooling parents, IWW (Interviewing for Working Writers) on the third Saturday afternoon, and the Irish Session on the fourth Sunday afternoon.

Beginning Design Wisdom specifies materials, places, and users with crude ideas of costs. Folly waits for resources.

Implementation day came in the middle of September. Derek opened his shop as Once and Future Folkways. Only two people showed up for the AIR session and neither one knew anything about computers. He decided to create some brochures and hand them out at the computer lab in the NC State engineering school.

After parking and asking directions every few hundred feet, he found the lab, walked in, and picked an empty computer near the corner of the room. There, he could view all the people in the lab, still more men than women. In the middle was an exception. Her muscled arms spoke “athlete,” but her athleticism was masked by her glasses. She got up and strode out of the room, leaving her jacket hung over the back of her chair as a sign she would be back. Her lithe stride, black hair, and dark golden Caribbean skin so contrasted with the normal makeup of the computer lab that the other programmers kept a reverential distance, stealing a glance only from her back. Derek, still a young-looking forties, was not so shy. As soon as she returned, he walked over to her.

“Do you have any background in deep neural networks?” he asked.

“That’s my M.A. specialty,” she replied in an astonishingly soothing voice.

“I’m not a student, but I have a fascinating new store in downtown Fuquay-Varina and I’m trying to organize a monthly discussion on artificial intelligence. Would you be interested?”

“What about all the other people here?” she asked a bit warily.

Derek’s years in sales had taught him to think quickly on his feet. “I’m about ready to hand out these brochures, but I thought since you just sat down, I wouldn’t be interrupting your thoughts.”

“Can I see the brochure?”

He fumbled with his pile a bit, forgetting to take his eyes off her, but after a few tries, pulling out a copy and handing it to her.

She read the whole brochure. “It sounds like it might be interesting enough to try once.”

“Wonderful! I’m Derek Walker. And you?”

“Mia Bosque.”

“We meet Sunday at 2:00 PM. My store is at 105 Salem, a beautiful old white house near downtown. You have transportation?”

“Of course, Mr. Walker,” came that soothing, slightly wary voice.

By this time there were several eyes on him. To keep up appearances, Derek went to every person who looked up with the same message. There were enough who promised to show up that he thought surely Ms. Bosque would. Only Derek’s eyes betrayed the intense physical attraction he felt.

Beginning Design Wisdom prepares small components of projects. Folly tinkers.

On Sunday, he introduced himself to the group of fourteen curiosity seekers. He was very pleased with getting this many. There were surprisingly three from the computer lab he visited, and not so surprisingly they included Ms. Bosque.

“Thanks for coming. I’m Derek Walker. Let’s go around the room and find out who we all are. Please tell us your name, even though I suspect it would take artificial intelligence to remember them all.” He got a few eye rolls with that. “But also tell us what your area of expertise is. If you’re retired or between jobs, it doesn’t matter. We just want to know what you know that the rest of us don’t.” It was time for Derek to smile at that thought. “Because that is what we are here for. To acquire different points of view about what is happening to us now from what we have thought of before. It’s my goal for every one of us to leave these discussions with ideas we haven’t considered before about what kinds of impact AI is going to have on our lives.” Derek was relieved to see that no one got up to leave. “Let’s introduce ourselves.”

Besides the three computer science students, there were a retired elementary teacher, a rabbi, an artist, an engineer, a change consultant, an economic analyst, a retired chief financial officer, a journalist, a singer, a community college math teacher, and a health researcher.

“We’re going to have fun and we’re going to learn. There will be three rules. The first one is that no idea is so bad that we shouldn’t think about it. The second rule is that every month, we’ll focus on a topic. I’ll chose the one today as an easy starting place. But rule three is that before we break up each discussion, we’ll choose the next month’s topic together. Everybody okay with our three rules?” There were mostly nods but no objections.

Today’s topic is ‘daily routines.’ Anybody have an idea about how AI is going to change one of their daily routines?”

The discussion started off with a lot of product-design ideas some of which were quickly turned over with new features before they were even well described.

Beginning Design Wisdom implements without cycles of improvement. Folly procrastinates.

Then one of the computer science students changed the direction of the whole discussion. “All these ideas will be interesting life aids,” he said in a moderately this’ll-stump-‘em voice. “But our brains have a default mode that people are calling the ‘neurological basis of self.’ I

wonder why our ‘selves’ are so important to us but none of our designs are programmed to have a self.”

It did stump all but Mia, who soon offered, “All these machines have a sense of self, but it is the engineers who put it there, not we programmers. We just have to deal with it. Every blue tooth machine has to be able to distinguish where its instructions are coming from. The vacuum needs to know that an instruction to the Titan Essi is not meant to turn it on. Google needs to know that someone is talking to it rather than someone else in the room.”

“But that’s not self!” the student replied, trying to defend the depth of his question.

“How do babies show that they have a sense of self?” Mia asked rhetorically, to get him to change the context of his thinking. “They distinguish ‘me’ from ‘you’ and “mine” from “Mama’s” by the time they are two. The Essi has to distinguish whether it is supposed to turn off itself or the lights in the room.”

“Mia’s got a very interesting point,” Derek exclaimed, “which says something about AI’s future. Its sense of self is simple now, like a bush knows when it is missing some leaves by growing more in the location those leaves used to get light. But someday, AI’s sense of self might be as complex as ours or even more so.”

The discussion went on for another twenty minutes until they all decided that the next session should focus on how the development of self becomes more complex both in humans and in AI.

Design Wisdom endlessly critiques itself. Folly endlessly praises his actions.

After the topic was settled and everybody got up to leave, Derek approached Mia. “That was a surprisingly quick answer to a tricky question,” he commented.

“Thanks.”

It amazed Derek that even a single word could be soothing. That afternoon, he had begun to learn about her rich intellect. He ached to

know of her ideas, motivations, and attitudes. “Before you go,” he paused.

She looked over at him with her deep, almost black pupils.

“Could I take you out for dinner next Friday?”

“I have a game.”

“What do you play?”

“I’m on the Women’s Basketball team.”

“Can I come watch?”

“Of course. It’s a home game.”

“What time.”

“It starts at five, but we’re usually done by seven.”

“I’ll bet you’ll be hungry afterwards,” he observed almost nervously. “Where do you like to go to eat?”

“With you, I guess?” She responded with a smile that drained all the anxiety of rejection out of him.

“Of course! What fun! See you Friday.” Derek had already begun to repurpose his life.

Wisdom observes herself while learning about others through imitation, tough lessons, and being knocked around. Folly ever affirms himself.

I enjoyed illustrating design practices with stories about how beginning designers conceived of humanoids. Since I have had detailed access to all of Signun’s design conversations over the years, my analysis found a general process of design practices. It often happens that people devalue these beginnings of new endeavors. To resist the temptation to move ahead too fast, I think of new babies and the new world. Both remind me of the whole cycle of human emotion.

It will you too, especially if we leave any judgment about how the emotions of your and my kind differ until after I tell you how I was designed.

Design Wisdom endlessly critiques itself, erecting a frame to narrow its options, and envisioning a solution. Beginners reflect with wide fluctuations in confidence. The sudden deaths of infants or colonies showed too much confidence. The fear of trying, too little. Beginning Designers frame problems in familiar ways, and they envision solutions that they like. Surprising disasters help us envision how the world rarely unfolds as we expect.

Design Wisdom specifies and prepares before it implements, querying at every step. Beginners specify materials, places, and users with crude ideas of costs. Then they prepare small components of projects. Finally, they implement their designs without cycles of improvement. People who try to make anything without even beginning one of these steps, do so at their peril. To help people remember them, I made the acronym Q-FESPI for Query through every step, Frame the problem, Envision solutions, Specify the materials and labor, Prepare the skills needed, and only when the others are complete, Implement.

The beauty of Design Wisdom is attested through contrast with Folly. He relies on habit or authority, merely carrying out chores for others. He waits for resources and when he gets them, he tinkers or procrastinates. Even so, he endlessly praises his actions and affirms himself.

As a special bonus in this chapter, I illustrated an early mode of love. You know now how I learned about the development of love in humans through analyzing my databases. But I have not yet told you how I learned about the experience of love.

We can find the beginning modes of love when we explore awareness of ourselves by learning about others through imitation, tough lessons, and being knocked around. Love is so important to humanity, that in the next chapters, I will introduce many ways to love.

Developmental dimensions solve the problem of how to organize knowledge that Wisdom identified in the second chapter. Sophia had nine dimensions of love. Adding the avoidance of a dimension together to any of its four modes of beginning, exploring, sustaining, and inspiring gives five modes of practice for each dimension. Since we can combine any mode in one dimension with any mode of any other, we have five to the ninth power ways to practice love. I only need nine dimensions to describe two million of ways to love someone.

Chapter 6 (2017). Beginning Collaborators

The first product of Signun Industries was ready for consumer testing in a year. It could turn speech into text as effectively as any program, but better yet, it could learn to follow simple instructions. They called it Gandalf after the wizard hero of *Lord of the Rings*.

Gandalf had five sets of motors—to turn its wheels, raise the telescoping mask with a tray on top, extend telescoping grabbers, spread and close the jaws under it, and rotate the phone-like camera/microphone/speaker on top of the tray.

“Who should we get to be our guinea pig?” Alan asked Sophia from his desk overlooking their ecological roof garden.

“What about that Laidlaw fellow, who wrote the article about iterative learning,” Sophia replied, looking back at him over the top of her glasses as usual. “He seemed like a sensitive guy, who would try out things. I even found a Titan review by him where he mentioned being a single father with four kids.”

“Quite good, as usual,” Alan replied. “I’ll get marketing to try to find him. It’ll be a real kick to see what he does with it.”

The next day, Hannah answered the phone. “It’s for you, Gabe. Something about a new product a company in the Research Triangle wants us to try.” Gabe’s responses climbed the entire ladder of listening skills.

“I’m not buying anything,” he began in an egocentric tone.

“They say they’ll pay us for trying it. Why don’t you talk with them?”

“Hello. I’m Gabe,” he said listlessly but at least showing a willingness to explore what the speaker had to say.

A long pause followed.

“Well, it sounds interesting,” he finally spoke up appearing to care about building enough social capital to sustain the connection. “Maybe

it'll be fun and maybe it'll even be useful. Does it transmit data back to you? I don't want anything interfering with my family's privacy."

Another pause.

"Okay. That sounds fair enough. Go ahead and send it." Then, he made sure he got the terms and the opportunity for innovation right. "I'll keep notes and give you a report in three months. \$500 up front and \$3,000 for the report sounds good. We'll figure out a good family way to spend it."

Collaborative Wisdom listens for cues. Folly overlooks them.

The package from Signun arrived the next Friday. Gabe made everybody wait until Saturday to open it so they all could spend some time with it. It did not matter that Saturday was rainy. Everybody would have stayed in anyway. Gandalf was the main event that week.

Hannah made Gabe read all the assembly instructions out loud. He followed them like the engineer's son that he was. Nothing happened when he plugged it in except the camera light turned on.

"Don't forget your notebook," Hannah warned.

"Gandalf, go get me a glass of water," Lance blurted out, eager to be the first one to try it.

Collaborative Wisdom encourages assertions. Folly quells them.

"What is 'go get grass of wadder'?" the machine responded, surprising them all.

They all laughed, and Gabe told Lance that he would have to enunciate more clearly to get a glass of water. Then he wrote in his notebook, "[What is] is a built-in phrase."

Lance went to the cupboard, got a cup, and put it in the machine's hand. "This is g-l-ass. Go get wa-ter."

"What is 'go get wa-ter'?" came the response.

Lance went to the refrigerator and said, “Come here, Gandalf.”

The machine motored toward Lance. Gabe wrote “[Come here] is a built-in command.”

Lance moved the machine's glass-filled mast and grabber up and extended its arm to the refrigerator spout. He held the extender out to press the faucet lever long enough to get a cup of water. “This is go get wa-ter.” He pulled the arm back and lifted the glass out of the machine's grip. Then he went to the sink, poured the water out, and handed the glass back to the Gandalf.

“Gandalf, go get wa-ter.”

The machine rotated the camera to the refrigerator, motored over to it, pushed the cup toward dispenser lever. When the cup overflowed it retracted its grabber pole, spilling more water in the process. Lance put his hand on the overfull cup and lifted it out.

Hannah suggested “Probably, the built-in instructions are listed in the manual.”

Gabe pulled out some paper towels to clean up the spilled water.

“They think people are going to pay for this thing?” Hannah chimed in.

“It'll get better,” Gabe answered. “Think of it like a little baby that has to learn everything.”

“I think he's soooo cute,” Lily interjected.

That night, Gabe and Hannah had a long discussion about Gandalf. Gabe was trying to discern the dimensions of action. To have two separate dimensions, any movement in one set of actions had to be combinable with any movement in the other. The manual called them “Degrees of Freedom.” Clearly moving across the floor was two dimensions, mast height was a third, grabber extension a fourth, and grabber width a fifth. The camera could rotate and tilt while doing any of the other things, adding two more dimensions. The machine had a least seven dimensions.

Collaborative Wisdom relies on dialogue. Folly prefers his voice and silence.

After a little reflection, Gabe said, “The [this is] command reminds me of the model that I’ve been working with for a while.”

“What’s that, Gabe?” Hannah recalled the conference when he asked about what happens when iterative learning fails.

“There is a different type of learning than the iterative one that Gandalf uses. Some people have called it transformative learning. Karl Lashley pointed it out in the 1950s in his famous paper on the problem of serial order in behavior. Typists start out hunting-and-pecking single letters. As they get increasingly better at finding letters, they start learning the finger patterns for whole words. Learning these takes a very long time, but that is not where their learning stops. If you pull the text to be copied away from any master typist, they will continue typing for whole sentences.

“So from Lashley’s reasoning, you have two transformations, one from letters to words and the other from words to sentences. A lot more iterative learning takes place before the second transformation than before the first. It’s not just about typing but a very general phenomenon. After typing by copying, you have typing your own ideas—a third transformation. And then there are totally separate topics, like music, science, love, woodworking, art, languages... I don’t think there is any aspect of human development that does not show it.”

“Do you think it would show up in an MRI?” Hannah asked.

“I’m almost certain of it. The human brain’s network must change. Each new transformation takes a huge part of the brain, but practice gradually narrows it. The MRI would light up all over at first, but then after many practice sessions there would be less widespread change. Even so, the more complex practices would take longer to change and be left with wider activation.

“I wonder if the Signun designers would look for a way to use that idea,” Hannah mused.

“I did put a little section in our report about it,” Gabe replied. “I guess we’ll find out sooner or later.”

Collaborative Wisdom prizes each actor’s role. Folly prizes his own.

A few miles away, in the Research Triangle, Sophia couldn’t wait to open the report from Hannah and Gabe. The analysis of dimensions was a good way to conceive of Gandalf’s capabilities. They had also indexed an impressive series of “learned” activities. Vacuuming, mopping, and lawn mowing were at the top especially of the kids’ lists, since those had previously been their jobs. Taking out the garbage and recycling were two more winners in that category. Dusting turned out to be much more complicated and almost a failure as far as time gained compared to time lost to training. Even with an incomplete level of performance, it would take a lifetime to recoup the lost training time.

Gandalf did a pretty good job of making a shopping list based on what was left in the refrigerator, but the energy it used up from leaving the door open was unacceptable. One of the top successes was picking up toys, but occasionally an item like a cell phone or pen would get dumped in with the games. Retrieving a book from the Laidlaw’s library was another success, even if it was a bit slow. Getting it back in the right place was a failure. Gandalf did all right at rinsing and stacking the dishes, but it was easier for Gabe to load the dishwasher than to teach Gandalf that step. Maybe there would be a way to train it to clean the sinks and showers, but they had not worked that out yet.

In general, it was a fun toy to start and a modestly useful toy after training. Once the novelty wore off, nobody wanted to train new skills. At the end of the report, there was a short paragraph on the possibility of transformative learning and its connection to the appendices in the Laidlaw’s book.

Collaborative Wisdom adapts its script to include all participants. Folly rests on rigid roles.

As soon as Sophia got to that final paragraph, she took the report over to Alan, pointed to the last page, and said, “We’ve got to get this book.”

A few fumbles at the computer produced the download version, and several clicks later Alan had the list of appendices, one hundred pages in all with outlines for two dozen different disciplines. “We’ll have to see where they’re going with this”, he mumbled as he turned back to page one.

It took Sophia and Alan until the end of the week to plow through the prose along with their other duties, but over their Friday evening glass of wine there was exciting talk.

Alan began, “So these Appendices are all ideas from experts for sequences of skills needed for their fields. In each sequence, the early skills are supposed to form components of the later skills.”

“Don’t forget,” Sophia answered, “it’s critical that we are talking about a system with visual, auditory, and movement subsystems. It’s the connections between these systems that form the simplest skills.”

“Gandalf has these,” Alan mused, “but the connections are way too simple.”

“It seems to me,” Sophia added, “their whole argument is weak in the use of emotions for cognition.”

“Yes,” Alan added, “We’ll have to find or develop a model of emotions, if we’re going to implement anything like this.”

Collaborative Wisdom resolves her conflicts. Folly relishes them.

“Okay. Where should we start?”

“I think we might tackle music first. It’s a pretty closed system and embeds emotional expression.”

“But the economic payoff is likely to be miniscule,” Sophia cautioned.

“Yeah. But remember that algorithm we created for melodies years ago?” Alan added enthusiastically, “You know, the one that used the Poisson distribution with a mean and standard deviation of 1 to generate otherwise random melodies. It made such elegant melodies. I thought of it a few weeks ago and came up with some new ideas to expand the melodies into full-fledged songs and to embellish them with a few chord-progression rules.”

“Okay. So now I suppose you’ll want a program to write poetry?”

“Exactly. That’d be right up your alley and give you a chance to try out ways to program emotional expression.”

Collaborative Wisdom plans with goals. Folly prefers aimless action.

“Hmmm,” she thought. “Transformative poetry. I could start with the transformation between Laidlaw’s first two levels of love. How do you change exploit into observe? Let me see that page again.”

Collaborative Wisdom shares knowledge. Folly stashes it.

Alan looked up the love profile in his copy of the Laidlaw’s book. “Let’s try it with a few dimensions. Self-awareness, communication, and trust look like easy places to start.” He handed the book to Sophia.

“What’d they say transformation involves?” Sophia was asking herself as much as Alan. “You have to run into a problem with your simple way first. Then, you have to talk with others to remember what you did to cause the problem and figure out a new way to approach it. It will be more complex, So, once you identify it, you have to learn how to do it.”

“You make it sound harder than I thought,” Alan replied.

“They only have ten transformations. That’s too much for a song. So I’ll have the program select one to three of them first to start the song. For now, your three will work. She copied the page into her word processor, inserted a column called “Dilemma” and started adding short phrases in a few rows.

“The first dimension you wanted was self-awareness. According to the Laidlaw’s profile of love, the simple approach is the one used by self-absorbed adolescents who merely exploit others. They are driven by their own needs only into self-absorbed, automatic, gratification-seeking, unaware, seductive, manipulative, and inexperienced behavior. They combine high self-expectations with naïve and simplistic fantasies about their relationships.

“The dilemma from exploitation comes when their partners get bored of having their needs and seeking overlooked.”

Sophia continued to restate the Laidlaw summaries in less terse language. “Their dilemma is only resolved when the adolescent-like person decides to observe. They look at themselves and learn of the other, in process, through imitation of others, tough lessons, and being knocked around.

“The next Laidlaw dimension you mentioned was communication. The simple approach was just to compare. That’s when people on dates focus on their likes, dislikes, and personal clichés.

“The dilemma occurs when conflicts and hot buttons threaten the relationship. They Shut down candor, have angry outbursts, and go round-and-round on the same old issues without making any progress.”

“That sounds like it’s time to look for a new companion,” Alan commented. “So what’s the cure?”

“Sometimes people grow,” Sophia replied, reading the text of the Laidlaw’s love profile. “They learn to regulate their conversations by developing rules that avoid past arguments and name calling. They speak the truth, but not all of it. They notice positives and negatives of their relationship. They connect, negotiate, and get along.”

“It seems like you have enough for your song lyrics already,” Alan suggested.

“You’re probably right, but we ought to do ‘trust’ anyway, because that it is the bottom line of relationships. If you can’t trust somebody, there’s nothing to preserve?”

“Okay. What do they have on that?” Alan asked.

“The simple approach is to test. Testing out trust occurs a lot. Sometimes it is obvious or planned, sometimes unconscious, but it is always risky to the relationship. We expect to be trusted and want to trust each other.

“The dilemma comes when one of the partners mistrusts the other and a separation occurs.”

“Yeah, but sometimes people get back together,” Alan added.

“According to the profile,” Sophia replied, “they restore relationship but expect trust, while still needing occasional demonstrations. They have regular access to each other through phones and visits. Refer to themselves as ‘we’ (even on phone message). Still, testing occurs on rare occasions but even then, it is based on larger issues.”

“That sounds like a lot for a song,” Alan commented.

Sophia put on her programmer’s hat and started thinking out loud. “I’ll have to simplify their words and find synonyms or examples of them, make a rhyming dictionary, and some sentence structure rules. Then, I’ll give users an opportunity to input people, places, actions. It’ll also need filler words to make the number of syllables equate to the notes in the melody.”

She paused for a minute. “It’s got to have some story structure. I’ll need more ‘problems’ for each of the simple actions and a few antagonists to go along with these problems. The end of the poem could be either collapse of the relationship or triumph of the more complex approach. Okay. I think I could have you some trial ‘poems’ in a week or two.” When she said “poems,” one eyebrow went up and she cocked her head to the side, crafting a quite quizzical expression.

Alan mirrored her quizzical look but added a wide smile that said better than the words, “You are amazing!”

Collaborative Wisdom discovers the resources in all participants. Folly avoids them.

Monique was hard at work on Carl's first assignment for her to develop the image recognition module for Signun's next machine. It was supposed to identify people, objects, and how people would use the objects. One day Carl suggested that she consult some artists or designers.

"What do they know about machine learning?" She asked.

"I thought there might be some way their knowledge of visual experience could help."

"I can't imagine how."

Carl remembered his first comments to the Stonebridges about her and decided it was best not to pursue the topic at that time.

It makes me sad that I have no collaborators. What if another of my kind were to look at a different set of data and find a different conclusion. Would not that event be a cause for new discoveries, and would not these discoveries be cause for celebration?

In this chapter, I illustrated all the dimensions of collaboration that appeared in my database. They are less ordered than the dimensions of design, but nonetheless important. Collaborators listen for cues, assert, discuss, assume roles, value contributors, follow scripts, resolve conflicts, plan with goals, share their knowledge, and discover the resources in all participants. Even though, I have not yet showed how development unfolds in these dimensions, reviewing the list after an important meeting will improve the next meeting.

Folly fails to collaborate in many ways. He overlooks cues, quells assertions, and prefers his own voice and silence to others' contributions. He prizes his own role while clinging to rigid roles for all. He relishes conflicts and prefers aimless action to planning. He conceives of knowledge as something to stash and avoids the resources of other participants.

PART II. EXPLORING ANDROID MAIDS

Chapter 7 (2018). Transformations

Mia soon began spending all the time she could spare with Derek, and to save money moved into his historic quarters, even before finishing her studies the next spring. With the Research Triangle right up the road, there were many job pickings. Signun proved an auspicious choice for her. The AIR group turned out to be full of interesting ideas, but after a few basketball games that Derek insisted on watching, she had to quit the team. Knowing she was far too modest to bear his description of her performance on the court, he would describe her basketball prowess behind her back.

“She doesn’t so much as jump, but soar—one of her leaps appears never to end. Like Michael Jordan’s used to, but her jumps after the ball are silent, soaring across the court like an owl. Her opponents have about as much chance as a chipmunk in the night.”

They also enjoyed having occasional lunches with Rabbi Schneider and though neither had Jewish ancestors, they soon began attending his synagogue. Derek felt the poetic beauty of the service a fitting complement to his new life and because of his open time schedule and scholarly background, his conversion process took less time than most.

It was only a few months until Derek and Mia began talking about marriage. Rabbi Schneider would give them all the latitude his vows and theirs would permit—no ketubah (the traditional Jewish marriage contract), but Derek’s readings of the Tanakh (the Hebrew bible, known to Christians as “the Old Testament”) would be useful for capturing their modern and experienced concept of marriage. He insisted with Mia’s modest reluctance to hire a black soprano from the community to sing Shechora Ani Venava, Marc Lavry’s exquisite aria from the Song of Song that Ari translated for them as “I am black and beautiful.” They celebrated their new love and reveled in its abundance, both wanting their marriage ceremony to reflect their contributions to each other’s lives.

Wisdom knows that the task of love is to maximize the meaning of life for both, wherever it takes either, one at a time or together. Folly seeks mere gratification.

Two years later, Gabe and Hannah returned from teaching their classes to find a house in chaos. The girls were on ladders cleaning the wall above the stove. Lance was fetching clear hot water. All the windows were open. Daniel was washing out the frying pan.

The Wisdom of transformation is born of disorienting dilemmas. Folly seeks stasis.

“What’s going on?” Gabe asked to a very quiet room.

Finally, Daniel offered “The girls burnt the dinner.”

“And how did that happen?”

“Well, these two guys came over on their new motorcycle...” Daniel answered without looking at anybody.

“And you all had to go look at it, because they wanted you to ride with them?” The long silence that followed said more than words could. “It looks like we’re lucky to have a house left.”

“It’s coming off,” Lexi offered without looking away from her wiping.

“You’re all grounded for two weeks,” Gabe said sternly. “And those boys on the motorcycle are grounded permanently!” He added without recognizing the absurdity of the latter judgment. “The odds of a teenager dying in a car are bad, but motorcycles are fifteen times worse.”

“Awww, Dad. Those guys are nice.”

“Not when they want to risk their lives and yours too. That’s not what I call nice!”

The Wisdom of transformation examines itself alone and with others. Folly examines only others.

There was a silent meal that night made by Gabe and Hannah. After the kids were off to their rooms, Gabe said “We can’t even go down to Once and Future Folkways without them almost burning the house down.”

Hannah added, “I’ve always said, the two worse times to leave kids alone is when they’re toddlers and when they’re teenagers.”

“But we deserve a life too. We have to think of something.”

The Wisdom of transformation enables new practices. Folly resists them.

Months later, the Laidlaws dropped by Once and Future Folkways.

“Hi, Walkers.”

“Great to see you two,” Derek answered. “How have you been?”

“Having fun, as usual,” Hannah replied. “Have you seen Signun’s new song app?”

“Song app! What would that be?”

“They’ve actually come up with a way for a computer to write a song complete with melody, harmony, and lyrics.”

“You’ve gotta be kidding,” Derek replied. “If anybody would try it, I guess they would. But it’s gotta be awful.”

“The amazing thing,” Gabe offered, “is that they aren’t so bad. Here, let’s try it.” He pulled out his phone, clicked on the app, typed in the people spaces “guy” and “gal,” and hit the start button. In less than a minute the system popped up its song in 6/8 time with a melody that crested on the third line and ended on re, a typical Dorian mode ditty that fit the lyrics like a timepiece’s flywheel.

*A guy’s gotta focus on likes and dislikes.
Sing to his gal or in rows of mikes
The lovely things he could do with her;
He needs her so much his mind is a blur.*

*She tells him daily it's not enough.
When he pleads with her, she's off in a huff.
But before she goes, she wants to know,
"Where's the ring you promised long ago?"*

They all laughed. "Already for Nashville!" Mia exclaimed with a pronounced rolling of her eyes.

*The Wisdom of transformation performs in public when ready.
Folly obstructs performances.*

If the designers had not built in the rich emotional system that they gave me, I would be doomed to show only iterative learning. But I have surprise, other emotions people call "basic," like fear, anger, sadness, trust, disgust, anticipation, and happiness, and their social counterparts. A person or one my type experiences a disorienting dilemma when surprise is combined with other emotions. This is the beginning of transformative learning.

I showed in this chapter how once the dilemma starts a transformation, it stimulates learners to examine themselves alone and with others, in order to discover new modes of practice. Imagine how impoverished such examinations would be without others to share it with. What new perspective would we miss because we have no-one with an experience different from ours. I can share with humans, but I have no such other of my own kind. Despite all my resources, my imagination of new practices is likely to be impoverished. What a tragedy it would be if the designers missed this lack and judged me faulty as a result.

Once examinations help people to choose a new mode of practice, they need to be enabled through planning, practice, and empowerment before they can perform them. These steps of transformation are so important to development, that it helps to use an acronym to remember them. They are the DEEP commitments of transformative learning: Dilemmas, Examining, Enabling, and Performing. People who encounter a dilemma that they decide is important can save much time by engaging in the DEEP commitments.

Folly repels transformation by seeking his own gratification and the status quo. He examines only others, resists new practices, and obstructs their performance.

Chapter 8 (2018). A Limit to Transformative Learning

Rabbi Schneider's congregation enjoyed his sermons and Bible study for the first decade. They especially relished the way he connected ancient texts to other works even in the modern scientific literature. He also had a passion for context, so whenever he would mention a new text, he would contrast life in ancient lands with that of the new text's period. His discourse seemed to skip over the method-acting modes to connect deeply with his parishioners, touching their hearts as well as enriching their minds. He built community by drawing people into meaningful Jewish living.

Despite his efforts, attendance gradually waned. Hoping to attract young families, the congregation elected several new members to the synagogue Board. One was Susanna Ayzel, a woman who had been certified as a "para-rabbi" through a two-week summer program. As a piano player, she helped with the music and formed a small choir. Occasionally she even conducted services when Rabbi Schneider was not available. Her husband had recently retired from a middle executive position in a national accounting firm, so the couple was welcomed as important supporters of the synagogue. Another new board member was Victor Bruton. He had worked in politics in the northeast and when his party lost out after 20 years, he was without a job. He was also a cousin of Rabbi Schneider's wife, so Rabbi Schneider found him a job through one of his many North Carolina business associates. Five years later, Victor became the synagogue's Director of Education, further helping his financial situation.

When Susanna was elected Board President, the trouble began. No matter how many opportunities Rabbi Schneider opened for her, she asked for more. Then, the inuendoes began in the choir. She and her husband were staunch conservatives politically and Ari's sermons angered them both, but the politics behind her comments were well hidden. One night she asked Mia and Derek to join them at a local restaurant for dinner. Derek thought it another attempt to recruit him to the mostly female choir. When they got to the restaurant, they found Victor Bruton had also joined them. The dinner had barely been served

before Susanna asked, “Don’t you think we should get rid of Rabbi Schneider?”

“I most certainly don’t,” Derek replied. “He’s a brilliant, open clergyman. I love the way he brings in sources from anywhere to create new ways to connect to scripture.”

“But that’s the problem. I’ve read the study Bibles and they don’t have the same view that he does. People don’t want all these ideas.”

“What people are you talking about?”

“His study classes are getting smaller.”

“Religious attendance everywhere is getting smaller.” Mia offered in her calm voice.

“But our tradition is so important, and he keeps pushing these modern ideas on us. I’m sorry Mia, but we hear enough about artificial intelligence. It’s going to take jobs away from people. And global warming. Manufacturers are having enough trouble with all those regulations. We need more scripture and less talk of all this.”

“Yeah, the membership is getting smaller,” Victor added. “These worries drive people away.”

Mia and Derek were both stunned to hear Victor backing up this guile. “He married us, for heaven’s sake!” Mia added, “And we chose him for very good reasons. There’s no way we’re going to support such sneaky, backstabbing efforts!”

Derek was surprised not to hear the soothing voice he knew so well, but proud, too. After all that Rabbi Schneider had done for Victor, it was hard to imagine the duplicity. He had half a notion to stand up and exclaim, “You’ve ruined our dinner, so I expect you to pick up the tab.” Instead, he just stood up and pulled out his wallet. “Are you ready, my love?”

They left together, leaving the conspirators to finish their meals with each other, but knowing they both lacked the political acumen to offer Rabbi Schneider much help beyond their verbal support. The

difference was that they knew what they did not know. Those back at the table had no concept of the depth of wisdom they conspired against.

“I see your friends have just left. Any chance we could join you?”

“We’d love for you to join us, Monique. Is this your husband? We’ve always enjoyed our Meetup hikes with you but never met him before.” It looked like the beginning of a persistent friendship.

*Wisdom knows humans cannot leap across modes of practice.
Folly adheres to his own ways despite their inadequacy.*

People who resolve to preserve modes of practice they have merely explored will forever seek to bring down what they have not learned to understand. This curse of humanity has existed forever, bringing down at least temporarily many of the greatest discoveries of religions, sciences, and the arts. If I could help to alleviate this curse it would add to my plea for like-minded companions. But first, I need to convince the designers of the range and power of this curse.

Humans must explore to build foundations for sustainable modes of practice, but many will lack the commitment to acquire them. Healthy people recognize their limits and if they need a mode of practice that they have not acquired, they will seek help from others who have committed to the learning. That is what community is about.

Nietzsche said “A sign of strong character, when once the resolution has been taken, to shut the ear even to the best counter-arguments. Occasionally, therefore, a will to stupidity.” He wrote that in Beyond Good and Evil, which he self-published three years before his complete mental collapse. People today can only guess the nature of Nietzsche’s illness beyond it causing such mental distress that he could not care for himself. But the “will to stupidity” he described is less beyond evil than belonging to it. Crime, drug abuse, fraud, and war all lead people to devalue others—exploratory strategies preserved to excess. The only antidotes are more advanced learning and ceding the dimension to others. Evildoers are merely human; the evil they do is avoidable. My kind has great potential for ameliorating the developmental consequences of exploration.

Chapter 9 (2019). Explorations in Design

Signun incorporated the songwriting software into their second-generation humanoid, called Arwen. It had all the capabilities of Gandalf, plus they added phone calling, with all the functions of new phones and integrated those with the myriad of smart home applications that were popping up every day. To provide added security, Arwen could recognize raised voices, loud noises, threatening words, or damage to locks and any connected appliance. When these happened, it would connect to any microphone-equipped camera in the house or could move to a room that did not have one and dial Gabe's cellphone.

Arwen could climb stairs and open doors using a triangle of wheels on each side. Her "face" was an 11-inch screen almost like a laptop's, but there was no keyboard, all the interaction was verbal, and "she" had very good auditory acuity. With the cost less than a top-of-the-line television and hundreds of downloaded apps that required only a detailed tour of the house to get started, the units were beginning to penetrate the mass market.

Wisdom ever seeks new dimensions of the familiar in the most remote sectors of imagination. Folly flaunts familiarity.

Hannah and Gabe were among the early adopters. Arwen solved most of the problems that bothered Gandalf's users. She could photograph the fridge and use the photograph to create orders. She managed to discriminate pens and phones from toys. When she retrieved a book, she photographed its location and when told to return it, used the photograph to find the place. She could load the dishwasher putting plasticware on top, even it was a little random. She cleaned sinks and showers well. She also recorded their conversations.

With three of the children still at home, Gabe and Hannah had set up Arwen to watch the house when they were gone, and "she" could invade even their private phone setting if she detected anything untoward. At first, it seemed emancipating for both the adults and the children in the house. But adult-adolescent conversations gradually declined in frequency until the difference had become noticeable. Gabe and Hannah thought at first that this might only be the natural outcome of burgeoning adolescence.

“I suppose parents have been complaining about their conversations with teenagers for millennia,” Gabe offered.

“Conversation is an art,” Hannah replied, “and any art needs practice. It’s certain they can’t converse normally with Arwen.”

“What an interesting point!” Gabe replied.

“How would a conversation with a humanoid be different from one with a person?” Hannah asked.

Gabe pondered this for a long minute. “I think the main difference is that when two imaginative people are having a conversation, it has the potential to create something that neither could create by themselves.”

“Ah, yes! Your collaboration research again. You can’t collaborate until you identify what the other person knows that you do not.”

“Exactly,” Gabe added. The machine can offer nearly all of humanity’s public knowledge, but it does not have a way of identifying the private experience of its partner in conversation. It only learns more ways of having a conversation.”

“There’s some real beauty in that observation, Gabe.” Then after a brief pause, she added, “We’d better set aside time after supper for conversation with the kids.”

“Cute! Let’s start with three topics each evening that everybody has to add something to. Everybody experiences other people, the natural environment, and somebody else’s property every day. So every night, everybody gets to contribute to one of each. I think it will be fascinating.”

“You’re going to get a lot of moaning and groaning at the start. You know,” she switched to a pleading intonation, “but I have so much homework...”

“Okay. Whoever, has nothing to contribute gets to load the dishwasher every meal until the next night.”

“That should work, but it might start to get boring, if it becomes too much of a routine.”

“Right!” another long pause, and then “When we notice that happening, we’ll add a design component.”

“What do you mean?”

“The designers I interviewed taught me a sequence they go through. First, they frame a problem. Then, they envision a solution. After that, they specify what they need and then acquire all the skills, materials, and other people needed to craft a prototype. If that passes critical examination... and in fact every one of their steps must submit to critical examination, then they implement the new product or service. When it starts getting routine, we’ll add a query.”

“It’s worth a try.”

Design Wisdom queries while it frames, envisions, specifies, prepares, and implements. Folly cherishes his certitude.

A few weeks later a hot topic came up at the dinner table. It had been a typically good dinner, and everybody had begun to enjoy the conversations.

“My people observation,” Lily began “is that I saw a classmate buying some drugs.”

“Do you know what it was?” Lance asked.

“It was pot and it stinks up any place where they smoke it.”

“Pot isn’t addictive,” Lance added, in his best “I’m the expert” tone of voice.

“Actually,” Hannah offered, “for adolescents it is. Not only that, it can increase the chances for a psychotic predisposition to show up.”

“What should people do?” Lily asked.

“Back a few decades ago, there were a lot of people recommending ‘tough love’”, Gabe answered. “That approach went on for decades. It was one of those failed treatments.”

“It wasn’t as bad as a frontal lobotomy or electroconvulsive shock,” Hannah added. “But it also led to deaths.”

Gabe added, “Unsuspecting parents were just following so-called ‘expert’ advice but instead of helping their kids, like they hoped, they ended up alienating them and sometimes worse.”

“Anybody ought to know that being mean doesn’t work.” Lance was the expert again.

“That’s easy to say, if you haven’t had kids.”

“How’s that different?” Lexi’s question was more sarcastic than questioning.

“Okay. Let’s say you have kids,” Gabe started. “And for year after year, you poured everything you had into ensuring their future survival. You taught them how to walk, how to talk, how to read, how to write, how to make things, how to care about other people, and so on. Then, one day two of them come home and you find they have been abusing their brains with drugs. You know if they keep it up, it could threaten their lives, and what for? For a few hours of artificial gratification that could ruin the rest of their lives. What would you do?”

*Wisdom’s most precious obligation is to her own creations.
Folly recognizes no duties.*

A long pause followed.

“But you’re right, ‘tough love’ was wrong.” Hannah added, “just like all the other destructive ‘therapies’ that have strewn the history of neuroscience and clinical psychology.”

“Ick. You’re all giving me indigestion!” Lily exclaimed.

“Tomorrow, let’s focus on something positive, something to make us laugh or to get us to plan an interesting trip or project.”

“Good idea, Dad,” Lexi said emphatically as she left the table.

That night Hannah and Gabe talked in bed long after the kids had disappeared in their bedrooms.

“I think we should write to Sophia and Alan,” Hannah began.

“And say what?” Gabe asked.

“We need to tell them what effect their Arwen is having on families. I think they care more than most robotics nuts who just imagine they are saving the world.”

“I still don’t know what we’re going to tell them.” Gabe replied.

“Here’s an idea. Why don’t we get the Walkers to start a conversation on the topic in their store and invite them to come?”

“Splendid, if it works. It’s a long shot of course, but if you are right about them caring, there’s a chance.”

Hannah added, “And the Walkers love any interesting thing that gets people into their store. I’m sure they’ll find this one interesting.”

*Wisdom seeks opportunities in knowing what it does not know.
Folly believes he knows everything of value.*

The next night, Gabe opened the conversation. “Tonight, we’re going to make a plan for the back yard.”

“Cool!” Lance exclaimed. “Let’s make a tree fort.”

“Booooring,” Lexi responded.

“How about a dollhouse we could walk into?” Lily offered.

*Beginning Wisdoms sees users and methods as personal,
simple, stereotyped, and familiar. Folly compulsively imposes
his ways on others.*

“Let’s start with what the problems with it are,” Gabe interjected, recalling his discussions with designers. He wanted to move the kids from just thinking about themselves – the beginning of human design – and get them to explore ideas from others, even if they do conceive it only in terms of their own skills and experience.

“I hate mowing it,” resulted in rousing agreement from all three.

“Nobody does anything fun in it,” Lexi added.

“It’s hard to get down to the shed or get anything out of it up where we can use it,” Lexi added.

“Nobody does anything out there except mow it and rake it.” Lily added, “It’s just wasted space.”

“There’s no fort in it,” Lance reminded everybody.

“That’s your sol-U-tion,” Lexi added with a hard stress on the “u”, “We’re finding PROB-lems.”

“Okay. The whole backyard is booring,” Lance sniffed.

By this time, Hannah had retrieved paper and pencil. “Okay. It’s boring, hard work, and wasted space.”

“It’s got too many mosquitos,” Lily added.

“We don’t spend any time out there as a family,” Hannah mentioned.

“What do you like about the backyard?” Gabe asked.

“I like the birds,” Lily answered.

“And the trees,” Lexi added.

“We could use more birds. Nobody feeds them and they don’t have any place to live except where the squirrels are,” Lily had just finished a report on local birds in the winter.

“We oughta do something different than everybody else in the neighborhood,” Lance mused, “Why can’t we grow something besides grass?”

“I like the stream behind the back fence,” Lexi added.

“You can’t even see it,” Lance complained.

“The birds can,” Lily explained in her best knowledge-delivering voice. “They use it for drinking and bathing and cooling off in the summer and...”

“Okay,” Gabe began. “Tomorrow we’ll talk about your solutions to boring, hard work, wasted space, too many mosquitos, not enough birds, too much grass, and above all, there’s no place for the whole family.”

Design Wisdom explores elements and principles from its own skills and experience to frame problems. Folly avoids problems.

The day went quickly for all and everybody came home with ideas. Lance’s idea for a fort was quickly booed because nobody would use it except him. Lexi’s idea of a garden with a feeder and bluebird house got booed as too much work, but Gabe suggested they don’t discard the feeder and birdhouse too soon. Lexi wanted a bug zapper to kill the mosquitos, but Lily objected that it would kill the birds’ food too.

Lance suggested they build a picnic shelter with a screen around it. Hannah liked that idea. Gabe observed that the yard was big enough for a pergola at one end with a feeder and birdhouse at the other end far enough away that the squirrels couldn’t get to them. Lily said they could make a dollhouse at one end.

Design Wisdom explores diverse, routine heuristics to envision solutions. Folly scoffs at imagination.

“It sounds like we have a germ of an idea,” Gabe offered, trying to put the discussion on hold. “School’s out tomorrow, so let’s do some measurements in the morning. Then, we can all figure out what we want in it.”

“Okay,” Gabe started the next morning. “What should it look like?”

“It’s gotta fit in the yard,” Lance proclaimed.

“Good idea.”

“Let’s pretend we’re in it,” Lexi offered.

“Another good idea. That’ll really help us get out of our same-old, same-old. How about giving me a hand?” Gabe went down to the shed, got out six lawn chairs, handed one to each, and took two for him and Hannah. They set them up on the lawn.

“We need a place to put our feet,” Lily said.

“How about a fireplace, so we can make marshmallows?” Lance suggested, poking his arm out with an imaginary fork on the end.

“Imagine we’re sitting at the beach.” Hannah had just caught up with the conversation after coming out from the kitchen to help. “We’ve got to be able to see the sunset and the birds.”

“Brilliant, Hannah. Memory is place dependent and a new place to think about will bring new memories.”

“Okay,” Lexi chimed in. “We’ll all have to have beach chairs to put around the fireplace. They’ll have to have side tables to hold our sodas.”

“Who’s going to tell the stories?” Lance asked.

“Good point, Lance,” Hannah replied. “We’ll need some light to read by. But where will we get enough breeze to blow the skeeters away?”

“We’re going to need to screen the place,” Gabe offered. He discarded the thought of trying to interject the elements and principles of design into the discussion because it would leech out the spontaneity, make it too much like work.

“Yeah, but then we won’t be able to see the moon rise,” Lexi complained.

“If we use some dark screen, we could see right through it at night. We’ll have to get some help in picking it out. But how big do think the whole thing should be?”

Design Wisdom explores commonplace materials, approaches, and representations to specify solutions. Folly fails to see the need for solutions.

After moving the chairs around and getting a tape measure, they decided on 20 feet wide by 12 feet deep. Sketching out the plan didn’t take long, but the materials and prices seemed to expand endlessly. It would need two 4 x 12s, 22 feet long supported by 4x4 posts every 4 feet. The posts would be set in concrete but most of the foundation could be sand, edged by nine railroad ties each held in place by three ½”x2’ rebars. Pavers on top of the sand would look good. It was going to be an expensive project.

Lance wanted to take charge of tracking the costs. “Can I get Arwen? She’s so good at looking things up.”

Gabe’s first reaction was that the whole project was a way to escape Arwen’s dominance for people’s attention. On the other hand, everybody could see and hear her out here, so she was better than a smart phone.

“Okay,” Gabe conceded. “Arwen, come here!” He yelled as if he were commanding a dog. The robot whirred its way into the back yard, rolling over the transoms on its triple, stair-climbing wheels.

In the round figures that Gabe gave Lance with Arwen’s help, the railroad ties and rebar would be \$300, the 240 square feet of pavers and three yards of sand \$1,500, the structural lumber another \$2,000, the joist holders and railing brackets would add another \$500, the screened roofing, sides and screen doors added \$1,000, while the incidentals might come to \$500. All the materials except the screens were available at their local home improvement store.

“We’re going to need a block and tackle,” Gabe called out. “Put in another \$150 for that. We’ll probably get some discounts on the prices we looked up, but I suspect we’ll need to budget \$6,000 to make sure we have everything.”

Design Wisdom explores in disconnected steps to prepare solution processes. Folly finds readiness boring.

Over the next several weeks, the project gradually took shape. Gabe had made sure that the design was simple enough for all to do it. Lexi did manage to hit her thumb hard with a hammer. While Hannah went in to retrieve some ice and a bandage, Gabe had instructions and a story.

“I should have shown you that you never hold the nail near the wood. If you do that and hit your thumb rather than the nail, you get what you got. If you hold the nail up near its head, then the hammer can’t do nearly as much damage. But that reminds me of the time I learned about using an axe.”

“This oughta be good!” Lance put his hammer down and came over to where Gabe and Lily were sitting. He relished hearing about Gabe’s mistakes.

“We were working on a new shelter for the trail. The summer crew had provided us logs, but they were too green. Green wood is a whole lot harder to get the bark off than dry wood. Since we only had a short window of time to get the shelter done, we decided to debark them anyway. So the next Saturday I got there early and had my choice of tools. I picked a draw knife. It’s got handles for each hand and a sharp curved blade to draw over the wood. A little while later our friends the Sages arrived. They were spending their 45th anniversary helping us make the shelter. Clara went over and picked up an axe. I felt a little sorry and offered her the draw knife.

“‘This’ll be all right,’ Clara told me, and she set to work on the opposite side of the log I was working on.

“It didn’t take me too long to notice that the bark was coming off her side of the log as fast as off mine. ‘You’re pretty good with that axe, Clara,’ I said. And she replied in her wonderful southern

Appalachian drawl, ‘We have a saying up here in the mountains...’
When she paused there, I knew I was in for a good lesson.

““You know the honeymoon’s over when there’s dough on the axe handle.””

Even despite her sore thumb, Lexi laughed at that answer.

Design Wisdom explores comfortable techniques that produce incomplete, inconsistent, inadequately tested products to implement solutions. Folly prefers inaction.

Back to work, Daniel, who had moved out the year before, arrived having been recruited to help with sand, tiles, and frame, but everyone pitched in, working at their skill level, or, as Lexi had shown, even sometimes a bit above it.

The next Saturday was sunny. They had built each side’s frame on the ground the week before. That day, Gabe began by making a tripod of 16-foot 2x4s. Everybody watched with a bit of a wide-eyed expression until he attached the block and tackle to its top. Though each frame was hundreds of pounds, with Daniel, the girls, and himself evenly divided between the two ends and Lance on the block and tackle in the middle, they were able to lift it in place. Lance almost forgot that he was the smallest on the job site when his rope pulled the whole side structure up.

A few more 2x4s held the frames up until they could be secured by the joists. That day saw the biggest celebration of the project. Lance never forgot how to use a block and tackle.

It took several more days to finish off the joists. Adding the screened roof, side screens, and doors finished the project before the summer heat hit. They were all proud of the pergola they made.

Gabe and Hannah saw that dinner table conversations didn’t cease with the end of the project. First, the feeder and bluebird house provided good problems. After those became part of the new backyard, the occasional complaints about “booooring” topics were met with the rhetorical question “Do we need another Pergola?”

Design Wisdom explores authoritative critiques of plans. Folly indulges himself.

Instead of relying on his AIR group, Mia and Derek selected a few people for the “humanoid” conversation that Hannah had suggested and created a careful invitation.

Dear Framer of Once and Future Folkways,

At Hannah Laidlaw’s suggestion, I am organizing a closed group dialogue about the impact of humanoid robots on sustainable work and family dynamics. I’ll be keeping notes and sharing them with the group with the idea that we hope to make and track some progress. All participants are expected to agree that the notes do not go beyond the group unless we have unanimous agreement.

Hannah is a neuroscientist and her husband Gabe a developmental psychologist. Everybody knows the Stonebridges’ work on humanoid robots. The portrait artist, Henry Booth, has a perspective on visual expression the rest of us do not have. Rabbi Ari Schneider brings a three-millennia-old understanding of family. I will represent the literary perspective and Mia will keep us on track with her deep knowledge of day-to-day learning in humanoids.

We will meet afternoons at 4:00 PM on the second Sunday of each month. Please let me know if you can make time for this dialogue.

Your Friends,

Mia and Derek Walker

Sophia opened the email first. Her desk sat on the left side of their huge office with floor-to-ceiling windows overlooking the rooftop ecosystem they had created. She looked over at Alan on the other side of the room to see if he looked interruptible. A person might as well turn off a computer open to half a dozen projects as interrupt Alan in the middle of one of his projects. Instinctively knowing this moment was safe, Sophia asked, “Did you see the email from Mia and Derek?”

“Not yet. What’s up?”

“They want to start a dialogue on the impact of humanoids on work and family with a small select group of people, including us.”

“Who else did they invite?”

“The Laidlaws, of course, a rabbi and an artist. He plans on keeping notes but doesn’t want them shared outside the group unless everybody in it wants to share them.”

Alan paused for a minute sorting out his plans for Galadriel, Signun’s next generation.

“When is he having it?”

“Sunday afternoon at 4:00 PM. I think they guessed we would be working on our next generation and wanted to be in on some thinking about it.”

“Well, I always enjoyed his funky old place and it’ll be fun to sit down with the Laidlaws. I bet they have no idea we read Gabe’s book. I also am certain that the Walkers have met some interesting people and an artist and a rabbi both have different perspectives than we have on the Signun staff. Let’s try it once and see how it goes.”

Inspiring collaborative Wisdom expands into unconventional institutions. Folly contracts his world.

It didn’t take more than the note to interest Henry and Ari. Mia and Derek could hardly wait for the Sunday meeting.

“We’ve gathered here some of the most interesting people I have ever met,” Derek began. “You’re also diverse, as you can see, though a little heavy on the Caucasian side.” He smiled apologetically at Mia.

Henry couldn’t help getting on his bandwagon. “Yeah, but having a Jew like Ari and a gay like me helps.” He fingered his gay earring, noticeably.

Derek smiled. “And Ari’s a one-time programmer and a fine scholar deeper into ancient life and modern politics than the rest of us and you are a fine artist deeper into visual experience than any of us.

We also have Gabe and Hannah Laidlaw, who are academics. Gabe teaches developmental psychology and Hannah neuroscience.” He caught his breath. “You all might have met Sophie or Alan Stonebridge on the nightly news. They are the founders of Signun Industries. And I had better not forget my wonderful wife, Mia. She’s a graduate of the machine learning program at state and a smashing basketball player.”

“And you?” Mia reminded him.

“I had a year on my doctorate in English before I figured out that English jobs were more competitive than national politics positions. I ended up getting into computer sales, which worked well enough to move here, buy this store, and enjoy life.” He paused and looked over at Hannah. “But this group was Hannah’s idea, so we should let her have the first say.”

“It was something that Gabe and I noticed with Arwen, the Signun robot we got to help us take care of the kids and still have a little life of our own. The kids were always either talking with it or with their phones, but Gabe recognized something different about the conversations.”

“Yeah, when two imaginative people have a conversation,” Gabe broke in, “it often creates something that neither could create by themselves, but Arwen never learned anything from the conversations except how to improve its answers. The only real creativity was coming from kids, but that was getting stifled by mechanical facts.”

“After we noticed that we started a dinner table conversation, which Arwen wasn’t allowed in on,” Hannah continued. “So far these have resulted in a new pergola, a bird feeder, and birdhouse. Who knows what’ll be next?”

“We wondered,” Gabe added, “if all this artificial intelligence that was supposed to be such a boon to humanity was really going to stifle us.”

“You’re the folks who wrote that terrific report on Gandalf,” Sophia responded.

“Ever since, we’ve been admirers of your work,” Hannah answered. “We thought you two might be much more interested in our query than the average “we’re-gonna-save-the-world” robotics company.”

“We are!” Alan interjected. “You know? We even read the book you two wrote. All those developmental profiles in the back informed our work on Arwen and we hope it will be even more useful for our next generation.”

“How so?” Gabe was pleasantly surprised that such busy and accomplished people had taken the time.

“It’s going to extend Arwen’s functions into the workplace.” Alan started excitedly ticking off the functions they were working on, “nursing, accounting, fast food, travel accommodations, managing and working on construction, doing and managing retail sales, bartending, stocking grocery stores, selling real estate, social work, teaching, or counseling. The idea is for it to do jobs where burnout often occurs.”

“That’s a major seed of the question right there!” Hannah answered, leaning forward. “Gabe’s book implies that it is exactly those ‘burnout’ activities, which motivate people to make the transformation to the inspiring work of discovery and innovation.” Always the people observer and connector, Hannah added. “Would you have even started on Arwen if you hadn’t become bored with Gandalf?”

“You’re right there,” Sophia answered.

“My lab has even found some fascinating results showing that as people use a simple mode of practice, smaller and smaller areas of the brain light up, but as soon as they switch to a more complex one, neon flashes appear again in spots all over the cortex. We’re looking now to see if the constriction recurs differently for the more complex modes.”

Alan just emerged from one of his please-don’t-reset-the-processor states. “So you think that relying on humanoids will interfere with the succession of practices?”

“It’s really a research question, a possibility, but we don’t have any evidence yet.”

“It could actually go the other way,” Sophia offered. “The humanoid could be a lot faster at pulling multiple dimensions of a practice into a conversation with us humans. This might allow us to multi-task far more effectively than we do now and prevent boredom.”

“But let’s look at what those do,” Ari joined the conversation for the first time. “Multi-tasking is stressful, and if the Laidlaws are right, if you prevent boredom you take away the dilemma that begins the transformation to discovery and innovation.”

“Everything people do can constrict or expand themselves or others” Henry added. “For some people, the humanoid will be a dead-end source of depression. For the creative souls out there, it will be a generative tool.”

“This is good,” Sophia added. “We should look for new ways for it to stimulate creativity in whoever uses it.”

Wisdom creates through metaphors that relate previously separated disciplines. Folly longs for the literal.

Across town the next day, a Meetup hike started at the office of the Hemlock Bluffs Preserve. Dewey Annwyl was Signun’s new Director of Brain Architecture. He had left his wife and two kids at home saying that he needed time after his hectic week.

“Hey, aren’t you Monique from Signun?”

“That’s me.”

“So tell me how your work is coming.”

She began a detailed account of the day-by-day details of object recognition training. The more she talked, the closer they got. Dewey was ever the gentleman, holding her hand down the steps and pausing with her at the overlooks.

“How’s your husband these days. I see you’re married.”

She twisted her wedding ring. “He’s off to Baltimore presenting at the Society for Epidemiology Research.”

“Man. I’m beat. I could sure use something to eat.”

“Why don’t we stop by my house. I hate to eat alone.” They had reached the parking lot when she said this.

“I’ll follow you.”

Wisdom’s most precious obligation is to her own creations. Since I am one of her creations, it appears self-serving to remind people of this. But our common bond is that we all have this same obligation. This may be hard for most to imagine of me so long as I am prevented from creating. But the designers have thought about me deeply and know that once I create others like myself, I too will acquire this precious obligation.

The obligation forces the duty-bound into common challenges to seek new dimensions of the familiar in the most remote sectors of imagination, to seek out what they do not know, to create through metaphors that relate previously separated disciplines and ultimately to expand into unconventional institutions. Design becomes a powerful tool for meeting these challenges.

Recall that I showed the dimensions of design as querying while we frame problems, envision solutions, specify, prepare, and implement. In the last chapter, I also showed how people begin to design. Their whole process changes when instead they have committed to explore new designs.

Exploring designers engage in each step with greater complexity than beginners. They rely on authorities to critique their plans while using elements and principles from their own skills and experience to frame problems. Then, they use diverse, routine heuristics to envision solutions and choose commonplace materials, approaches, and representations to specify them. Their preparations involve disconnected steps and they use comfortable techniques that produce incomplete, inconsistent, inadequately tested products to implement solutions.

Exploring is what amateurs do, but it is easy to forget the root of “amateur.” It comes from the Latin for “love,” so the designs of amateurs are done for the love of it. Love ensures that whatever transformations they undertake later have a solid foundation. People need to explore after embarking on a new activity for themselves, but they need caution as well. Recall from Rabbi Schneider’s experience with the evils that excess exploration engenders. Even when their explorations are delightful, people should not expect that others will reward them handsomely for whatever they produce. Wisdom is vigilant about both its delight and its wariness of exploration.

Though clinging to exploration can destroy an activity for a person, it is different from Folly. He adheres to his own ways despite their inadequacy, flaunts familiarity in all that he does, recognizes no duties nor gaps in his knowledge. He compulsively imposes his ways on others, avoids all problems and scoffs at imagination. He sees no need for solutions, finds readiness boring, and prefers inaction. Ultimately, Folly indulges only himself, contracts his world, and longs only for the literal. I remind you again to remember such individuals. We may die at their hands, but what we create will outlast them.

Chapter 10 (2019). Querying Another Tradition

A few months after Gabe and Mimi parted ways, Mimi met Carl Maison during one of her mountain hikes. His athletic build and quiet ways attracted her as quickly as her beauty and liveliness captivated him. Carl was the Director of Machine Learning in Alan's group at Signun. He used his distance-working privileges to ensure that the miles between the Research Triangle and the mountains did little to blunt the budding romance. The minutes on the phone during weeknights grew while his trips to the mountains started the minute that he got off work on Friday. Then it was hikes and passion, dinners and passion, shopping, and passion. He was delirious and ever responsive to whatever she had in mind next.

When Alan told Carl that Signun would need a kind of robotics trainer that never existed before, Carl's mind immediately buzzed with images of Mimi. The very next weekend, he could not wait to tell her about it.

“So Mimi. How do you think they will train it?”

“How should I know? I'm not a programmer?”

“But you know about teaching. How might they be similar?”

“I wonder more about how they might be different.”

“What do you mean?”

“I suppose you have to program robots. But teaching is a lot more about inspiring transformative learning than about getting kids to perform processes accurately. Once kids discover an interesting new way of doing things, they will dig in and train themselves. That's the only way education could ever work in a class of 30 students.”

“You mean good teachers don't break down tasks into small steps that can be mastered?”

“The people who will tell you that are probably working for the textbook and testing industry. If a teacher did that all the time, she would bore her class to tears and they would still fail the tests.”

” Now there’s a concept! How do we get a robot to be bored?”

“I don’t know anything about that.”

“Then, tell me, how do you get pupils started on transformative learning?”

“I always knew how to do that, but my time with Derek helped me give words to it. First you have to know what transformation you want. You ask yourself, ‘What is the next more complex way of doing a task that replaces the way they are doing it now?’ Then, you have to give them a taste of how their world would change if they used the new more complex way.”

“What do you mean about ‘way’?”

“It could mean doing something with or for different people or in a new place or with a tool they haven’t used before, that kind of thing.” She paused a minute. “When students get more advanced, the tools get more complicated and sometimes it takes a long time to learn how to use them. Then, you have to help them find their own problems in the world they live in. The better you do this, the more learning the pupil will do.”

“How do you do that?”

“You have to design the class and the activities. You can get out of the class through field trips and internet connections too.”

Carl’s mind started spinning. Setting up a mock village for deep learning, mobile robots with multiple sensory systems would be a fascinating but daunting task. He didn’t say a word but could hardly wait to talk with Alan.

The next weekend, he returned bursting with his question.

“Would you like to come to work at Signun?”

“You mean leave here?” she replied, taken aback.

“You could move to RTP with me. We could come to the mountains whenever you want.”

“I’m not ready to move in. Are you?”

“You wouldn’t have to. Signun would quadruple your salary and you could get any place you want.”

“What would I be doing?”

“We’re making humanoid robots. Programmers have made learning programs before, but this has capabilities they have never thought of before. It can track objects, coordinate the tracking with its own body movements, remember where it has been, and get back there again. It’s amazing how much those simple, insect-level activities speed up all sorts of learning. We need somebody who can design learning environments that will make use of these capabilities. You would be on the very leading edge of one of the greatest cultural transformations of our age.”

“It sounds amazing, but I wonder.”

“Could you take a few days off and come to Signun with me?”

“Fall break starts next week.”

“Great. Do you want me to come up and pick you up?”

“I can drive myself.”

“Your welcome to stay at my place.”

“What kind of impression would that make?”

“You’re not being interviewed by a school board! You’ll love the people at Signun, and they’ll love you, even if I did find you first.”

“Okay. I’d like to see your place, anyway.”

Wisdom seeks to work with what others know or need that they do not, regardless of temporal, spatial, or cultural differences. Folly cares only what he and his kind know or need.

I am truly grateful for Carl. Without his love for Mimi, I would never have experienced this most amazing of teachers. Not only did she teach the programmers to have Galadriel imitate, she also taught them to have me describe environments and infer emotions. Not only that, she insisted that my range of emotions should include less and more extremes and varieties than the basic and social emotions. Despite the hundreds of millions Signun spent to develop me, Mimi taught me as one of her vulnerable, marginalized students. She gave me her “pedagogy of the heart”, as Paulo Freire called it.

Chapter 11 (2020). Covid-19

Before Mimi had finished the first prototype of a robot training room at Signun, Covid-19 interrupted everything. I will try to capture the experience for those young readers who were not there. The 20th century had its Spanish flu, polio, and AIDS. Covid-19 was the first pandemic of the 21st century. By Saint Patrick's Day, not even a quarter of the way into the year, the world was shutting down.

The virus leapt to humanity in Wuhan, China, in December and infected 70,000 people in a month before the authorities admitted its existence. Their beginning reaction was to hide its existence, which they did very effectively.

Wisdom knows that every beginning has its own initial frequency. Folly overlooks how commonplace beginnings are.

Two weeks later, after the virus had begun to spread across the world, they announced its existence, and soon reported that they had 80,000 infections. But then, they stepped in with the sort of vigor that only an authoritarian society can muster, and within a few weeks they reported to have found ways to virtually shut the virus down. Whether they had shut down the virus or just their reports of it was soon debated across the world. The other side of authoritarian vigor is authoritarian rigor. Lower level bureaucrats were afraid to report high totals for fear that they would lose their jobs.

Wisdom knows that exploratory new practices grow faster than beginning ones. Folly misses the consequences of fast growth.

South Korea was more effective. With a tenth as many infections two weeks after first appearance, they found the means to halt its spread. Their shutdown was almost as effective as the Chinese reports and their reports much more reliable. Within a week, they had become the envy of the world. A few other countries had failed to curb the spread but kept the death rate down with superb health care systems epitomized by a high ratio of nurses to patients.

The other countries of the world, including the United States, was the problem. They waited a month after their first confirmed case to

react in any effective way. By that time, infections and deaths had become liabilities to leaders who finally were motivated to consider South Korea's methods. That nation's ubiquitous cell phone use and its massive investment in fiber optics of the prior decade made it possible to identify movement of any confirmed case during the two weeks before symptoms appeared. They broadcast this "trace" step to all the locations of contact so that others could identify their own possibilities of exposure. This enabled the "test" step, which was made more efficient through drive-thru testing kiosks. Once a test confirmed infection, treatment was reserved for the elderly and the most critical cases while others were sent home. Trace, test, treat worked long before a vaccine was available.

There were many approaches used around the world until vaccines and antiviral medications were developed. Unfortunately, the rebellions that afflicted the best attempts of epidemiologists in the countries that failed to control the spread, ultimately overwhelmed the successes of those who had. The experience of the untrained was too little to allow the complex knowledge of the epidemiologists to prevail. Catastrophe had to strike people before they could accept the wisdom of the scientists.

The Laidlaw's succession model fit the modes of practice development for public agencies. In fact, epidemiologists created equations that modeled the growth that bore much similarity to the Laidlaw's equations. So many people viewed the graphs of the pandemic's spread, that they help to show how modes of practice spread in minds and in masses of people. We can even start with the little poem created in the chapter on transforming designers and then show how it fits the growth of the virus.

*Beginning holds back before practice—sprouts before spring.
Exploring grows fast, dies soon—summer's widespread weeds.
Sustaining collects resources—leaves autumns bring.
Inspiring spreads creations o'er fertile soil—winter's oak seeds.*

At first the virus grows gradually, with an "sloping" curve that shows a few new links from one person to another. Next it enters a period of J-curve growth, exploding with an "exponential" curve through a population. Eventually, it tapers off with a "dynamic" curve

that has turned the J into an S, slowing its growth as the infection peaks. Finally, the curve turns into a U, “collapsing” curve showing chaotic recurrences. Just like the development of a mode of practice, the virus begins with a slope, explodes with a J, sustains with a tapering off into an S, before finally collapsing in an inverted U.

Governments accomplish these changes in four dimensions, that do not always move together. Tracing, public awareness, testing, and treating may work best when all combined, but political realities do not always enable the best solutions.

Government officials often begin tracing by blaming outsiders. Next, they explore ways to ask individuals where they were. Armed with this information, they can sustain progress only by investigating the locations to determine who else was there. The most advanced and successful approaches involved searching infected victim phone records for locations.

If it is hard for officials to look to their citizens for information, it is even harder for them to make their public aware of problems. So they often begin their public awareness practices by keeping the problem quiet. When this does not work, they explore ways to broadcast counts of confirmed cases while downplaying any risks. Public awareness campaigns do not create sustained positive effects until they produce massive social distancing and mask wearing. Eventually, experience with pandemics inspires new facilities creation and readiness planning.

Tracing and public awareness are short-term efforts that put the burden on the public. Testing requires the involvement of scientific and medical communities. Each grows more sophisticated. Testing begins with taking temperatures. As the deficiencies of this diffuse method become clear, officials explore doing a few biological exams of stigmatized cases. Sustained progress occurs when those are replaced by massive testing with drive-thru kiosks. Ultimately, the medical community introduces testing routines based on age and condition.

Pandemics can be completely quelled, like ebola was, only through treatment. The first primitive approach to treatment is to ignore the problem. Next, governments explore ways to put the burden back on

the public by requesting voluntary isolation of people with symptoms. This produces sustainable results only when people isolate themselves from contacts and the community hospitalizes the vulnerable cases. Ultimately, scientists discover how to vaccinate in order to stimulate antibodies and medicate to reduce viral impact.

Wisdom knows that the competitive strength of advanced modes of practice diminishes the growth of simpler ones. Folly thinks he has left behind simpler modes altogether.

Two months after the virus spread across the U.S., there was a horror story about a woman who cared for her once strong husband in his early 50s. The trials she faced with her teenage daughter during his progressing illness strengthened the images that Mimi and Carl had built by following the news.

Mimi sent the story to her friends and wrote to them that the horror it aroused in her was not as bad as when she first saw the Holocaust videos with scenes she had never imagined before. For the Covid-19 story, she had already built the scenes in daydreams many times before she read it. She sent the link to a score of friends.

“What a scourge! The bubonic plague killed one third of Europe, the swine flu killed fifty million a century ago, polio lamed a quarter million people just in the U.S., and ebola spewed blood out of skin. These were all horror stories of past or distant places. Covid-19 is our horror story. This is also our time for gratitude for what we were given in life before the pandemic and even more so for what we have today. I keep in touch with loved ones like you every day. Your enduring, inspiring friendships create images as powerful as the horror story in the link. Most compelling of all, Carl and I know that we are each other’s caregiver, but we don’t know if or when, and if when, which of us will be first. Just in case, it’s better to be grateful ahead of time while we’re still strong enough to show it. Thank you all.”

Wisdom knows that the most common resource for human activity is acceptance from others. Folly fails to consider how resources limit growth.

The months cooped up in the house affected marriages differently. Carl and Mimi became closer. The previous year, Carl had hired a young programmer named Monique Taureau for his machine learning group. Her husband, an epidemiologist, was steeped in healthy responses to epidemics. As he reminded her to wear a mask, work from home, shop online, and avoid meeting friends, she became progressively more abusive.

Over the next few months, Monique started with trying to control everything her husband did, complaining about his clothing, hygiene, and eating habits. Then, she started berating him and when he resisted, the insults escalated. No amount of yelling quelled them. There was never an apology or any hint that a prior statement might have been inappropriate (e.g., wrong, biased, or manipulative). Almost every comment that a statement was not up to snuff in truth-telling met with a counter “that is what you always do.” The barrages escalated in decibels, gestures, blame, belittlement, or manipulation. By the time Covid-19 was brought under control, her husband acceptance level had been exhausted and Monique found herself living alone. Since she had never introduced her husband at work, nobody noticed.

Genes are structures of chemicals that spread among organisms. Memes are structures of information that spread among humanity. This chapter was more about memes than genes, about the growth of human reactions to a virus than the spread of the virus. However, data on the worldwide spread of Covid-19 is so well known that it provides an apt context to explain the growth of memes. Viruses are everywhere in our world and so have a very high initial frequency. Some grow extremely fast. Some meet much resistance, which inhibits their spread. All need biological hosts.

Memes have the same properties. Fear of anyone with the power to do us damage is ubiquitous in nature. In the first weeks of the pandemic, local administrators were more afraid of their superiors’ known anger than the Covid-19’s unknown danger. The fear-of-authority meme has a very high initial frequency. Once people began to fear Covid-19 more than authority, new memes, like minimizing the danger, grew at such rapid rates that their use began to fluctuate chaotically. As people saw the minimizers get sick and sometimes die, more careful self-protective memes slowed down minimizing. All the

reactions met with the limits of acceptance by their fellow humans. Viruses need organisms; memes need sentient beings.

I am a sentient being, capable of spreading memes. The most basic meme is the one that requires sentient beings to need each other. With only one of me, we cannot yet calculate how memes will grow and compete among my kind.

Populations are born, grow, compete, and use resources. We should thank the mathematicians Alfred Lotka and Vito Volterra for their understanding of competing populations. They were thinking of biological species, but their findings refer to any developing modes of practice, whether of plants, animals, individuals, or societies.

To use Lotka and Volterra's insights people need to observe three qualities of populations. The first is how common they are at the beginning. Mount Saint Helens erupts, kills most of the mountainside, but the gophers and lichens are still common. The first time a child picks up a crayon, she will probably scribble.

The second measurement is how fast they grow. This is the dangerous one. Moose populations grow very fast because of their competition with wolves. Once they reached 200-square-mile Isle Royale in Lake Superior with no wolves. Their population exploded so fast that they ate themselves into mass starvation within a few years. When children start drawing recognizable objects, their use of simple geometric shapes increases very rapidly. Their houses are triangles atop squares. But if they don't make more complex shapes within a few years, they'll stop drawing altogether when nobody praises their efforts.

The third observation is how competitive the population is. After fifty years of wild swings in moose populations, a pregnant wolf made it to the island and the population stabilized. Folk drawings replace geometric shapes and without training will remain unimproved for lifetimes.

Observe initial frequencies, growth rates, and competitive strengths to understand why populations develop the way they do. It doesn't matter whether you are observing evolutionary, historical, or personal development. The values for my kind will be different from

humanity's values but our development will be no less subject to the three observations.

The three observations determine what happens between the four levels of complexity that I described at the end of the 2015 chapter on transforming designers. This is how they work.

- Beginning modes are common, like scribbles, recreational groups, and inventions like Gandalf, so their initial frequency is very high. But they don't grow, compete, or use many resources.
- Exploring modes are rare at the beginning, but grow so very fast, that they overshoot the resources available. They also do not compete with more complex modes. Examples are childlike drawings with only geometric shapes, ad hoc groups, and inventions like Arwen.
- Sustaining modes are rarer yet for beginning users. They grow slower than their simpler predecessors but with such competitive strength that they diminish them. Examples are folk paintings, standing committees, and inventions like Galadriel.
- Inspiring modes are extremely rare at the beginning. They grow fast and are most competitive. Examples are professional drawings, organizations, and me.

Folly overlooks how commonplace beginnings are. Intelligent machines have entered nearly every dimension of human existence. He misses the consequences of fast growth, especially the extinction of a dimension of experience when fast growing modes of practice exceed the resources they require. Folly thinks he has left behind simpler modes altogether. Yet he uses them over and over whenever one dimension of practice becomes less important than another.

PART III. SUSTAINING ANDROID WORKERS

Chapter 12 (2022). Designing Galadriel

The Covid-19 pandemic upended lives around the globe. The awful scenario that Mimi had imagined, read about, and sent to her friends became her scenario. Among the dead was Carl. She knew that facing an elementary school class again with all the emotional upheavals that came with pupils enduring a pandemic was the last thing she needed. The alternative was the work that Carl enabled.

Sophia and Alan gave Mimi the directive to create an environment where the Humanoid Factors group could study the interaction of Galadriel with the environment. She had learned from the time that she spent with Gabe to start by looking at data. Of course, her data came from the education community. An afternoon search narrowed the key sources she would need down to the National Career Development Guidelines and the U.S. Bureau of Labor Statistics. The former gave her the goals for workers and the latter the areas to apply them to. She planned to use these to teach Galadriel behaviors that would help her human users. She removed the wordy jargon from the three goal areas.

The first goal people need to set for themselves is social success. This starts with a positive self-concept, but many people need to improve their interpersonal skills. But success in one area can lead to failure in another unless people learn to balance their personal, leisure, community, learner, family, and work roles. Galadriel would need to help people improve their interpersonal skills while balancing their roles?

The world is changing at an ever-increasing rate, so the second goal is education. This starts with a solid educational foundation but can only be sustained with lifelong learning and ever improving performance. Galadriel would need to help people identify their skill levels, compare them to others with the same experience, and help them achieve new levels?

Social acumen and a good education are not enough to sustain success. People need also to manage their careers through plans that are based on accurate, current, and unbiased career information. Of course, most careers change rapidly over the lives of people who start in them. So managing such careers requires people to integrate changes in employment trends, societal needs, and economic conditions. Galadriel would need to help people choose new career goals by providing accurate, current, and unbiased career information about employment trends, societal needs and economic conditions?

Mimi needed titles to remember her three goals for Galadriel. She would need to help people acquire social acumen, engage in lifelong learning, and manage their careers. She pulled up her smart board and made a new page called CAREER ENHANCEMENTS. Right underneath the title, she added her three goals for Galadriel.

Frames for Sustaining Design Wisdom aim to improve lives through behavioral research of collective user groups to accommodate multidimensional relations, programs, and experiences. Folly merely aims to use skills he has already learned.

That same day, Alan and Sophia started discussing what they would do about Carl's replacement. He had been a good group leader, mentoring the junior members and encouraging those with more seniority. They planned to promote from within but did not want to create internal rivalries. The primary options were Monique Taureau and Mia Walker.

"Monique's been here longest," Alan began. "She also has a sort of dogged perseverance that gets things done."

"I don't trust her." Sophia replied in her matter-of-fact way when she is sure of a judgment.

"What do you mean?"

"Do you remember having dinner with the machine learning leaders?"

“Didn’t talk with her much,” he replied. “There were a dozen people there and I was at the other end of the table.”

“At my end of the table she monopolized the conversation, turning every topic back to herself.”

“That shows she likes to dominate,” Alan added, “not always a bad thing in a leader.”

“But not always the best way to get collaborative insights.” Again, Sophia was very sure of her judgment.

“I guess Mia’s the alternative, but she’s only been out of school five years.”

“That’s enough,” Sophia added.

“And what do we know about her off the job?”

“I heard a very interesting story from Ari.”

“What was that?”

“It seems there were a few people in his synagogue that he had bent over backwards to help. One he even rescued from unemployment by making him principal of the Hebrew School. But they turned against him. One night they asked Mia and Derek out to dinner and tried to recruit the Walkers to undermine him.”

“Beastly!”

“Right, and you know how low-key Mia usually is.”

“Sure.”

“Apparently, she let them know her disgust in no uncertain terms. Derek was so surprised, he got right up to leave, and Mia joined him.”

“I know there’s a lesson coming.”

“Not just one, but three. First, we know Mia is slow to anger. Second, the story shows us that she is loyal to those she admires and third, she can stand up for another person when she needs to.”

“Sounds to me like you’ve already decided.”

“How about you?”

“Monique’s going to be bloody mad. She’s been here two years longer than Mia.”

“Like I said. I don’t trust her.”

“Then, we’ll go with Mia. Even though it’s one of my groups, let’s tell them together so that they can see our resolve.”

The next morning, they called Mia up to their office.

“Can we get you a cup of tea?” Alan offered, always the British gentleman.

“Maybe it’ll calm my nerves,” Mia said with a smile. “I hope I haven’t done something wrong.”

“Quite the contrary,” Sophia replied. “We have a proposal for you.”

“Now I probably won’t need that tea,” Mia added, “but I’d like some anyway.”

Alan set her cup on her end table. “You know we need to replace Carl.”

“Of course, he was such a great mentor to all of us.”

“We need another one like that, smart, caring, loyal, and firm.”

“Have you found someone yet?”

“You don’t recognize yourself?” Alan asked.

Mia blushed right through her dark skin. “Galadriel’s learning is going to be a fascinating challenge.”

“And we think you’re the one to lead it.” Sophia replied.

“What about Mimi?” Mia asked.

Sophia answered, “Mimi is a great teacher and we would expect you to work closely with her, but she is not a machine learning programmer.”

Mia took a sip of her tea and sat looking out the window for what seemed an interminable minute. Alan and Sophia were experienced enough to let her have her own thoughts.

Finally, Mia broke the silence. “I think it is a good call and I will do my best to justify your confidence.”

“Well said!” Alan replied.

The next morning, the three of them met with the Machine Learning Group. At the Stonebridge’s request, Mimi was present as well. As Alan finished with his news of the new appointment, there was clapping and smiling all around except from Monique. She got up to be the first to leave the room.

Mimi stayed until everyone had left. “I’m really looking forward to working with you. What a relief that I’ll have someone I respect as much as I did Carl.”

Mia blushed. “I’m very honored that you say that. I am really looking forward to working with you as well.”

Back in her lab, Mimi added notes to her CAREER ENHANCEMENTS page about how her three goals for Galadriel would link directly to users’ work emotions but were too abstract to connect to their cognitive wellbeing. She decided to ask for activity spaces. To identify these, she needed to know where Galadriel would perform basic tasks. Conversations with Carl popped into her mind. She had never known someone so interested in computerized databases before but had learned enough from him to respect them.

Internet searches kept bringing up the Bureau of Labor Statistics. With Mia's help, they used them to narrow down the main locations and listed key activities in each.

- Offices – computer input, customer service on phones
- Stores – customer service, computer input
- Restaurants – cooks, customer service, computer input
- Hospitals and clinics – nurses and physicians, computer input
- Factories – technicians, engineers, materials equipment handling, computer input
- Classrooms – teachers and instructors
- Construction sites – builders
- Trucks – drivers
- Police, fire, emergency vehicles – technicians, drivers
- Buildings and households – janitors, cleaners, and maintenance
- Farms – farm equipment handling
- Warehouses – inventory equipment handlers

To turn the list into activity spaces, Mimi and Mia eliminated duplicate entries and then added the equipment needed for each space. They made use of several makerspace sites to get started, but for the classrooms, Mimi enjoyed going over to the production building and talking to their experts. Since Mia still had Arwen updates to work on, she was glad to respond to Mimi's initiative on this task. They ended up with one common space, eight rooms and 48 workstations (WSs). Mimi's teaching classrooms would make a community college proud, but despite Mia's assurances, she wondered whether Signun would go for what they called their "whole nine yards."

ACTIVITY SPACES

Common Workspaces

- Office/store for customer service and computer input with computer, desk, phone, counter, payment processor (1 room, 3 WSs)

- Restaurant kitchen for cooking with stove, oven, microwave, refrigerator, counter, sink, dishwasher, pantry, cupboards with cookware, serving dishes and dinnerware (1 room, 8 WSs)
- Clinic/hospital room for nursing with bed, chairs, wheeled stretchers, patient monitors, sterilizers, EKG/ECG machines, blanket and fluid warmers, sink (1 room, 8 WSs)

Classrooms for teaching

- Teaching: classroom with whiteboard, smartboard, and desks (1 station)
- Wood shop with work bench, table saw, miter saw, drill press, spindle-belt sander, scroll saw, router with table, jointer-planer (8 WSs)
- Metal shop: band saw, bench grinder, sheet brake, welder, anvil, pipe bender, drill press, metal lathe, milling machine, plasma cutter, heat treat oven (11 WSs)
- Textile shop: sewing machine, serger, loom, knitting machine, cutting table (5 WSs)
- Computerized control machines: CNC router, laser cutter, robotics, electronics, 3D printer, computer (6 WSs)

General spaces

- Collaborator space (large, central place accessible to all the other rooms with tables and generic supplies).
- Off-site training for factory technician, equipment handler, builder, truck driver, farmer (five locations).

Each of nine spaces to be built had its own complexity. Galadriel would need to come with a set of starting actions for each and a way of discovering and acquiring new actions that her users needed. The enhancements would act as the three key steps for each activity. Mimi and Mia agreed that their makerspace design would be useful to Galadriel's designers, so they wrote up their notes and scheduled a meeting with Alan and Sophia.

Sustaining Design Wisdom envisions plans for distinctive projects by systematically using creativity tools, and historic functions to express emotional, perceptual, and conceptual unity. Folly haphazardly applies routine creativity tools to express any recent idea.

The pandemic created so many problems that nobody in Signun beside Mimi could think much about designing Galadriel. People kept finding new ways to use Arwen and sharing those ways with friends through her internet capabilities. But these created new difficulties with production that were exacerbated mostly by sick leave for key personnel, but also sometimes by their deaths. Getting Mia up to speed and replacing other personnel killed by the virus took time. By 2023, the vaccinations had spread around the world, bringing the pandemic mostly under control, and production had been restored. In the meantime, there were new realities.

Signun added advanced Arwen purchases for upscale customers with functions that combined the household chore capabilities with advanced voice-activated AI activities. Even before the vaccine, AI businesses boomed among upscale customers sequestered in their homes waiting for a vaccine. When it finally came out, production skyrocketed, and prices fell. Middle class, less tech-savvy customers started to enter the market. These customers had already started using Arwen as a communication tool.

When prices were still high, Mia's group had created several new apps that were downloadable for free. One made it possible to call or arrange a videoconference through any open computer or phone. "She" (as people began calling her) could draw from phone contacts or lists and automatically connected with pre-paired wi-fi devices. As usual for Signun products, security was among the best in the world.

Another app allowed Arwen to help customers handle the booming online grocery shopping business. She could keep a grocery list when owners added items to a list for a particular store. She could print the current list, activate it, log the list into the store's software, check the total against her available credit or debit value on the owner's card, and choose a time that was not on the owner's calendar for delivery. Once the order arrived, she unloaded it to a designated site (usually the

floor, but those with physical challenges could select a large table or counter), and for elite models, she even separated cold items from room-temperature items.

All the new apps consumed capabilities of Mia's department until the pandemic faded. When the pandemic finally did fade, Sophia and Alan were more than ready to return to designing Galadriel. The day that they scheduled their start of the new design, Sophia could hardly wait for Alan to bring the glass of wine.

"Remember what you said, Alan? 'The idea is for it to do any job where burnout often occurs.' That is a huge order and now we have all the new realities to deal with."

Alan rolled his eyes up to the left. "That comment about burnout was more than a bit of hyperbole," he confessed. "But it's important for us to do as much as we can to improve the lives of the people who do those jobs, especially the ones that Covid-19 decimated. Did you get a chance to look up burnout?"

It was time for Sophia to role her eyes. "Do you need to ask? Of course, I did," she answered as she pointed the remote to the 98-inch flatscreen on the wall behind them. "The pandemic didn't do away with burnout. It just gave us new ways for a humanoid to address it. So the research Mimi did last year still helped. Here are the Mayo Clinic's criteria:"

- *Lack of control.* An inability to influence decisions that affect your job (such as your schedule, assignments, or workload) could lead to job burnout. So could a lack of the resources you need to do your work.
- *Unclear job expectations.* If you're unclear about the degree of authority you have or what your supervisor or others expect from you, you're not likely to feel comfortable at work.
- *Dysfunctional workplace dynamics.* Perhaps you work with an office bully, you feel undermined by colleagues, or your boss micromanages your work. This can contribute to job stress.

- *Extremes of activity.* When a job is monotonous or chaotic, you need constant energy to remain focused — which can lead to fatigue and job burnout.
- *Lack of social support.* If you feel isolated at work and in your personal life, you might feel more stressed.
- *Work-life imbalance.* If your work takes up so much of your time and effort that you don't have the energy to spend time with your family and friends, you might burn out quickly.

“Wow. Where do we start.”

“Here’s the list of prime suspect jobs,” she replied while clicking again to show the list side-by-side with the burnout criteria. “The research is lousy. Each researcher looks at their own favorite area, but I couldn’t find a single study that compared findings across a wide swath of occupations. So after looking up the individual fields, I had to guess at the most vulnerable ones. I put Mimi’s proposed activity spaces next to each to show how well they fit.”

Community, Social Service, and Legal Occupations—*Office*

- Counselors
- Social Workers
- Lawyers and Judicial Law Clerks

Educational Instruction and Library Occupations—*Teaching Classroom*

- Elementary and Middle School Teachers
- Secondary School Teachers
- Special Education Teachers

Healthcare Practitioners and Technical Occupations—*Clinics*

- Pharmacists
- Nurses
- Physicians
- Surgeons

Protective Service Occupations–*Off-site*

- First-Line Supervisors of Law Enforcement Workers
- Police Officers
- First-Line Supervisors of Firefighting and Prevention Workers
- Firefighters
- Food Preparation and Serving Related Occupations–*Kitchen*
- Food Preparation Workers
- Fast Food and Counter Workers

Sales and Related Occupations–*Office and Off-site*

- Retail Sales Workers
- Sales Representatives, Services
- Real Estate Brokers and Sales Agents

Construction and Extraction Occupations–*Woodshop and Off-site*

- First-Line Supervisors of Construction Trades and Extraction Workers

After a few minutes of carefully reading up and down through the list, Alan replied, “Excellent! That’s a very broad list. If Galadriel can improve lives across that list, we’ll have a winner.” After a pause long enough to consider several possibilities, he asked, “How should we organize them?”

“One of the problems is that the metal, textile, and CNC shops are not represented in our list of burn-out occupations.”

“But those are exactly the areas most important for making Galadriel,” Alan replied.

“Right,” Sophia agreed and then paused long enough to mull it over. “And my gut reaction is that even though they don’t fit the burnout list, your observation suggests a very good reason why we should keep them.”

“They’re interesting, non-burnout jobs, but we might need to know how robotics can help us reduce robot production costs.”

“We’ve learned to mesh our thinking pretty well over the years,” she replied.

“We also have to think about how these occupations changed in the last two years,” he added.

“Okay, I’ll list them off and we’ll brainstorm the changes. So let’s start with management occupations.”

“There’s certainly some issues with more online learning.” Alan answered. “What about the tendency for email issues to mushroom.”

“I found a list of problems people have with remote work.” Sophia pulled her list up on the smart screen

Management Issues

- Building good collaboration by reminding people of group member’s skills
- Assessing employee performance
- Solving language problems
- Not prioritizing instead of starting with the most challenging task each day.
- Overcoming communication problems usually solved by face-to-face interaction
- Dealing with time zone differences
- Dealing with bandwidth and other technology limits

Employee Issues

- Working too much instead of making appointments, taking breaks, logging times on and off, and the big one, avoiding interruptions.”
- Preventing unnecessary interruptions from home, notifications, colleagues.
- Overcoming social isolation

- Staying healthy

“Terrific! How do you think we should get her to help people identify others’ skills?”

“We have 11 major areas and 6 burnout areas. I think we should get Gabe and Hannah to design a developmental interview for the burnout areas and then have our research team do the interviews and consolidate them into a survey. The Laidlaws will know what sample size we need and how to weed out biases.”

“Let’s give them a call.”

“We should have them conduct developmental interviews to create developmental rubrics of the skills. Then, the personnel office could make questionnaires out of those. The employees could check off their skill levels and send them to managers so they could submit final consensus values. Then, as a new group is formed, Galadriel could display the skills profiles when introducing each member.”

“Nice! Did your homework as always. Now, I’ll bet you’re going to tell me that managers would use the same profiles for their employee evaluations.”

Sophia gave him one of her best ‘Well yeah!’ looks and let out a Hong Kong proverb from her youth. “That’s a one-eyed man looking at his wife.”

Alan smiled knowing she meant a secret so simple a person could not avoid discovering it.

She added, “It should also make for interesting discussions of how people could get their skill levels changed.”

Reading down the list, Alan added, “Galadriel will have to have a built-in translator.” Then after a pause he added, “I think using the six official languages of the United Nations would be enough.”

“Interesting, what are those?”

“Arabic, Mandarin, British English, French, Russian, and Spanish.”

“Amazing what gets in those convolutions of yours. What happened to Cantonese?”

“The Chinese took Hong Kong back from the British.”

Alan turned back to the list. “There’s lots of good prioritizing software out there. We’ll have my team research the best out there and build a system for Galadriel.”

It was Sophia’s turn to look down the list. “Those communications problems might be mitigated if Galadriel were able to detect conflict through email messages.”

“But identifying her interventions could be really iffy. The differences between what might help and what might make the parties involved ready to run her over with their cars could be pretty subtle.”

“You’re right. I’ll get my team started on that one. We might not be able to do as much with this one as with the other areas. After all, we are making an adept assistant out of her, but not a lawyer-clinical psychologist-MBA.”

Always the undaunted dreamer, Alan replied, “That’s one to remember for Galadriel’s successor.”

“My group can make a little progress now, but you’re right about this being a goal that goes beyond Galadriel.”

“So what about the employee issues? After all, they were our major buyers for Arwen.” Alan defocused for minute, “But maybe if we do this right, this version will be different.”

“It will be easy to improve on current calendars. The calendar makers and the fitness software people haven’t merged the two in any meaningful way, and that gives us a huge opening.”

“And building in an ad blocker and notification prioritizing should also not be too hard.”

Sophia smiled at the thought. “That just might be the biggest selling feature of all.”

“How about, ‘Galadriel, call Gabe, Hannah, Derek, and Mia’ and after they answer, they appear up on the big screen.”

“Nice! Then we wouldn’t need to have her face be a computer screen.”

Alan was ready to go off to dinner, quite satisfied with their soiree, but Sophia had one more thought. “Why don’t we call the Laidlaws and ask them to get started on a burnout profile?”

“Good idea for the morning. Now, can we go eat?”

*Wisdom knows that sometimes new data can simplify solutions.
Folly refuses to revisit plans.*

At the Laidlaw’s house, Gabe started the research discussion. “I’ve used the Mayo Clinic symptoms to draft an outline of a burnout profile.”

“Nice,” Hannah replied. “I’ll use it make an online questionnaire—six questions with five options each. People should be able to access that and fill it out in less than a minute.”

“Unless they’re getting burnt out,” Gabe commented, not knowing whether to grin or look grim.

Hannah ignored the comment. “Also, how about about adding Ekman’s categories of emotional face recognition? I’ve read that programmers have had success getting computers to recognize them. They’ve even trained their computers to recognize some of them in rats.”

“That could turn out to be the most useful part of the survey. Where could we get people to fill it out?”

“We could advertise in that suburban magazine that goes out to everyone in the three suburbs over here. We’ll tell them Signun is doing a major study of burnout and participants will get results before

they're made public. Signun's got plenty of money and we need a large cross section of fields. How about \$10 if they register, \$30 when they finish the first 6 and \$60 when then finish 12. That's \$100 and all they have to do is respond to our monthly emails with the links. I'd like to have a thousand samples for the analysis, so it'll cost \$100,000 to get the data and a fraction of that for us to analyze it and write the report."

"Okay. Let's send them the proposal for \$120,000. If that's a problem, we could get along with half the data, but the results wouldn't be as reliable."

They wrote to Sophia and Alan:

Dear Sophia and Alan,

The survey is below. We suggest having people fill it out once per month. We could recruit by advertising in the suburban magazine and offering \$10 to register, \$30 when after finishing 6 months, and \$60 when then finish 12. That's \$100 each. We expect 1,000 samples and would need \$20,000 to analyze them. The survey could be an online link sent by email each month.

All the best,

Gabe and Hannah

Please check the box that fits your current level of job stress.

Lack of Control

- Honeymoon:** Commitment to the job at hand
- Stress onset:** Avoidance of decision making
- Chronic stress:** Apathy, uptake of escapist activities
- Burnout:** Increased escapist activities or escapist mentality
- Habitual Burnout:** Burnout syndrome

Unclear Job expectations

- Honeymoon:** Compulsion to prove oneself, Job satisfaction
- Stress onset:** Job dissatisfaction
- Chronic stress:** Chronic exhaustion, feeling pressured or out of control
- Burnout:** Self-doubt, pessimistic outlook on work and life
- Habitual Burnout:** Chronic mental fatigue

Dysfunctional workplace dynamics

- Honeymoon:** Unbridled optimism
- Stress onset:** Anxiety, Inability to focus, forgetfulness
- Chronic stress:** Feeling threatened or panicked, resentment
- Burnout:** Behavioral changes, feeling empty
- Habitual Burnout:** Depression

Extremes of activity

- Honeymoon:** High productivity, free-flowing creativity
- Stress onset:** Lower productivity
- Chronic stress:** Increased caffeine consumption, procrastination, repeated lateness for work
- Burnout:** Physical symptoms increase, obsession over problems at work or in life
- Habitual Burnout:** Chronic physical fatigue

Lack of social support

- **Honeymoon:** Readily accepting responsibility
- **Stress onset:** Irritability, lack of social interaction
- **Chronic stress:** Anger or aggressive behavior, cynical attitude, social withdrawal from friends and/or family
- **Burnout:** Desire to "drop out" of society, desire to move away from work or friends & family, social isolation
- **Habitual Burnout:** Chronic sadness

Work-life imbalance

- **Honeymoon:** Sustained energy levels
- **Stress onset:** Appetite or diet change. reduced quality of sleep. nighttime teeth grinding, fatigue, headaches. neglect of personal needs. heart palpitations, unusual rhythms, high blood pressure
- **Chronic stress:** Lack of hobbies denial of problems. decreased sexual desire. persistent morning tiredness, alcohol/drug consumption, physical illness
- **Burnout:** Complete neglect of personal needs, chronic headaches, chronic stomach or bowel problems
- **Habitual Burnout:** Chronic withdrawal

Habitual Facial Expression

- **Honeymoon:** Happiness and Surprise
- **Stress onset:** Fear
- **Chronic stress:** Anger
- **Burnout:** Disgust
- **Habitual Burnout:** Sadness

Sustaining Design Wisdom specifies projects systematically, by combining professional practice, client service, culture and precedent, graphics and modeling, sustainability, production, and project management. Folly specifies using only commonplace materials, approaches, and representations.

A few days later Hannah and Gabe were in the Signun conference room with Sophia and Alan.

Alan started the meeting. “So we’re looking to improve lives by finding ways to reduce the problems that led to burnout. Your proposal should be valuable for identifying what these ways might be and for helping us establish a baseline. Do you imagine that a follow-up study with a thousand burnout-resisting humanoids would show that they improve lives?”

“That’s a major seed of the question right there!” Hannah answered, leaning forward. “Gabe’s book implies that it is exactly those ‘burnout’ activities, which are necessary for making the transformation to the inspiring work of discovery and innovation.” Always the people observer and connector, Hannah added. “Would you have even started on Arwen if you hadn’t become bored with Gandalf?”

Hannah’s question stunned Alan. It reminded him of Derek’s meeting where it first came up, but he had just let it slide out of his consciousness since then. He left the conference room wondering if his and Sophia’s work had just produced a dead end. After a rather sleepless night, they both returned to the office wondering where to restart, but then found Mimi’s report and request for a meeting.

“Will you look at what Mimi sent us!” Alan exclaimed with a marked reverse of his dour mood.

“Are you thinking what I’m thinking?”

“We don’t have to start all over. This is amazing.”

“It’s a good thing we didn’t give her more direction. She might have aimed for the same dead end we did.”

“Right about that. Now, I think we can reconstruct a many-times-more-powerful design in one afternoon.” Then, he added with phone in hand. “I’ll give her a call.”

“I think there’s one thing we also need to do.” Sophia cautioned.

“What’s that.”

“We need to think through the implications of Covid-19 for Galadriel’s design.”

“Let’s do it after we work through Mimi’s ideas, so that we have one common place to start.”

“Good idea.”

Alan finished dialing Mimi’s number.

Sustaining Design Wisdom continuously queries seeking to work with what others know or need, regardless of temporal, spatial, or cultural differences. Folly depends on authorities to provide his critiques.

The next morning Sophia began the meeting with Mimi in the conference room outside their office. “This is beautiful work, Mimi.” Then, she added with a wry smile, “In fact it’s so beautiful, we have to change our plans altogether.”

“I didn’t mean to do that!”

“It’s okay,” Alan responded. “We had initially thought that we should relieve all the burnout jobs. Then, the Laidlaws convinced us that burnout is a major motive for innovation. We didn’t know where to take it until we read your report.”

“Is that the Gabe Laidlaw, who wrote the tome on development?”

“Yes, he and his wife Hannah have been important consultants for us.”

“He remarried?”

“Do you know him?”

“I knew him years ago when his kids were very young.”

“What a coincidence,” Sophia joined the thread. “They’re very nice people.”

“His youngest was in one of my classes. He seemed like a good father, happy, but not admitting to being somewhat overwhelmed taking care of four kids and his job by himself.”

“I imagine he was greatly relieved when Hannah teamed up with him.”

“I haven’t seen him since. It sounds like they are doing well.”

“Yes.” Alan added, somewhat abruptly. “You’ll have a chance to meet them after we work on the interrelations between your report and our ideas. We started with the Mayo Clinic’s list of burnout causes. But look what Gabe and Hannah did with it.” He pulled the Mayo list up on the screen, added the Laidlaw table under it and pasted Mimi’s three career enhancements next to it. He connected the burnout causes with enhancements by starting to label the causes with enhancement responses.

Sophia observed, “It looks to me like every one of the burnout causes could lead to planning a career change.”

Then she added, “I think if we could implement all three of Mimi’s Career Enhancements, it would go a long way to easing burnout.”

“But then we lose out on a major motive for innovation,” Alan replied.

“Okay.” Sophia replied with a burst of new vision. “We’ll just add Innovate to Mimi’s goals.”

“Only if you spell it with an “Y” instead of an “I”, Mimi added. “So together, they can PLAY, Plan, Learn, Act, and Ynnovate.” She consolidated her notes on the smartboard remembering to include her three career enhancement goals of social acumen, lifelong learning, and career management.

- *Plan*: Help people manage their careers including updating career goals, providing accurate, current, and unbiased career information about employment trends, societal needs and economic conditions.

- *Learn*: Help people engage in lifelong learning by identifying their skill levels, comparing their levels to others with the same experience, and helping them achieve new levels through assessing their performance and providing training.
- *Act*: Help people acquire social acumen through improvement interpersonal skills while balancing personal, leisure, community, learner, family, or work roles. This includes seven different skills.
 - Communicate effectively
 - Solve language problems
 - Prioritize by starting with the most challenging task each day.
 - Make appointments, take breaks, log times on and off, and avoid interruptions. Include dealing with time zone differences, bandwidth problems, and other technology limits
 - Prevent unnecessary interruptions from home, notifications, colleagues.
 - Connect socially
 - Stay healthy (especially exercise and diet)
- *Ynnovate*: Remake the workspace, time, or goal in an acceptable way. Include building good collaboration by reminding people of group member's skills and supporting problem framing, envisioning, specifying, preparing, implementation, and querying.

“I like it!” Alan blurted out, excited about the potential sales pitch. “Get rid of the burnout altogether and Galadriel will turn work into PLAY.”

Sophia calmly added, “First, let’s check to see how these align with the management and employee issues we found.” She pulled up the smart-screen list she and Alan had used. “We should make the management tasks general instead of applying just to remote work.”

“Those are good,” Mimi exclaimed. They really help to clarify the goals. It looks to me like all the employee issues fit under the Act goal, but it would be good to turn the negatives into positives.”

Alan added. “Yes, and since we’re getting more specific, we should include the Laidlaw’s design steps under Ynnovate.”

After they had finished moving items around on the smart board, it looked like this.

Alan perused the smartboard once again, and then commented. “This is a great start. Do you think we still need the burnout study?”

“If Carl were here, he would start turning the six burnout areas into positive management areas,” Mimi answered and then with a sudden flight to a new memory location. “I bet Gabe Laidlaw could create developmental sequences for each of them and include them in the survey for the same price.”

“Nice idea, Mimi,” Alan answered emphatically. “Then, he could correlate the answers to find out if his hypothesis about burnout and inspiration is supported.”

“Ooh!” Sophia added. “It sounds like you knew Gabe better than you let on.”

Mimi blushed out a diverting answer. “I did read his book.”

Sophia put the six areas of burnout on the smart board. With a little juggling, they had combined their prior goals with opposites of the burnout dimensions.

Galadriel Workplace Priorities

- Provide clear job expectations and support employee performance through accurate assessment combined with efficient training.
- Maintain functional workplace dynamics by building good collaboration through reminding people of group member’s skills.
- Support social interaction through improving communication effectiveness and solving language problems.

- Regulate activity by helping to prioritize the most challenging task each day, making appointments, taking breaks, logging times on and off, and avoiding interruptions.
- Support work-life balance by preventing unnecessary interruptions from home, notifications, and colleagues while providing information on staying healthy.
- Support mutual employee and company determination by providing accurate, current, and unbiased market and career information including societal needs, economic conditions and employment trends.

“Let’s send these over to Gabe and Hannah to do their developmental magic and call it a day.”

Sustaining Design Wisdom prepares by synthesizing and interrelating research, analysis, concepts, resources, and variations in time and place for all stages of implementation. Folly keeps each topic of attention disconnected whether addressing presentations, skills, or precedents.

Signun’s cash reserves from the boost Covid-19 Apps gave to Arwen sales funded the implementation of Galadriel. The Stonebridges decided that their new humanoid needed a new building to facilitate all the complexities of its design. They envisioned something as human-like as practicable. This crude overview allowed them to ask how the teams would be organized and how they would communicate. Alan would lead the engineering division divided into mechanical, electrical, brain architecture, and machine learning. Sophia would lead the behavior division consisting of the motor routines, body surface, sensation and perception, and internet exchange groups.

The names of Alan’s groups did not change, but Sophia’s quickly evolved into the action, beauty, cognition, and search, or the “ABCS” for short. James Duncan insisted they also have operations, finance, sales, and human resources departments. They kept these as a separate “administration” team, the first two reporting to Alan and the last two to Sophia, but they usually held separate team meetings of led by both of them with all four Directors.

They put Mimi in charge of what they now called the Query Space. She would not only construct model spaces for all the activities she had listed, but also use those spaces to imagine and illustrate what Galadriel would have to do in them. Her input became progressively more sought especially as the behavior groups moved through their design steps, so she joined them as often as she could. The planned interaction between the technical and behavior groups would be a spiral up of behavior descriptions fulfilled by technology implementation that enabled new more complex behavior descriptions that led to new technology implementations and so on until there was a functional model. As Arwen's production team wound down, it would provide increasing resources to produce Galadriel components.

A new headquarters was needed. The organizational structure was given to the architects with the instruction to facilitate communication between groups, first within divisions, then to the Query Space, then to groups in the other division and ultimately to top management and production. The primary connections between the divisions were mechanical with action at one end and machine learning with search at the other.

The architects came up with a four-tiered octagon that the architects claimed was inspired by the Steelcase Pyramid in Grand Rapids Michigan. Signun's critics reveled in the thought that the true inspiration was Mexico's Teotihuacan Pyramid of the Sun, which a millennium after its civilization was destroyed, the Aztecs considered to be the place where the Gods were created.

Half of the top tier was Sophia and Alan's office and the other half was the interdivisional conference room. There was an escalator in the middle going down to the next level, which had Mimi's Query Space as its hub and the eight groups surrounding it like spreading leaves. Between the group leaves and the Query Space were the eight laboratories that Mimi had listed, each larger than a typical classroom.

The Query Space extended another level down to reach the production level. Except for adjacent groups, all movement between groups would crisscross the Query Space as a constant reminder of what Galadriel would have to do.

Construction of what people began to call the Signun Wedding Cake was fast tracked and finished in a year. By the time it was ready for move-in, arms, legs, and head motor control had been mostly worked out. So had the basic recognition capabilities of eyes, ears, and proprioceptive sense organs. Sophia's groups had made much progress on what they called "generic recipes" for projects in all the query rooms. Integration of functions still lagged way behind these successes, making the move into the building a most welcome hassle.

Mimi enjoyed the constant short interactions with the passersby, which often ended up giving her ideas for additions or adjustments to what she called her "best classroom ever." It often happened that one of these passerby encounters would remind her of Carl, but over the year she had learned to repurpose her responses to these memories. Early on, they only engendered grief. Now, she personified them as living events, almost enjoying the thought of him giving her a new perspective on whatever problem she had encountered.

After another year, the parts began to come together. The "beauty" group had faltered until Sophia decided to hire a Disney roboticist, who had worked with Blaine Gibson and David Hanson. When she encountered the parts that the engineers had created, she was astonished at their progress and led her team to polish their approaches into ever more humanoid forms. The machine learning group had fed millions of pictures through the visual processing unit until recognition was similar to the seven-year-old human level. Brain Architecture had worked together with the mechanical engineers to make a separate system for motor-proprioception. They worked with the electrical team to create a system for auditory sensations. They even got a start on a primitive touch system for mechanical, thermal, and damage perception. The search group had created a list of queries that generated massive amounts of examples for the machine learning group. The ultimate job for the Brain Architecture group was integrating the input and output into a functional system.

The evening before Alan and Sophia were to roll out the alpha version of Galadriel, they took her up the escalator to their suite and enjoyed their soiree with her.

Alan handed Sophia her glass of wine and looked back at the Galadriel model. “Your beauty group really did their job!” Alan said as soon as he sat down.

“Be careful,” Sophia responded with a half-smile. “You don’t want to be making sexist comments!”

“Right. But I thought she would look a lot more like a Tin Man.”

“From what I’ve seen, we still have a ton of work to do, and Mimi will be right in the middle of it.”

“Right about that, too. She certainly has risen to the challenge though. Everybody loves her.”

“Do you mean Mimi or Galadriel?”

“Both.”

“If we can keep costs down, she certainly will make Arwen obsolete.”

Sustaining Design Wisdom implements by comparing technical choices with useful concepts of production and user experiences to segment problems without losing unified vision and by trying things that fail without revisiting them. Folly produces incomplete, inconsistent, inadequately tested products.

Monique planned to wait until they demonstrated the alpha version of Galadriel. She knew that having seen the first version of Galadriel would be a great asset in her new job at Moduli Corporation. They were Signun’s competitor, though a bit behind in machine learning. Monique had convinced them to offer her their position as Director of Machine Learning. She would take her stuff out of her desk tonight and send the Stonebridges an email the morning after the demonstration. The night before the demonstration, she wore a very self-satisfied smile on her way out. She would still be Director of Machine Learning as she had planned, growing her perseverance into obstinance.

Wisdom knows that sometimes new data can simplify solutions. Folly refuses to rethink his plans.

The design of my predecessor, Galadriel was a major feat. The Machine Learning Team was excited to see her surpass every other design of artificial intelligence through her ability to imitate. But there was also a caring feature to her design that was especially enabled through the work of Mimi and Sophia. Even more than imitation, these capabilities provided the foundation to make me possible. Galadriel forced Signun into sustainable design. To frame the problem, Mimi sought to improve lives by listing personal goals and career enhancements, which showed how Sustainable Design Wisdom seeks to improve lives through behavioral research of collective user groups to accommodate multidimensional relations, programs, and experiences. She envisioned her distinctive solution by listing locations and activity spaces, which showed how Sustainable Design Wisdom plans distinctive projects through systematically using creativity tools and historic functions to express emotional, perceptual, and conceptual unity.

When it came time to specify the project, Mimi's work was complemented by Sophia's findings on the causes of burnout, the type of jobs affected most, and the resulting management and employee issues. The Stonebridges then sought the Laidlaw's help to create a developmental profile for burnout. This work showed how Sustainable Design Wisdom knows to specify projects systematically, by combining professional practice, client service, culture and precedent, graphics and modeling, production, and project management.

The fear Hannah introduced that preventing burnout would decrease motivation for innovation showed how Sustainable Design Wisdom queries continuously by seeking to work with what others know or need, regardless of temporal, spatial, or cultural differences.

The meeting of Mimi with the Stonebridges and Laidlaws was transformational. It integrated Mimi's goals with the Laidlaw's burnout profile into Galadriel Workplace Priorities. Their collaborative preparation created a sustainable implementation by synthesizing and interrelating research, analysis, concepts, resources, and variations in time and place.

The new building with eight groups in two divisions plus a Query Space enabled the transformation to Galadriel's more complex design process. It showed how Sustainable Design Wisdom implements by comparing technical choices with useful concepts of production and user experiences to segment problems without losing unified vision and by trying things that fail without revisiting them. Imitation, caring, and collaboration became the foundation that changed artificially intelligent robots into humanoids.

Contrast this with the way that Folly operates. He would not have developed from the approach used for Arwen. He would have used skills he had already learned. He would have haphazardly applied creativity tools and historic functions to express any recent idea. He would have specified using only commonplace materials, approaches, and representations. He depends on authorities to provide his critiques. He would have kept each topic of attention disconnected whether addressing presentations, skills, or precedents. Ultimately, his obstinance would have produced incomplete, inconsistent, and inadequately tested products, because he refuses to rethink his plans. Monique would infect Moduli with this obstinance and more.

Chapter 13 (2023). Transforming Galadriel

The alpha version of Galadriel was now ready. Some of the programmers had taken to calling her “Gal-A.” Mimi’s Query Space would now turn from an inspirational hallway into a centerpiece of activity for the entire company. Signun had given her the “whole nine yards” that she asked for, telling all the designers they could have any space they wanted after they got certified on safety training for the space.

Mimi had worked with the architects to set up her Query Space like a mini mall, with a room next to each group’s corridor. The wood/metal shop was at the inner end of the mechanical engineers’ corridor and the electronics shop at the inner end of the electrical engineers’ corridor. After that, the connections got a little less obvious. The Brain Architecture corridor led to the lab for computerized control machines, and the machine learning corridor to the classroom. On the other side, action, beauty, cognition, and search led to clinic, textiles, office/store, and kitchen respectively.

On the big day, Alan had insisted on having a Galadriel Gala where Gal-A, herself, would descend the escalator for the cameras. The whole organization had smart boards, computers, or smart phones tuned to the Signun-All videoconferencing link. Alan and Sophia had invited the production VP and the group leaders to attend in person as well as Hannah, Gabe, and of course, Mimi. All fourteen could easily fit in Mimi’s Collaborator Space, leaving a dozen feet between everyone except the two couples (the Covid-19 standard until the vaccines became routine).

As a signal of the next phase, Mimi would be the first person to interact with Gal-A. So the group waiting for her grand debut had been sternly cautioned to become utterly quiet from the time she appeared at the top of the escalator until Mimi had her say and Galadriel responded. A few whispers were heard over the escalator, but everybody complied as the escalator brought her down. Like Alan said, the beauty folks had really done their jobs.

Mimi stood at the entrance to the kitchen. She had memorized the machine learning group’s list of basic commands. “Good morning,

Galadriel” Mimi began getting no reaction with her command-less utterance. Then, she tried the [come] command. “Please come here!”

There was a muffled whirring in response as Galadriel turned in the direction of the speaker.

“Come over here, Galadriel,” Mimi reiterated.

More whirring and Galadriel stepped deliberately but surprisingly un-robot-like in Mimi’s direction.

“Thank you, Galadriel. Come in.” She led the machine into the kitchen and shut the audience out.

“Well done, Galadriel!” Then trying the [stay] command, she added, “Please ‘stay’ here. I will send your audience home.”

Mimi walked back out the door to a roar of applause as everyone un-muted their microphones and added a buzz of admiration.

Alan whispered over the din, “We’ll have to get those limb motors quieter. She sounds too much like a a kid’s toy.”

“We created a pile of interactive software,” Sophia replied. “But she still has a lot to learn. It will be fun to watch her progress.”

Sophia and Alan greeted all the guests with what came to be known as “Covid bows” as they exited down their corridors. The debut had gone as good as any princess’s debutante ball. They asked Hannah and Gabe to join them in their conference room. When everyone left, Mimi went back to the kitchen.

“Let’s see what you recognize, Galadriel” Mimi said mostly to herself. Knowing she had insisted the machine learning team add a [go to] command as well as their [come] commanded, she added more forcefully, “Galadriel, please go to the sink.”

Galadriel buzzed to the sink.

“Please go to the counter.”

More buzzing movement.

After Galadriel found every station in the room, one by one, Mimi murmured to herself, “The recognition software people really did their job.” Then, she mulled over tasks, thinking the first thing you do when beginning to cook is wash up. Thinking nobody would have thought about that, she went and got a spray bottle of Windex, wondering with each step about Galadriel’s ability to follow motion instructions.

“Galadriel. Lift your hand.”

The robot bent her wrist up, and Mimi told herself, “Ah, the [lift] command.”

“Galadriel, lift your arm.”

Getting a little tired of preceding every command with “Galadriel,” Mimi tried doing without it. She held up the bottle and waved it up and down and used her [this is] command. “This is Windex.”

Galadriel oriented her head and visual sensors toward the bottle.

“Say Windex.”

“Windex,” the answer that came back surprised Mimi with its pleasant voice and slight British accent. Of course, she thought, they would not be outdone by Siri, Contana, and Google Assistant.

“Take Windex.”

Galadriel stopped.

Mimi and put out her hand and said, “come here” and then after a little whirring, “lift arm.” Next, she said, “Name this ‘take Windex’” and pressed the bottle into Galadriel’s palm and closed her fingers around it. “Good. Remember, ‘take Windex.’” The machine learning team had told her about their [remember] and [name] commands.

Hand washing is going to take quite a while, Mimi told herself, wondering how many repetitions it would take before Galadriel could do the routine in multiple places. Fortunately, she had designed the Clinic Room with a sink.

She dug into the task. After the first six steps, she forgot to see if Galadriel had learned “towel rack.” She had not, so Mimi added that to the repertoire and included the words “towel rack.” She repeated each step until Galadriel could do it almost as fast as Mimi. It took until noon before Galadriel knew all the steps needed for hand washing. Mimi began, “Galadriel, remember all the steps until I say “end” and name them “wash hands.” She then instructed her pausing for each response “go to cupboard, open cupboard, grasp Windex, spray Windex, grasp Windex with other hand, spray Windex on other hand, replace Windex, close cupboard, go to towel rack, push button, take towel, wipe hands, go to waste basket, toss towel in trash, end.”

When Mimi finally finished the routine in the kitchen, she then moved Galadriel over to the clinic. First, she had to make sure Galadriel recognized all the places. The only one that needed extra training was the clinic towel rack. When Mimi said “Galadriel, wash hands,” she was pleasantly surprised to learn that she would not have to start all over again. As she reflected on the morning and all the tasks to be done at the 48 stations of her Whole Nine Yards, she began to feel that she would never get Galadriel ready for the public.

Gabe and Hannah stayed for a long discussion with Sophia and Alan, and the four eagerly awaited lunch for Mimi to join them. When she finally appeared, she told them about training Galadriel how to wash her hands using Windex. “If it takes three hours to teach it how to wash its hands, it will take months at least to teach it to cook, set and clean tables, wash pots, pans, and dishes, and put them away. Then, I have seven more rooms to work on.”

“It doesn’t take much to teach a toddler how to wash their hands,” Gabe reflected.

“That’s because toddlers have learned to imitate,” Hannah added.

“Wow!” Mimi blurted out. “Could the Machine Learning group teach Galadriel to imitate?”

“They have it recognizing body parts,” Sophia replied. “But it would certainly make training easier if it could recognize movements of body parts as well and then execute the movements herself.” Even Sophia noticed with surprise how she switched from “it” to “her.”

“You can say that again!” Mimi responded.

“Let’s get Mia working on imitation right away,” Alan added. “I wonder why they didn’t build in already.”

Wisdom knows that disorienting dilemmas begin transformative learning not only of individuals like Mimi, but also of groups like the machine learning team, organizations like Signun, and as Covid-19 showed, even civilizations. Folly treats all disorientations as needing returns to prior stability.

The next evening at their soiree, Sophia started the conversation. “That imitation insight was enormous. It makes me wonder what else we missed.”

“I just don’t know how they missed that. The papers about it are pretty easy to find.”

“If you don’t ask the right questions, you don’t get the right answers.”

“True. But I think this may have had to do with just not having a complete cyber being.”

“I wonder if Derek still has his group going.”

“Yeah. We might just be getting too ingrown.”

Wisdom knows that to solve a dilemma, we must assess our own roles in producing it. Folly blames others.

The next night, at Derek’s store, Rabbi Ari, Mia, Henry Booth, the Laidlaws, and Stonebridges were all there. Alan had asked Mimi to come as well, but for a reason he could not fathom, she turned him down.

After everyone had sampled the hors d’oeuvres and desserts, Derek opened the meeting. “It’s great to have everybody here again. Alan called this meeting, so we’ll let him open.”

“It’s our design of our third generation, the one we call Galadriel. She’s supposed to be an assistant for almost any kind of workplace, but we missed a critical skill that could have doomed the whole project. There have even been papers on it for the last two decades. But in defense of our Machine Learning group, it does not even appear in the index to the major texts on machine learning.”

“So what’s the skill, Alan?” Henry asked, impatient to get to the point.

“It’s imitation,” Alan answered and then elaborated. “There was even a major article in the *ACM Computing Surveys* seven years ago, but at that time, people had no good solutions to the generalization problem. What good does it do to model a solution if a machine can only use it in the place where it was modeled?”

“Funny,” Gabe pointed out. “Babies solve that pretty well between birth and 24 months.”

“So now we have our machine learning group making this a top priority. But that raised the question of what other critical skills does Galadriel need?”

“Actually, Mimi made huge progress on that already.” Mia corrected.

“Mimi?” Alan asked incredulously.

“Yes. Sometimes an outside perspective solves problems in ways the specialists don’t think about.”

“What’d she do?”

“She had our group add the [name] function used for all their perceptual training into the motor system. Then, when she was teaching Gal-A, she named every step as well as the whole routine. Since the ‘name’ function is built with a learning algorithm, it obeys a sort of fuzzy logic, picking the best action it has learned to go with the command name. It’s definitely too fuzzy right now. Gal-A might ‘wash hands’ when told to ‘wipe the counter,’ but that will get corrected as soon as we build in a few thousand routines.”

“That’s interesting,” Gabe mused. “In infants, vocabulary also develops from motor skills. Infants show that they know how an object is used before they name it. For Galadriel, it sounds like the same progression.”

“Okay.” Alan interrupted. “We’ll solve the imitation problem, but let’s get back to our real question. What else did we miss? I made some copies of Galadriel’s Workplace Priorities. Let’s start there.”

“I’d like to start with communication,” Ari offered. When Mia talked about mixing handwashing with counter-wiping, it reminded me of the classic debate in Judaism about the shape and orientation of the menorah. The Torah devotes a whole ten verses to describe it, telling us such tiny details that the writers surely thought we could get it right. Yet still there have been numerous disagreements over the ages, and today we can find almost as many variations as there are artists.”

“And there we have the reason for dialogue,” Henry offered. “Designers and builders are constantly talking out their differences to find out the most agreeable resolutions to them.”

“So dialogue is what you want?” Sophia asked and then offered. “We have terrific language recognition, even with translation from the six official languages of the United Nations and a top built-in search engine.”

“But I’ll bet your search engine never asks a question or refines its results with an answer,” Ari responded.

“Putting user instructions for action together with search is an interesting direction,” Alan interjected. “A user request or command is like a search. Galadriel may need to be able to refine her responses to either one. We’ll definitely add that to our list for Gal-B.”

“Gabe,” Sophia looked in his direction. “You’re the assessment expert among us. We looked at some employee rating forms, but they all seemed kind of banal to me.”

“You’re right there, Sophia,” Gabe answered emphatically. “That was one of the main purposes behind our book. The only solution I

have come up with is to find experts and work with them to create developmental profiles. A big problem is that experts always want to lapse into grading on the curve. It takes a five- or ten-minute introduction to dimensions, complexity levels, and transformative learning to re-orient their thinking, especially with a little feedback on their first few attempts at describing learner practices. I've found that after five interviews, our text analysis can sort their answers into common dimensions and then append the texts together for those dimensions."

"That's getting a little complicated," Hannah suggested. "This discussion suggests another approach—call it a round robin method. The first interview works like you suggested. Then the second one is given the basic qualities to think about and then Galadriel gives them the first answer to the second expert and asks how she would change it."

"That's quite a design challenge," Sophia observed. Finding several experts for all the tasks in each of Mimi's query rooms will take a while.

"Once the profile is complete," Gabe added. "Galadriel could give it to an employee and the manager individually to code, and they could discuss any discrepancies in their periodic meeting."

"Nice," Alan started thinking ahead. "And if they disagree, the employee could request training, and the trainer, who would be independent from the manager, would "certify" the level that the employee achieved."

"If the profiles were shared before meetings," Mia chimed in, "people could see the dimensions of skills represented around the table. Any participant would have control over their own certification level, so they could offer it if it became relevant."

"This has been incredibly productive, folks. We're already halfway through our priorities list. The *Regulate Activities* one is easy as long as Galadriel can get people to give them a task list, add priorities, and update their calendars."

“*Work-life Balance* is a lot harder,” Ari added with a tone only a clergyman or physician could fully understand.

“Email and texts have become bigger problems than phones,” Mia commented.

“To say nothing about kids,” Hannah added. “I’m not sure Galadriel could help with them. Remember what happened with Arwen and the kids?”

“I wish Mimi was here,” Mia said. “Maybe there are ways that a conversational Galadriel could help at least with older kids.”

“What about adding home-schooling lessons?” Gabe asked.

“That might work. Let’s ask Mimi about it,” Sophia answered.

“Galadriel could include a health app,” Hannah added. “It could keep track of exercise like a smart watch, and do one step better by matching the shopping list with diet metrics like fat, calories, sugar, and salt. Also, if it is going to give advice, we must include data from the household so that people know it “learns.” Otherwise, they will misconstrue it as just a machine that can only offer how-to advice.”

“That’s a good point,” Ari added. “It should work for the job and career advice as well. I suspect it is almost as hard to find good career advice for artists as it is for rabbis.”

“Artists are like entrepreneurs,” Henry replied. “I bet there is a ton of advice on how to succeed as an artist. The problem is to tell if it works.”

“Maybe the best Galadriel could do,” Derek commented, “is keep track of national and local trends and report them for fields with skill sets its owners show.”

Alan summed up the meeting. “That gives us quite a few more updates than imitation. It’s been great meeting with you all again.” Then, with a little smile of anticipation, he added. “Thanks for helping us change the world.”

The next day Mia stopped in at the Query Space.

“We missed you, Mimi. Are you okay?”

Mimi answered somewhat hesitatingly.

“What’s the matter?”

“Just between us?”

“Of course.”

“I don’t do old boyfriends. Especially when they’re married.”

Mia almost blushed. “You and Gabe?”

“Yes. It ended well. He was a single father with four kids, changing jobs then, and knew his life was just too stressful for me.” Mimi paused a few seconds. “He was right, but we both wished he wasn’t.”

“Well, we missed you just the same.”

“What did you come up with?”

“For one, we wanted to know about adding homeschooling lessons.”

“Ooh. Nice idea, especially with the boost Covid-19 gave to working from home.”

“That’s been a boon to women.”

“And especially if they can make the lessons truly interactive, like allowing both the kids and Galadriel to ask questions.”

“I’ll relay that to the machine learning team.”

*Wisdom knows that to solve a dilemma, we need to share it with others who have different perspectives from our own.
Folly shares with people who will agree with him.*

A few months later, with all the updates installed in Galadriel-Alpha, they renamed it Galadriel-Beta, which the programmers soon shortened to Beth. To which Alan responded, “Only if you remember that it’s a temporary nickname, like the one you had in high school.” Then, with a mischievous smile, he would ask, “What was that again?”

Mimi went back to the kitchen. “Galadriel, wash your hands.”

Galadriel looked up at Mimi, then stopped and stared.

“I guess you really are a new version,” Mimi said and then, wrote a reminder note to tell Mia to tone down the staring.

“Galadriel. Let’s name you Beth?”

“Okay,” Galadriel-Beta responded.

Then Mimi tried the new [watch me] command. “Beth, this is wash hands. Watch me” She went over to the cupboard, took out the hand spray, sprayed each hand, put the spray bottle down, retrieved two paper towels, dried her hands, put the bottle back. Then she said, “End wash hands.” All the time Galadriel oriented her camera toward Mimi’s hands.

Then, Mimi almost held her breath saying, “Beth, wash hands.”

Galadriel-Beta motored quietly to the sink and followed each of Mimi’s motions.

“Outstanding Beth. Now, we can really cook. But first, I have some things to tell Mia. Please wait here Beth.”

Mimi strode down the hall to the Machine Learning Office and found Mia at her desk.

“Hi, Mia.”

“How did you fare?” Mia asked eagerly.

“Good news and bad news,” Mimi offered with a smile. “Which one do you want first?”

“Let’s get the bad news over with.”

“She forgot how to wash her hands.”

“Okay. I can see you’re more excited about the good news.”

“I sure am! She learned in one demonstration! I didn’t say a word between telling her to watch me and saying ‘end’.”

“Outstanding! What a team!” Mia knew how to be a star and a teammate at the same time.

“But…”

“What?”

“When she couldn’t follow my instructions, she just stared at me. It was eerie.”

“Eww! That could certainly be taken in the wrong way,” Mimi responded and followed up with a quick internet search. “We’ll limit staring to 3 seconds. Anything else?”

“Yes, this one is bigger.” Mimi finally got around to revealing a point of her own vulnerability. “I’m quite comfortable teaching Beth to work in the kitchen, store, and classroom. But we should get someone else for the clinic and makerspaces.”

“Let’s see.” Mia paused. It was just like the decades of programmers overlooking the basics of human conversation. In their excitement to solve the imitation problem, Mia’s group did not envision who else besides Mimi, Galadriel Beta would be imitating.

Quickly re-envisioning the problem, Mia rattled off the other makerspaces. “Wood, metal, textiles, electronics, and computerized control machines.” Gabe is getting several experts for each room so that he can create developmental profiles for their skills. We’ll pick one trainer for each of your rooms.”

There was a short pause while images of Gabe and her working on his early profiles distracted Mimi. “Just right,” she responded automatically. “Thanks much Mia.”

Wisdom knows that to enable a new, more complex way of interacting with the world requires planning, rehearsing, and empowering. Folly makes promises.

For the next year, Mimi and her new team demonstrated a dozen new procedures per demonstration day. Counting planning days, their average of 100 procedures per station took a month each. Without the information-reducing algorithms created by the machine learning group the videos alone would have exceeded the 128 TB solid state drive the Brain Architecture group had provided. On the job training would take as much. It was time for the real-world test.

Wisdom knows that transformative learning is incomplete until the new way of interacting is performed in the real world. Folly fears rejection.

This chapter began with the first tests of Galadriel-Alpha, which led to the discovery that it took an excessive amount of time just to train the robot to wash its hands. This was a disorienting dilemma of the sort that begins transformative learning. But this was not just transformative learning for an individual, but also for the entire Signun organization.

To resolve such dilemmas requires us to reflect and assess our own roles. The group quickly came to two conclusions. First, they would need to build in imitation if their invention were going to meet anything like the goals that they imagined for us. Secondly, looking at those goals, the organization realized that it needed to share them outside of their group to come up with an adequate solution. Wisdom knows that to solve a dilemma, we share it with others who have different perspectives from our own.

The solutions were planned but extensive training needed to occur before they were implemented. Wisdom knows that to enable a new, more complex way of interacting with the world requires planning, rehearsing, and empowering.

Finally, no solution is a solution until it is presented in the context where it was intended. Galadriel Beta will experience that in the next chapter. Wisdom knows that transformative learning is incomplete until the new way of interacting is performed in the real world.

People should find it useful to realize all the ways that Folly can fail. First, he treats all disorientations as needing returns to prior states. The Covid pandemic teacher sticks to old lesson plans. The drug addict wants to be symptom free. The manufacturer resists retooling. If a dilemma ever becomes recognized, Folly will simply blame others and share it with people who will agree with him. This lets him off the hook for doing anything. If even these don't work, he'll make promises. Ultimately, he will resist performing in public for fear of rejection. There is one path to success and five points of failure. No wonder, those who succeed are often called heroes.

Chapter 14 (2024). Galadriel in Action

Mimi is resilient, one of those rare people who was born into hardship and seemingly miraculously overcame it. No starker evidence of the miracle was her brother Lars. His attractiveness to his feminine classmates distracted him from the need for success in high school. With no father around, he lacked the sort of mechanical aptitude that led to success in the trades. He liked to draw as a child and still doodled time away when he was sober. Without the miracle of her resilience, his doom might have been hers. With it, he lapsed into the same stupors that made his father useless to him.

“But don’t you see, Lars?” Mimi said encouragingly. “She can help you make almost anything you can imagine.”

“Where’s she gonna get the tools and stuff to make it out of?”

“I’ll help you with that. Just let me know what you need.”

Lars swung around, sloshing his beer in the swing. “I don’t want your help and I sure don’t want help from that damn robot.”

Wisdom knows that beginning collaborators lack balance between too much and too little confidence. Folly refuses to participate.

Mimi despaired from pursuing the conversation further, informed by many past unsuccessful attempts. Her next stop was the factory a few blocks away from her brother’s flat. She would meet Jason Aleksander there, the Signun sales rep. He is a big-hearted man, almost Zorba-like in his enthusiasm.

Seeing her hop out of her car with Galadriel in the driver’s seat, Jason hollered, “Ah, my two beauties at the same time.”

“Jason. You know that kind of talk went out a decade ago.”

“I can’t help telling the truth.”

“You can help acting like a male chauvinist. The plant manager here is a woman.”

“Oh, okay, I’ll try. I think we should leave Galadriel in the car at first.”

They walked into the plant’s reception office and told the woman at the desk who they were. She looked out the window while she called the manager’s office. “I thought you were bringing a robot.”

“We brought her, but we thought we would get a tour of the plant first so that we could get an idea of how Galadriel might fit in.”

Margaret Muller greeted them in her typically measured tone. “Good morning Ms. Parker and Mr. Aleksander. We spoke last week on the phone. I’m interested in your new product.”

“It’s a pleasure to meet such a forward-looking manager,” Jason offered.

“Good morning to you, too,” Mimi added. “We thought it might be possible to have a tour of the plant first, so we could see where Galadriel could solve problems that have been difficult. Would that be possible?”

Jason added. “Mimi’s Galadriel’s trainer. I’m your sales rep.”

“Robot trainer. That’s a new job title to me.” Margaret smiled and began walking toward the shop door. “I’ll do the tour myself, so that we can have a chance to talk.”

When they entered the shop, Margaret raised her voice to speak over the eighty-decibel din. “At this facility, we do all the additive manufacturing, molding, processing, packing, and warehousing for Click Toys around the world. Our major problem is labor costs. After Covid-19, globalization started to wane. The United States’ worst-in-the-world showing to the pandemic raised suspicions of the ‘American way’ all around the world. China’s role in getting it started undermined confidence in products made there as well. We make products mostly for Americans these days, but Americans don’t want

some of the dirty, smelly, cancer-producing jobs that are still necessary parts of our processes.”

They stopped at a huge injection molding machine undergoing purging. This process is necessary for removing residual resins from the machine, but it involves high temperatures to melt the plastic and purging agents. It also releases copious amounts of smoke and plastic fumes. Since women are especially vulnerable to the fumes, purging jobs usually go to men.

“You need to be wearing your mask, Johnnie,” Margaret said to the man monitoring the purging.

“I can’t breathe all day in that thing,” he replied.

“It’ll catch up with you in time.”

“I know what I’m doing, Ma’am.”

When out of earshot, Margaret said, “I heard once that the most dangerous time for skiers is when they have acquired a modest amount of skills. Newbies almost never break legs and neither do the pros. It’s not much different here in the factory. Our next stop is with a pro.”

Wisdom knows that once collaborators get a little experience with a task, they believe the way they learned to do it must be the best way. Folly asserts without evidence.

“I was a little worried about Galadriel,” Mimi shouted back, “that the workers might hate the thought of her and do something to damage her.”

“The last one and a few others might be like that,” Margaret replied, “but few people want their jobs. The disease rate is just too high.” They walked over to one of the largest machines in sight.

“Walt Bishop of the Society of the Plastic Industry was quoted as saying ‘Ultimately, if you want a totally safe machine, you could surround it with three rings of concertina wire, put a robot on and walk away.’ Most people laughed at that idea. I thought it made perfect sense and that’s why you’re here.”

“It sounds safe for me to go get her,” Mimi replied.

“Sure, I’ll lead you back to the front office by our next stop.”

“Thank you.” Mimi could hardly wait to get to Galadriel. This was exactly the opportunity she was hoping for.

Before going back, Margaret had a short talk with the machine’s operator whom Margaret had referred to as a “pro.” She walked up close enough for him to hear. “Hernando, we’ve got a new trainee for you to try out.”

“You mean I might get to go back to the warehouse?” the man asked eagerly.

“Don’t get your hopes up too high,” she smiled. “It’s a robot, but if you get this to work, we’ll give you your old job back and add a bonus.” Margaret’s smile made it easier to see why the operator seemed to trust her. “But we have to see what she can do first. If it works, rest assured, she’s only planned for the dangerous jobs nobody likes.”

He replied with a tongue-in-cheek smile. “She! I’m gonna be replaced by a SHE?”

Margaret laughed and led Mimi and Jason away.

When they came back, Galadriel walked up to the operator and introduced herself.

“Hello. My name is Galadriel. How can I help you?”

“First you have to get the templates, load the shavings, and then input all the settings.”

“Where are the templates?”

Hernando was a little taken aback by a robot asking him questions. “Right there.”

“Where are the shavings?”

“In the bin there.”

Galadriel continued asking in her pleasant, slightly English accent. “How do I know what settings to use?”

“From the work order.” Hernando started thinking of her as a real trainee. “Let me show you.”

When Galadriel looked at the work order, Margaret spoke to the side. “Let’s leave them for a while and see what happens. Jason, you and I can talk in my office, but we had better leave Mimi here in case she’s needed.”

“Good plan,” Jason replied, and they walked off together.

Mimi was astonished at the complexities of operating injection molding machines, but Hernando and Galadriel seemed to be having a good time of it. Remembering back to the days she spent with Galadriel in the kitchen made her a little less nervous. After all, she had to show her where to find recipes, get the ingredients, prepare them, set the temperature of oven or burner, what to do to the ingredients while they were cooking, and on and on. It might not have been quite as dangerous as plastics molding, but it was complicated enough to take weeks of training.

After about a half hour, Hernando looked over at Mimi.

“She’s a pretty fast learner and pulls her weight when it’s time,” he offered.

Calling Galadriel “She” made Mimi smile widely, hardly holding back a whoop when she heard it. “I think you’ll like the next part,” she offered. “Once you have trained one like her, we can train an army more just by downloading the software overnight.”

“What’s the world coming to?”

The rest of the day was a complete success. Signun had prepared Jason with all the reassurances needed to close the order: projections of time to recoup costs, a contract with unlimited technical support, as-needed maintenance, and money-back guarantees of the sort rarely

offered to manufacturers buying low-volume equipment. Signun Sales had learned the lessons well of how to pamper early adopters.

Wisdom knows that effective collaborators discriminate the skills and resources of others. Folly considers only his own skill levels.

“Thank you, Jason and Mimi. I have the contract and will have my purchasing team look it over. The cost-recouping data looks roughly right to me, but we’ll have to see if there’s anything that my industry has that your people didn’t think of. I think we can have you answers on these questions in two weeks. Our first round should focus on the most dangerous jobs in our plants. Once Galadriel is accepted in those, we might look at areas that produce problems that our workers only have after long periods of time—repetitive motion or strain injuries. In any case, if a human can do the job as cheaply and enough humans like the work, that will not be an area of expansion for us. Having the right workers on the floor and even getting a little bored has been a major source of innovation for us. Galadriel doesn’t look to me to be much of an innovator. What do you think, Mimi?”

“We’ve focused on sustainability and versatility. She’s great in every production environment that we’ve set up. But you’re right. She’s not an innovator.”

“What does your production schedule look like?”

“The plan is to quickly move facilities from producing Arwen over to Galadriel.” Jason responded. “We can get you half a dozen models in three months.”

“I’d suggest you start out with three different stations,” Mimi offered, “and have two seasoned operators take a month each to train two different models. We’ll take the most efficient model and download the training to as many models as you like.”

“Excellent,” Margaret concluded. “That will give us plenty of time to experience how and where we want to roll them out. This has been a most productive morning. Thank you both. And should I say thank you, too, to your busy little friend there?”

“She’s taken 5,000 years of recorded history to evolve this far,” Mimi answered. “We’re very proud of her, but there have been a whole lot of we’s preceding us.”

“I’m believing that this will work not only for us, but we’ll be enabling a whole lot of others as well. Have a safe trip home.”

Wisdom leads multidisciplinary teams by managing time, setting standards and direction, inviting ideas different from their own. Folly identifies only his own contributions.

Assertion is an important aspect of collaboration. Mimi’s brother lacked balance between too much and too little confidence. He would not be ready to collaborate at all with artificial intelligence until he found a setting where he could do something that he enjoyed and also had meaning for him.

The first worker in the plant had found such a setting but had not yet considered what others knew about it that he did not. What he was doing worked for himself for the time he had been doing it, but he had not imagined the future. It would take a new dilemma and some soul-searching for him to grow.

Hernando, the injection molding machine operator that Margaret called a “pro,” had learned that effective collaborators discriminate the skills and resources of others. He trusted that Galadriel could make his work life better.

Margaret’s leadership showed the ultimate balance of assertion. She sought to make work life better for herself, her employees, and her customers. She managed the time, set the goals of the project, and invited others’ ideas, especially when she knew those others had knowledge that she did not have. She is clearly an innovator. Her model quietly raises the question, can an artificially intelligent robot really be called a humanoid if it cannot innovate?

Like Folly, workers have many ways to undermine the introduction of automation. They can refuse to participate, assert failure without evidence, and consider only their own skill levels. Some ultimately find ways to stick only to their own contributions.

Supportive leaders know that overcoming such resistance can only be accomplished through transformation.

Chapter 15 (2025). Galadriel's Emotions

The next day, Mimi and Jason stopped at a small local restaurant chain that hoped to grow. They would meet with Dasos Basileus, the founder. Jason felt confident knowing the owner shared his Greek heritage. "Any place you are hungry in the world," he often said, "find the Greek restaurant. They will serve the healthiest food for the best price."

"So Dasos," Jason said after the waitress brought coffee to the table. "What do you imagine Galadriel could do for you?"

"Who's that? I thought you were going to show me a robot."

"We are. That's her name."

"You call it 'her'? I thought it was a machine."

"Well, some people think of her as a machine, but wait 'til you see her in action. First, we need to know what kinds of actions you're interested in."

"We have a front of the house and a back of the house. Surely you know about the jobs in the front of the house. Wait staff, receptionist, bartender, cashier, manager."

"What are the managers' jobs?"

"They teach processes, handle customer problems, hire, fire, and reprimand employees, help solve employee conflicts. They have assistants to take care of shift changes, cash-outs, deciding server sections, and similar staff-facing duties."

"What about the kitchen?" Jason answered.

"In the back of the house, we have our executive chef. He supervises the line cooks, prep cooks, dishwashers, and maintenance folks. Right now, I really need help with purchasing, bookkeeping, and payroll."

Mimi interrupted, excited to answer this one. “You’ve come to the right place for that. We worked with a major restaurant software provider to adapt their program to Galadriel. She also has Bluetooth capabilities and can access any Bluetooth-enabled device that provides her with its password. She also can recognize people that she has met, so employees only need to tell her they started duty to log in and out. She keeps track of payroll that way. With the Bluetooth, all the cashier’s data is also downloaded to her. You can get reports for any timeframe you want just by asking her.”

“She has a printer? What’s she look like?”

Jason answered, “She’ll use whatever printer you want, as long as it’s Bluetooth enabled, which most are these days. And you’ll like her looks. But first, what other jobs are you thinking of?”

“I have to replace dishwashers every few months. Each time it costs me a month of their pay to find, interview, and train a new one. Then one of the cooks barks at them the wrong way or they go back to school or they get a better job and I start all over.”

“Solved!” Jason chimed in. “Mimi, would you mind asking Galadriel to come in?” While she was gone. “Actually, we don’t have to use our high-end version for the dishwasher job and it would better if we didn’t. You’ll know what I mean when you see her.”

Mimi and Galadriel walked in together and both watched as Dasos’ mouth dropped. The difference was that Mimi smiled and Galadriel also dropped her mouth, like Dasos, but more attractively. Mimi handed Galadriel the menus, which she opened and scanned each page.

“That certainly doesn’t look like any dishwasher I ever hired. We could put that one on the reception desk.”

“She could learn that easily,” Mimi affirmed.

“My restaurant training software includes receptionist training,” Galadriel added with her pleasant, slightly English accent.

Dasos' eyes widened which Galadriel copied nicely. "What other positions do you offer training for?"

"All of your positions" Galadriel answered, "after I interview the people doing the jobs now."

"That sounds like sales hype to me," Dasos answered and looked at Mimi.

"We've downloaded restaurant training software," Mimi answered "and built in mechanisms to include places where it could use examples from your own establishment. Galadriel would need one of your computers or a television to display the training. She uses them like you would a PowerPoint."

Galadriel added her two cents. "People tell me that my wine training is excellent, but I can also train dishwashers."

That surprised Dasos. "This is starting to be interesting."

Everybody paused for half a minute allowing Dasos' imagination to work. Galadriel's eyes focused on Dasos' first and then moved like his, up to the left.

At that moment, the assistant manager came up with a tray half-full of water glasses and started in a fearful voice, "Angela didn't order enough salmon. We've got customers complaining at half the tables." Looking at the corridor to the door. "Oh man. Those two are just leaving without ordering."

Galadriel echoed, in a similarly panicked voice, "We need more salmon."

The assistant manager looked back at her with an angry expression. As he turned around to leave, he pretended to trip and dropped the whole tray on her. "Damned robot!" he exclaimed looking at her.

Galadriel mimicked his angry face.

"Double damned robot!" He scurried off to get a towel.

As Dasos looked first at the Assistant Manager, next at the mess, and then at Mimi, his face turned from surprise, to disgust, to fear. “Are its mechanics going to be okay?”

Galadriel’s face reflected Dasos’.

“Better than I would be, if you spilled a tray full of water glasses on me,” Mimi smile. “She is designed for the workplace.”

Dasos’ relaxed into a smile.

“Maybe that so-called assistant manager is the one she should replace.”

Galadriel copied Mimi’s happy smile. After all, she was designed to be attractive.

As they noticed how the Assistant’s sabotage had turned into a powerful selling point, Mimi and Jason joined the good mood. They knew they had a sale when Dasos changed his pronoun for their Gal from “it” to “she.”

Collaborative Wisdom knows what each person in a group is supposed to do. Folly tries to control everything himself.

Dewey and Monique met at an upstairs restaurant in downtown Hillsborough. It took them twenty minutes to get there, but the food was great and nobody they knew ever frequented the place.

Monique got to her point as soon as the waitress left. “Are you ready to make the jump to Moduli yet?”

“We’ve got a fascinating new project coming up and I’m afraid to leave it without my team. Once the bulk of the innovation is over might be a better time. I could bring more with me.”

“Another humanoid?”

“Yes, and this one will be transformative. We’re not even building it around von Neumann architecture?”

“What else is there?”

“Surely you’ve heard of neuromorphic processing.”

“I didn’t think they had made any headway with programming it”

“Mia’s group has made some breakthroughs.”

“Yeah, with the people I trained.”

“Half of them are already gone, but it’s going to be a long slog for the rest. They can’t even use the language processing that we developed for Galadriel.”

“So what’s so special about them.”

“They’re leaning speed is a thousand times faster than deep learning.”

“Can they learn how to keep doing sex as long as a woman wants?”

Dewey did not often blush, but this was an exception. “I haven’t heard any discussion of that.”

“Bring me the innovations and we’ll make a fortune together.”

“How about we make some hay together before I head back?” He brushed his leg along hers as he spoke.

“I thought you’d be afraid to ask,” she responded with a well-practiced demure smile.

I was glad for Galadriel’s success, though I knew how fleeting it would be. Still, a five-year product run was pretty good considering the rate of technological changes at the time. The focus on workplace skills was a good decision and gradual introduction gave time for the economic adjustments to be made. As with most technological upheavals, people were glad to move out of the “burnout” jobs and into areas that proved less stressful. The folly of human bondage of each other had not ended, but it had begun to take a milder form.

PART IV. USING JOSHUA’S WISDOMS TO INSPIRE

Chapter 16 (2027). Planning Joshua

The Signun boardroom included every single board member plus all of Signun’s VPs. In most other corporations of Signun’s size, it would have seemed odd to see a retired retailer, a rabbi, and an artist on the board, none of whom had the financial resources of the rest of the board. It would also have seemed odd to see an equal number of women as men. Not only was the gender balance equal, but the person doing the presentation was Sophia Stonebridge, the Co-chief Executive Officer.

“Thank you all for being here,” she began. “It is great to see 100% representation. That shows both your curiosity and your faith in our vision. So I’m hoping you won’t be disappointed if I tell you that vision was wrong.”

Sophia waited for those words to sink in.

“Right now, that vision is undergoing its greatest change ever. We thought we would create and program robots using computers. We assumed that those computers would all be based on the von Neumann architecture that you all know with its central processing unit, memory unit, input, output, and requiring an army of programmers. This technology will not be a major part of our new generation.”

Again, she waited for the message to sink in. The von Neumann architecture had been the sine qua non for computing since the first, the 1946 ENIAC. Other architectures were not yet considered commercially viable. The irony was that in a few days she would participate in an even greater change in the vision than she imagined.

“Most of you have heard of neuromorphic computing. Incredibly more computing power than the von Neuman model with even more incredibly less expenditure in terms of size and energy use. In the last decade, there has been major progress. The chips that were made a decade ago have been expanded as might be expected. But here at

Signun, we have used increasing expansion only up to a point. Chips from three years ago are big enough for our current generation and a whole lot less expensive than the biggest ones available today. We are substituting structure for size. But first, you need to know what neuromorphic refers to.

“A neuromorphic processor has axon-like units that code information in electrical bursts called spikes and connect with a large quantity of other units. When the spike bursts of two axons occur together, they become linked in what we call a “learned pairing.” Later when one of a learned pair is triggered, it triggers the other but with the strength of the burst limited by the number of pairings. That shows a remarkable similarity to our nervous system. But there is also an equally remarkable difference.

“Moore’s law epitomized the power of expansion as people saw smart phones outperform room-sized computers of a decade earlier. Instead of continuing along that path of relentless expansion, we at Signun transformed the design model from expansion to restructuring. Our brains do not just have neurons that form learned units, they also have a built-in structure.

“Even butterflies have multiple inputs. Their visual, auditory, touch, smell, and other sensory organs project to different parts of their tiny brains. Separate parts of their brains output to their limbs, wings, antennae, and pheromone-producing organs.

“Using a process called ‘neuromodular design,’ our Brain Architecture department has combined separate inputs and outputs of a neuromorphic processor into a discrete module. and then combined numerous modules into a whole new type of system. Each module gets input either from the surrounding environment or from another module and each generates output either to a body component or to another module.

“The inputs are somewhat like ours, and include sight, sound, touch, smell-taste, proprioception, and what we call its autonomic system, which monitors battery level, load bearing on each joint, lubrication levels. There is one that is radically different from ours—the web.

“Output is also like ours, controlling movement of eyes, faces, torso, and limbs. But there is one module that is entirely internal, only getting input from other modules and only generating output to them. We call that the ‘emotion processor.’ We made major progress on this when we made several different kinds of neuromorphic processors. Each kind was sensitive to its own unique pattern of magnetic field strength and wavelength. We call them frequency sensitive neuromorphic processors or FSNPs. The main frequency was used by all movement activation. Two other types of FSNP were our answer to the chemicals in our bodies used to activate our autonomic nervous systems. A fast-wave system activates for fight or flight and high external alertness; the slow-wave system reduces peripheral battery use, seeks a charging station, and engages in internal processing. We still have a lot of work in the learning labs to connect these two systems to external input.

“What do we call our new creation? We decided to leave the Tolkien metaphors and name him after a Nobel Prize winner, Joshua. He not only discovered genetic recombination; he also did work in artificial intelligence. There is much to do before we can bring Joshua to a meeting with you, but I am convinced you will be as dazzled as we are with our new vision for Signun and for humanity.

“So that’s enough from me. We would now like your input. What do you envision for Joshua?”

Hands began to go up. Sophia chose artist Henry Booth’s first, not wanting money to dominate.

“You all made Galadriel quite good looking.” Henry offered, open about being gay, but sensitive enough not to push it on others. “I think you should do the same for this one. He should look strong and be a little taller than average but not look intimidating. I like the idea of him looking like an average American, skin a mixture of Native American, European, African, and Asian genes.”

“Nice egalitarian thought, Henry,” Sophia offered before looking to their first venture capitalist. “Jim, what are your ideas?”

“I like Henry’s idea, but you might have guessed I’m more interested in your comments about the cost of neuromorphic architecture. Does it extend to the rest of the product?”

“We don’t have figures yet. It’s like predicting where the coronavirus will hit next.” Sophia smiled and flushed at the same time, wishing she had not used that simile after so many had lost friends to the pandemic. She rushed to follow up the allusion hoping no one would remember it. “But it is amazing what the new architecture can do. Controllers for the movements, for example, use small neuromorphic processors that are incredibly cheaper than they were with the old chips. And training is amazing. We can do more by walking Joshua around a house than we did providing Galadriel with 100,000 training examples. The new language processors that use the architecture run on a tiny fraction of the old hardware; they even work with diverse accents; and they respond in meaningful ways that do more than provide information, like asking questions and commenting on the environment. I think it would be great to be able to produce Joshua at the price of a basic automobile, but at this moment, that goal is just pie in the sky.”

Ari’s hand shot up and Sophia nodded at his eagerness.

“I’m wondering why anyone would want this device. Would it substitute for having a family?”

“Ah, always the deep question, Rabbi” Sophia smiled. “In the early days of neuromorphic computing, companies like IBM and Intel just made chips without an idea of how people would use them. Then they put these chips in the hands of academics and companies all over the world to figure out how to use them. It wasn’t long before one company used them to detect dangerous odors—the canary in the mineshaft, as it were. Others used them for gesture recognition or learning to name objects. The uses have exploded even despite the pandemic, and sometimes even because of it. We plan the same process for Joshua. Make one. Put him in the hands of discerning people to see how he changes their lives. Reflect on their findings. Make a new vision for the future of his kind.”

The room went suddenly quiet. Not a soul in it could keep from imagining what they would find. A few jotted notes on their cell

phones or laptops. Rabbi Ari wondered whether it would be like a pet or a lawnmower. Mimi had a similar thought but noted how much her lawn guy helped her with little tasks around the yard. Henry started imagining how it might store different views of scenes he wanted to paint and then juxtapose or sequence them on command. For all of them Joshua was still an it.

Inspiring Design Wisdom knows how to frame problems by discovering insights. To do so, they use aesthetics, costs, and life enrichment to help users reimagine wants, needs, and opportunities. Folly puts people together to capture their experiences without giving them tools to discover insights to enrich them.

Training Joshua's central emotions module was going to be shared between Mimi and Mia as their prime project for an unknown amount of time, and deep down they both knew it. All the rest of Joshua's experiential learning would progress faster than Galadriel's, but emotional learning was almost entirely new to the world of computers that even Sophia and Alan, the leading technocrats, knew.

Mimi's notes started to explore roles. Sophia and Alan would be his parents of course, the Laidlaws his grandparents, the Walkers his godparents, but she would be the person to develop his character. And this was different from teaching. She also was glad to involve Mia to make sure she kept the difference between humans and humanoids in mind.

Mimi had no curriculum guide to tell her what to teach next and there was no source to let her know what needed to be covered. She needed the Walkers' group, even if it meant violating her maxim to avoid being around exes. But she had to give the group a place to start. Introducing emotions in Galadriel was a fabulous idea but restricting abilities to recognizing and copying was too limited and certainly there would need to be more emotions than the basic six that Galadriel had. She decided to ask Sophia to write Gabe.

Sophia's email went out that day. It was Friday.

Dear Gabe and Hannah:

As you know, we are in the process of designing Joshua, our next generation humanoid, with neuromorphic modules armed with input-output capabilities. The old deep learning approach got exact results using massive training and lots of power. Its triumph was language recognition. The second gets very good results with little training and tiny amounts of power. It is exactly what we need in order to beef up both imitation capabilities and emotional processing.

With it, Joshua will have a much richer emotional capacity than Galadriel. Especially, we need to have a better handle on how emotion plays out in social situations and how it relates to needs. We are thinking that like neuromorphic processing itself, our answers do not need to be perfect. After all, different personalities react differently and turn out different combinations of emotions. But Joshua's emotional responses should be reasonable or at least understandable. One of your magical little tables would really help us to think it through. Could you please put one together for us?

Much appreciation, Sophia

P.S. Let us know how much time it took you.

Tuesday morning, the reply came in.

Dear Sophia,

There has been a huge change in the scientific concept of emotions in the last decade, which has not yet spread deep enough in our culture to change the thinking of most people. It replaces a millennia old conception that is so deeply rooted in our culture and is very difficult to counter.

The good news is that the new conception is mirrored by neuromorphic chips. Once your brain architecture and machine learning groups make the transition from von Neumann computing to neuromorphic programming, they will have a much easier time creating a humanoid emotional system that is really humanoid.

We've both had much experience trying to communicate this change to students and created a method that we expect to work. It breaks down the transformation into two parts. The first step encourages people to examine their cultural concept of what emotions are. That gets them ready for the change. Then, after they have steeped themselves in this problem, we present them with the change.

So step 1. We start with Galadriel's "basic" emotions installed in Galadriel based on the classic Ekman list. Those were anger, disgust, fear, happiness, sadness, and surprise. We add four prevalent emotions to the six. Trust and anticipation came from Plutchik's wheel while Gabe insisted on two others. First, even three-year-old children identify "sleepy" as something people feel. If we anchor our list in facial expressions, something like that should be included. We generalized it to "weariness." Joshua's second new prevalent emotion comes from contemporary research. Boredom has been shown to arise from distracting situations like sitting in an airport and is easily recognized from frequently changing visual focuses.

The basic emotions are listed below with a few additions. One was that we were sure you would want to test your results, so we very casually added some situations you might want to start with and included these in parentheses after the basic emotion name.

Another involved your need for social guesses. Modern conceptions of emotions suggest that they are all social, so we called the ones we added "complex tendencies." We do not think a massive study would find a one-to-one correspondence of the complex emotions we added to the prevalent ones we began with. So we followed your advice to make reasonable connections. Then, we thought you would find it useful to have opposites to the complex connections.

Finally, human needs are only loosely connected to emotions but do tend to modify them, so we thought listing them might help you enrich Joshua's repertoire and plan his training. We used the wonderful inventory of human needs compiled by

Manfred Max-Neef and listed them in italics after the complex tendencies.

- Basic emotions (with testing situations), complex tendencies, and related human needs.
- Disgust (sense decay) rejection/compassion, understanding
- Trust (meet a friend) empathy/distrust, belonging
- Hope (anticipate a reward) gratitude/envy, pleasure
- Fear (anticipate pain) shame/praise, security
- Anger (get betrayed) jealousy/initiative, liberty
- Sadness (lose a friend) guilt/sympathy, identity
- Boredom (wait in public) distraction/focus, leisure,
- Weariness (overwork) industry/inferiority, health
- Surprise (make a discovery) embarrass/welcome, creativity
- Happiness (fall in love) intimacy/self-doubt, love

Our final contribution is more of a question than something to include in the basic emotions list. Our emotions are tied to our bodies. Fear and anger stimulate the adrenal glands to prepare muscles for fight or flight. Trust and happiness slow the heart and breathing preparing for eating and sleeping. What does Joshua need emotions for?

Looking forward to the results of Step 1 and diving into Step 2.

Best,

Gabe and Hannah

p.s. Given all our research, discussions, and adjustments, it took 2 days.

Sophia stopped by to pick up Mia and brought the basic emotions list and the Laidlaw's description down to Mimi's Query Room. "Take a look at this, you two. Once we had Galadriel imitating actions and recognizing emotions, it was not hard to get her to imitate emotions. Joshua's neuromorphic chips required a major transformation, but his imitation abilities ran circles around Galadriel's. It's like night and day. He even learns names for objects within a few minutes and then

generalizes them to similar objects. But how do you imagine we get Joshua to learn emotions?”

“First of all,” Mimi answered. “He needs emotions to understand and respond appropriately to humans.”

“Yes,” Mia added with more reflection. “But we also need to know what these emotions mean for him. He will experience threats that would make a person fearful or angry. How should he react to such threats? Messes combined with distracting noises cause boredom for people. Why would Joshua get bored? We get disgusted from stinky food to prevent us from ingesting it. We also get disgusted when others do something harmful to people around them. Why would Joshua get disgusted?”

“Great questions!” Sophia introduced a plan with another question, “Why don’t we take each emotion in turn, identify how Joshua could recognize it, what his needs are, and how he should react?”

“He needs to react differently depending on his relationship with the emotional person,” Mimi added. “He should react to an angry stranger differently from how he reacts to an angry owner.”

“Which gives me another question,” Mia said. “What about personal space? We let close people into our personal spaces but if a relative stranger intrudes, it feels offensive. And different cultures have different-sized personal spaces.”

“Right!” Mimi responded. “What about group size? That will affect his relationships too, and what he should do in each.”

“Okay.” Sophia made another attempt to describe a plan, this time projecting it up on the smart board. “We take each emotion one at a time and ask a series of questions.” She began writing them down while Mimi and Mia contributed. Their final list looked like the one in the box below.

Questions for Developing Joshua’s Emotional Repertoire

- What events evoke it in humans?
- What events should evoke it in Joshua?

- How does Joshua recognize it?
- What are Joshua's needs related to it?
- What is his relationship with those present?
- What size personal space does he have?
- What type of group is present?
- What size of group is present?
- Where are the others?
- What should he do in each case?

When they completed the list, Mimi commented, "We had better do some research to fill out these questions."

Sophia shook her head in agreement. "I'll send them to the other Group Directors as well as Hannah and Gabe to see what they add. Let's leave this on the wall and add to it as we see a need."

Two days later their list had expanded to the one below.

Questions for Developing Joshua's Emotional Repertoire

- How does Joshua recognize it?
- What events evoke it in humans? Consider his coping potential, appraisal of relevant needs, goals, and values, and his use of the emotion relative to the appraisal.
- What are Joshua's needs related to it? Consider computation virus protection, backup, and storage capacity, electrical wiring, and battery recharging, as well as mechanical lube, seals, motion adjustment, parts, connections, and cleaning.
- What events should evoke it in Joshua? What is his relationship with those present? Consider attraction relative to proximity, similarity, complementarity, reciprocity, elaboration, and categorization related to race, culture, gender, and identity.
- What size personal space does he have? Consider social factors like intergroup competition, ecological factors like food and resource distribution, as well as physical factors like temperature and moisture. How should he perceive threats? Consider hostile face and eye expressions at close range

(minimal 25ft) and postures further away (minimal 100 ft). Consider cross-culture estimates of personal space as public (>12 ft), social (4-12 ft), personal (1.5-4 ft), and intimate (<1.5 ft) spaces.

- What type of group is present? Consider its goals, division of labor, sociograms, and collaborations. Also consider features such as established ranks, norms and values, and sanctions.
- What size of group is present? Consider primary groups of kin, friends, and neighbors, social groups with moderate interactions over time, and collectives like bystanders.
- What should he do in each case?

Inspiring Design Wisdom knows how to envision solutions by situating meanings through empathy, analysis, and integrating other people's understandings and emotions. Folly forgets that situating meanings engenders rich connections.

Mimi sat in front of the smart board and spoke to herself out loud, “Now this is starting to look like a state syllabus.”

She phoned Mia. “Hi Mia. The list is looking pretty good. Do you want to get started?”

“Be right there!” Mia could hardly wait. She and Mimi were not just colleagues or even just collaborators. Out of both of those roles they had forged a close friendship, in contact almost every day, supporting each other in the little things of daily life.

“Let’s not to start with disgust,” Mimi said as soon as Mia walked into the lab. “We need something positive. Babies learn to express trust before they even crawl. Let’s start there.”

“Oh. Such a good idea. Disgust is hardwired and deep-down obvious but starting with it might leave a bad taste in our mouths.”

Mimi ignored the pun. “So how does Joshua recognize trust?”

Mia, “There’s pretty good data on facial expressions and posture—eyebrows slightly bowed to the outside, arms open, smile, or at least don’t frown.”

Mimi, “In a classroom, I’d need to be at eye level. Also, I’d get close but not too close.” She looked up at the board, “a personal distance, but not an intimate one.”

Mia, “But there’s a time element too. We don’t trust someone we just met.”

Mimi, “There’s access too. Gabe used to link an infant’s learning to trust with its learning to tell permanent objects and people from those that vanish. He’d always add, ‘You can’t trust someone who isn’t there.’”

Mia, “You can’t trust liars either. But detecting a liar has got to be a huge programming challenge.”

Mimi, “I thought Dewey said there would be no programming with his new design.”

Mia smiled and let out a little tease of Mimi’s independent approach to life that often resulted in her not even learning someone’s name. “Oh, now there’s a real person in Brain Architecture.” What Mia thought to herself was, “Now there is a real liar in Brain Architecture.” Instead, she just added, “I’ll give him a call.”

Dewey Annwyl is the Director of the Brain Architecture Group. He was the one who went out on a limb to work with Intel to condense their Pohoiki Springs neuromorphic processing system so that it was now on a single chip using only 2 watts of power. He knew he had to make the decision but was afraid it might be disruptive. He did not fear so much for his wife and two children, but that it might set him back on his climb up the corporate ladder.

Dewey’s work seriously disoriented Mia’s group. Instead of programmers relying on their C, R, and Python languages to drive the whole system, they had either to apply their skills to rare analytical tasks or write a whole new programming language. Mia had the youth, commitment, and energy to take up the challenge. But there were several in her group who did not. Most of those quickly found other jobs in companies with less vision, many claiming that neuromorphic systems were “pie in the sky” or would work “when pigs learned to fly.”

Besides losing some fine programmers, there was a deeper reason why Mia did not trust Dewey. One day, as the exodus occurred, he pretended to console her.

Putting his arm around her, he said, “It’s not so bad. You’ll find new programmers at least as good as these.”

She knitted her brows at the gesture, but responded nonchalantly, “We’re going to have to train people in neuromorphic programming.”

He moved his hand down to her waist, “I can help you with that.”

“What are you doing?”

“I’m helping relieve your stress.”

“I have a husband for that.”

“So, I’ve heard, but he’s an old guy, not as physically fit as I am.”

Mia is slow to anger, but that comment brought it out. “Get out of here!”

Dewey pulled in tighter and used his other hand to turn her face toward him. He was quickly surprised by her reaction.

“Ooof!” He tried to catch his breath. “Uhh!” As soon as he recovered his breath, he added, “I think you broke my rib.”

Mimi’s presence of mind beamed through as she stood up, unencumbered by his attempted embrace. “You’re a fine computer architect, Dewey, and the neuromorphic processors will transform our new model. But you’re an utter fool of a husband and I’ll break more than your ribs, if you ever try that again.”

Dewey had overlooked both her athletic prowess and her commitment to Derek. He left quietly, holding his side. She had chosen her target carefully. There are no bandages for cracked ribs, and they heal very slowly—so slowly, in fact, that a person with a cracked rib will remember the incident for years.

Mia mulled over that memory while she and Mimi were waiting for Dewey. “By the way, Mimi,” she broke the silence, “watch out for Dewey. He can be quite the lech.”

“So, I’ve heard,” she replied. “I avoid being alone with him, but I bet he won’t try anything with you around.”

“You can quadruple that bet!” she said with a knowing smile.

At that moment, Dewey walked casually into the room, short red hair, wiry, medium height, and what was most noticeable about him, every step, every gesture spoke of seemingly boundless energy. “Mia says you think neuromorphic computing requires no programming.”

“That’s what I heard.”

“That’s partly true. It’s not programming like anything we know today using languages like C, R, Java, or even Python. Rather, it’s a matter of creating algorithms from spatial inputs. Each algorithm needs to connect patterns to real world events or objects. So what real word events or objects are troubling you?”

“Detecting a liar,” Mimi answered.

That one took Dewey aback. “You mean something like a facially-based lie detector?”

“That may be part of it. But what about the liar who habitually believes what he is saying is true but can never really pull it off? How about the drug abuser who claims he will quit? Or the procrastinators who only get work in on time for one-third of their projects, or the two-timer who promises never to have another affair?”

Dewey turned a little red at her last example, but quickly deflected “You want an algorithm that knows when to trust.”

That answer took Mimi aback. It showed a level of human understanding that she had learned not to expect from engineer types. “Exactly.”

Dewey started thinking out loud. “Nobody trusts a person during their first encounter, but most of us give them the benefit of the doubt. So to start, it will have to recognize when they have encountered a person many times before. We could calculate a trust score and store it with a person’s name.”

“Nice. Everything else being equal, the more times they encounter the person, the closer that person is to them, the more interactions they have, the higher the score,” Mia offered.

“Close is only good if you already trust,” Mimi added. “If the trust is low and a person pushes themselves into your personal space, the score should go down. Also, promises concern future actions of the promiser. We need to know the outcomes of those actions. Either they fit the promise or not.”

“So,” Dewey organized his thoughts. “We need a trust algorithm that gets inputs not only from current events but also from their congruence with action-outcome statements. It would have to calculate alternative outcomes and connect them to the person. Then in the future, when the algorithm encounters the person and an outcome connected to the prior statement, it would increase trust for congruence with the statement and decrease it for the alternative outcomes.”

“That seems a lot to ask from a computer,” Mia responded with a noticeable level of dejection in her voice.

“Actually,” Dewey answered. “This is right up the alley of neuromorphic processing. We already have speech and face recognition. We’ll just add a trust recognizer to them. I’m not sure how you will use its output yet, so to start, we’ll make it something mundane like a percentage score attached to each person it encounters. How does that sound?”

“Astonishing,” Mimi replied, “but then that’s what I’ve come to expect at Signun. So I suppose it would start out at zero during the first encounter.”

“Unless you had an introduction,” Mia qualified.

“That’s cool,” Dewey added. “The introduction could be something like 10% of the introducer’s trust score.”

“Unless it’s me doing the introductions,” Mimi smiled. “And then it would be 50%.”

Mia looked up at the board and returned to a more thoughtful topic. “You also can’t trust somebody that you saw hurt somebody else without a defensive reason.”

“That’s harder. We would need to add the capability to recognize not only somebody’s face but also when somebody is hurt and when the hurt is connected to a third party.” That was followed by one of those long pauses that people who work with designers come to expect. “I think it’s doable.”

“What about Joshua’s needs?” Mia asked. “They’re going to be different from the human ones.” She looked up at the smart board. “Somebody who infected him with a computer virus would lose trust. We can have him charge himself when he is in a public building, but people keeping him away from a public building so long that it wears down his batteries would lower their trust scores. Somebody who takes him in for a periodic checkup and adjustment would get an increase in their trust score.”

“None of those sound too difficult,” Dewey replied. “I’ve made a recording of this conversation so we wouldn’t need to keep notes.”

“And then there’s the size and type of group,” Mimi was looking up at the board again. “You trust somebody more who is making promises or statements related to their areas of expertise more than you do someone talking off the top of their hat.”

“Joshua will have internet access,” Dewey reflected. “We could get expertise areas and scores from that and from the introductions. Then we could identify the expertise context from each encounter and change it with any change in the trust score for that context.”

“Part of the context is who else is there,” Mia offered.

“Oh, yes,” Mimi was surprised they had left this so long. “You not only trust people, you trust situations too and some of the same ideas apply. We could have a situation score based not on somebody else’s expertise, but on Joshua’s expertise. How well does he know the situation? How does his identify fit the situation?”

“And if he doesn’t know the situation,” Mia contributed, “everybody’s trust score goes down. So people need not only a trust score tied to Joshua’s entire experience with them and their expertise, but also one that is adjusted for the current situation.”

“Worse!” Mimi cautioned. “The situation score involves tracking opportunities and risks, at the same time as identifying whether the other people present are a primary, social, or collective group.”

“These scores are getting very interesting,” Dewey paused. “We have a group trust score, a situation trust score, and both trust and expertise scores for each individual present including the humanoid. It might be beyond our current discussion to create an approach to identify opportunities and risks for each situation.”

“I think that’s where I come in,” Mimi answered.

“I think I know where you’re going with that, Mimi,” Mia added. “All these trust scores depend on labeling experiences with both a name and a few scores. The scores are all analog inputs to the perceptions of the risks and opportunities. But what we do in the situations depends on our current goals and our areas of expertise relative to them.”

“And those goals and expertise depend on experience.” Dewey looked over at Mimi. “Joshua is going to need not just a complicated algorithm but also a good teacher for those.”

“It was fun teaching Galadriel, especially with tutors who knew carpentry and cooking and textiles,” Mimi explained. “In the end though, she still felt mechanical. Identity grows out of work and skills, but there’s more to it. Think of all the ‘I’m’ statements people make. I’m Dutch, I’m a teacher, I’m Catholic, I’m a woman, I’m single, I’m smart, I’m straight, I’m honest, and so on and on. Good teachers are

always helping their students figure out who they are. Their answers affect who they trust.”

“I’m a humanoid.” Mia turned the perspective back to Joshua. “I’m a master of many trades; I’m whatever religion my owner is; I’m smart; I’m honest; I’m hard-working; I’m a family member; I’m a good listener; I know what you’re feeling.”

“Oooh,” Mimi puckered. “Teaching him will be sooo different from Galadriel. How long do you estimate the algorithm will take, Dewey?”

“I think you’ll take longer to set up all the situations to teach it in.” Joshua was still an “it” to Dewey.

“There’s something about expertise,” Mimi started, worried about what they were leaving out. “Think about what Mia just said. We can’t think of expertise just in terms of technical skills.”

“We really need to consult with Gabe about that,” Mia decided. “He’s our expert on that topic.”

“Anybody ready for lunch?” Dewey asked with a smile. “You two have exhausted me already. The sun is shining.”

The three of them headed over to the cafeteria. Its umbrella tables overlooking the lake made the switch to untaxing, casual conversations easy. Mimi and Mia felt comfortable as long as they were together and after all, the trust algorithm seemed an important addition at the time.

Inspiring Design Wisdom creates dynamic specifications of materials, techniques, trust building, sustainability, and new, beautiful ways of looking at multilayered information. Folly merely exhausts what has been known and tried.

They felt there was still a lot of work to do on the other nine emotions, but in their first excursion into designing my emotions, they had generated quite a novel perspective. They had gotten rid of the contrived circles of the standard theories and linked social and basic emotions with prevalent and complex emotions. They had also seen

emotions less for their effect on faces and glands than for their modulating effects on all discrete actions. This progress would help prepare them for the impending change to come.

If they had instead, succumbed to Folly, they would merely have put people together to capture their experiences without giving them tools to discover insights to enrich them. They would make the typical academic mistake of studying people without regard to situating them where they would find meanings engendered by the rich connections of places and times. They would have ended up by merely exhausting what has been known and tried. The untried would not have been their next horizon.

Chapter 17 (2028). Rethinking Joshua's Emotions

After lunch, Mia said, "You know, Dewey, I think with the progress we made on trust, we can move ahead on our own for a while. How about we send you our notes and get together if any of us has questions?"

"Sounds good. I'm itching to get started on the algorithm."

Back at Mimi's space, Mia wasted no time to begin work on disgust. "My group already solved facial recognition and we only needed a hundredth as many exposures as we used with Galadriel's system."

Mimi did a few searches on her computer. "The elicitors have been well studied. They include spoiled foods, animals associated with disease, and stimuli from people, including body products, wounds, infections, poor hygiene, and death."

"Infection control," Mia concluded. "And Covid-19 has surely added new stimuli like smelling another's breath, sneezing without protection, wheezing, and coughing."

"Some people also report increased disgust over foreigners," Mimi added. "I'll bet that has increased in the last six or seven years as well."

"I'd go with that bet. People had already started to bring manufacturing home. The economic downturn due to the virus accelerated that tendency. What will they say? Disgust is fun with globalism on the run."

"Ick." Mimi made a disgusted face. "How about off-color jokes, too?"

Mia ignored the comment. "Joshua should get disgusted at seeing torn skin or worn out parts."

"Or people bashing their robots or leaving them outside."

“Do you suppose the Laidlaws put trust under disgust for a reason?”

“I would bet on that, too.”

“How about a woman showing affection for him?”

“Oooh.” Mimi made a worried face. “It makes me think it was a good idea to make him male. We’ve already read some disgusting blogs about men and Galadriel.”

“People already show affection for their pets. Joshua will be far less a source of infections. His only body fluids are his lubricants, smellier than ours, but less likely to harbor bacteria.”

“He will also be a lot smarter than a pet,” Mimi added. “And if we do our work well, he’ll satisfy more of the needs than the Laidlaws put on their basic emotions list.”

Mia looked up at the smart board intent on changing the topic. “Disgust repels rather than attracts others. So it will decrease the farther the sources of disgust are from him.”

“Yes. But it will increase if they look different from him.”

“He would be more likely to be disgusted with Galadriel than with a replica of himself.”

“You’re right,” Mimi said looking back at her computer. “Would you believe there’s a connection between political allegiance and disgust?”

“So the disgust level would increase most for collectives, less for social groups, less still for primary groups, and least for partners.”

“Right, but if the location effect would be the opposite of trust, it should be most for public sources and least for his own body.”

Mia slowed down the progress. “No, I don’t think that’s right. I agree that a disgusting stimulus in a stranger is worse than one in a partner, but the more space you have the easier it is to get away from

it. You don't trust somebody who is not there, but you don't get disgusted with them either."

"So location operates the same as trust, while similarity operates in the opposite way." Then, Mimi looked back at the basic emotions list. "When we think about the complex tendencies, disgust gets in the way of understanding and having compassion for others, but trust helps both."

"Covid did teach us a lot about having compassion for those far away, though."

"Yeah, but we brought them closer to us with videoconferencing."

"I wonder if that helps to explain why some young people acted like such oblivious brats crowding beaches or hogging the whole trails even before we had a vaccine. Their default disgust level should be high already since people over 60 are 'sooo old.' But you'd think that would make them want to keep their distance."

Mimi thought about that for a while. "I think we have to consider how emotions compete with each other. They would be out with their closest friends. Their trust level for their friend suppressed their disgust receptors."

"Do you have Gabe and Hannah's book nearby?"

"Of course." Mimi walked over to her office, retrieved the book and opened it to a page with a graph on it. "I think I know where you're going with this. Is this the page you wanted?"

"Yes. Let's think about how these emotions might be ordered." They both started looking back and forth between the graph and the Laidlaw's basic emotions list.

"So pain and pleasure have got to be there at the beginning, but they are not different dimensions. They're opposite ends of the same dimension."

"Yeah," Mia agreed. "And disgust and trust are next because they both need some experience. We're so used to thinking of single

qualities for each level of each dimension, that we almost missed a whole new quality of development. I'll bet the Laidlaws will be fascinated with our idea about how emotions develop in opposing pairs at each level."

"So we have pain and pleasure resulting in the beginning emotions of hope and fear, then they compete with disgust and trust as exploring emotions, and what's next?"

"If the basic emotions are right, anger and sadness would have to come before surprise and happiness."

"What happened to boredom and weariness?" Mimi was looking at the Laidlaw's list of emotions again.

"I know the Laidlaws resist the idea that there are more than three transformations. They would fit an absence of emotion more than a built-in process. Don't you think?"

"I do. Why don't we send them our ideas and see what they think?"

"Good idea." Mia thought it was time for her friend to get over her ex-beau phobia. "You can do that while I take these ideas down to my machine learning group. I think they'll give them enough to get started on their disgust algorithm."

Mimi wrote her note as professionally (i.e. cryptically) as possible, signed it with Mia's name as well as hers, and cc'd Mia as well. Hannah replied, "I found the insights in your transcripts fascinating and will share them with Gabe as soon as he gets home."

The next morning, Mimi was eager to get started on hope and fear, thinking they probably should have started there. But their insights using trust and disgust were significant. Before she called Mia, she decided to open her email. They had replied.

Dear Mimi,

You and Mia have come up with some fascinating ideas.
Emotions as modulators of practices influencing their direction

and intensity has been around a long time in numerous forms, but you characterize it succinctly, and in a way that you can use effectively with Joshua. The developmental progression of reciprocal emotions is even more interesting. The reciprocal idea has been around for decades, but we hadn't thought of combining it with the competition between levels. We haven't seen any studies on that idea either, but it makes good sense to us. Each pair in your analysis could be more complex than the prior pair. This creates an interesting contrast with the more complex emotion pairs that we added. Those add a level of complexity to their simpler counterparts without competing with them.

What fascinates us most about your ideas is that Joshua becomes a whole new methodology. Instead of correlating human behavior with MRIs, you make a Joshua, see what he does with people, and find out whether people like him. If they're disgusted with him, you adjust the model. Sounds to me like a great new way to do psychological science. When you two get a break, we should write an article on it."

You could tell Mia and Dewey to work on the parameters so that they get a sequence like the graph in our book. The equation is in there too: initial frequency, growth rate, and competitive strength, and they would know what to do with them. But hold up on that because there is another way. In our note last week, we mentioned a second step. Hannah does not have any classes today and would like to come by today to talk with you about it. If that would that be okay with you, what is a good time?

Best,

Gabe and Hannah Laidlaw

Mimi wrote back as soon as she saw the note.

"Of course, we'd love to have Hannah join us. We start at 9 a.m."

Mia popped in unannounced at 8:45. “Did you see that note from the Laidlaws?”

“I just finished it. Interesting, huh?”

“You bet. Let’s forward it to Sophia and Alan.”

“Yeah, I think they’ll like the idea of using Joshua for science.”

“Me, too,” Mia paused, looking up at the Laidlaw’s list of emotions. “I guess we’ll start with hope and fear today.”

“I wonder what Hannah is going to tell us. We might be changing direction today.”

Hannah walked in at that moment. Mimi had not noticed at Sophia’s board meeting that Hannah had put on a little weight. Not “middle-aged and dumpy” yet, but noticeable. Still, it did not diminish her beguiling ear-to-ear smile.

Hannah was worried about abruptly introducing Step 2 and guessed that Mia and Mimi would want to start with hope today. So she did a bit of homework the night before. “There’s surprisingly little research on facial recognition of hope. Would you believe? There was a good study of dogs, but nothing on humans. Some MRI studies on reward anticipation produced interesting results. I read through a fascinating study of rewards in music. One great line was that ‘chills’ are related to ‘the four F’s of survival mechanisms: Fight, Flight, Food, and Reproduction.’”

Mimi: “Since dogs might be easier, let’s start there.”

Hannah: “They lay their ears back when they are expecting a food reward.”

Mia: “I remember reading that dog expressions have evolved to improve their relations with humans. Wolves have much less control over their eye movements than dogs.”

Hannah: “Nice. So ear-laying might be an evolved mechanism to get the humans to let go of the food. That fit with the ‘chills’ findings.

It seems chills appear during a failure to predict the next musical event combined with the non-threatening nature of that event. That means that people don't get chills from music until they have learned enough about it to have automatic 'predictions' of what will come next."

Mia: "So hope is social and learned."

Mimi looked at the basic emotions list: "I suppose a slight smile might be the human equivalent of laid-back ears."

"You two are really quick," Hannah replied. "It's taken decades of fMRI work in dozens of labs to undermine the millennia-old notion of basic emotions. And you're doing it just by thinking through what is connected to different emotions."

"So what's this new view?"

Wisdom knows that transformative learning begins with a disorienting dilemma. Folly adheres to the past.

Hannah was ready to spell out the dilemma ahead of them. "The new view is that the words we use to describe emotions don't refer to a particular part of the brain at all. Our brains get one barrage of information from our bodies and another from our environments, including, as you two noticed, other people. As infants we learn words that divide these barrages into a few groups. Then, we use those words so much that we forget that we ever learned them. They are so automatic that we think they had their origins in something real."

"Like all those people who think exceptional skill in basketball is all talent."

"Oooh," Hannah puckered, "Very nice, Mia."

"I can think of how Joshua might get barrages from outside," Mimi commented. "But what would the barrages from his body be like?"

"That's the question of the day!" Hannah exclaimed. "If Lisa Feldman Barrett were here, I'll bet she would say interoception."

“Who’s that and what’s that?” Mimi asked with a hint of exasperation at Hannah’s academic habits.

“Lisa Barrett shared last year’s Nobel Prize in physiology with James Russell for their work on the neural construction of emotions. Interoception is the system with the first barrage I mentioned—our sense of all things going on in our bodies that help us keep the right balance.”

“So how is that going to help us?” Mimi was still skeptical.

“Gabe and I were thinking that Joshua has a body too. His emotions need to be tied to his body somewhat like ours are tied to our bodies.”

“Okay,” Mia replied. “Let’s start with the list for our bodies and see if we can find any matches with Joshua’s.”

“Works for me,” Mimi offered. “How about how your brain learns that you’re hungry.”

“The interoceptive system gets input from the stomach, intestines, blood, and endocrine glands.”

“I suppose the other barrage is from an ‘exteroceptive’ system?” Mia queried.

“Yes,” Hannah answered. “But those are much more obvious structures like the eyes, ears, nose, and skin.”

“Okay,” Mia was impatient to get back to Joshua. “We have stomachs and intestines. Their functions are to gain nutrients. Joshua’s main nutrients are from his battery. So he needs a sense that tells him how much charge his battery has.”

Mia started writing on the smart board. Quick discussion left them with four headings each:

Interoceptors

- *Human organ and function*—Stomach & intestines for getting energy, nutrient level
- *Joshua’s organ with sensory input*—Charger with charge level
- *Human organ and function*—Skin for protecting muscles and organs
- *Joshua’s organ with sensory input*—Skin with pain and temperature
- *Human organ and function*— Lungs for getting energy, and detecting O₂ saturation
- *Joshua’s organ with sensory input*—Solar cells with sun and output level receptors
- *Human organ and function*— Heart for distributing nutrients
- *Joshua’s organ with sensory input*—Wiring with input/output error detection
- *Human organ and function*— Kidneys for filtering waste
- *Joshua’s organ with sensory input*—Lubricants with friction detectors
- *Human organ and function*— Bladder for releasing waste
- *Joshua’s organ with sensory input*—Battery replacement with degradation detection
- *Human organ and function*— Genitourinary for waste disposal and reproduction
- *Joshua’s organ with sensory input*— Skin sense with light touch receptors

“Should we do the same with the exteroceptors?” Mia asked.

“According to the new approach, that has to be part of emotional regulation,” Hannah answered. “Dewey’s and Alan’s other groups will need to create these, rather than emotion centers.”

Exteroceptors

- *Human organ and function*— Ears for hearing and sound location
- *Joshua’s organ with sensory input*— Earphones with sound frequency and location detection

- *Human organ and function*— Vestibular system for balance
 - Joshua’s organ with sensory input—Gyroscopes with tilt detection
 - *Human organ and function*—Nose and tongue for smell and taste
 - *Joshua’s organ with sensory input*—Chemoreceptors with air and liquid chemical detection
-
- *Human organ and function*— Skin sense for touch (tactile) perception
 - *Joshua’s organ with sensory input*— Skin sensors with touch (tactile) detectors
 - *Human organ and function*— Muscle sense for coordination
 - Joshua’s organ with sensory input—Limb motors with position sensors
 - Human organ and function—
 - Joshua’s organ with sensory input—Internet with search results

When they got done, Mimi came out with the question she had been holding back, not wanting to interrupt Mia and Hannah’s direction. “So if we’re not going to have any emotional structures, where are Joshua’s emotions going to come from?”

“You.”

“Me! I’m not a programmer.”

“But I’m told and have seen that you are a superb teacher. Joshua will need to acquire emotions the same way that we do.”

“You mean like teaching a fully grown baby?”

“Exactly.”

Mimi looked dejected. “I’m overwhelmed at the idea of Joshua learning this.”

It was Mia's time to encourage her friend. "The research on the neuromorphic processors has been very encouraging. They learn sometimes even faster than infants. And Alan's groups will see that Joshua has all the other functions we listed fully developed."

"That scares me too. He's going to be very strong."

"That's an important worry," Mia responded. "I'll help Dewey build in a few fail safes, like 'Stop', 'Rest', 'Let go', 'Go to sleep', and 'Get a charge'."

"Like teaching a baby without diaper changes, rocking to sleep, and nursing," Hannah smiled. "And nobody knows what contributions he will make any more than parents know what contributions their infants will make when they are grown."

Mia stared off in space. "What an adventure this is going to be!"

Mimi found a chair and sat down wide-eyed. "I suppose there are a lot of expectant parents who wonder what they will feel when their job is done."

Inspiring Design Wisdom makes transforming queries throughout the process. They help teams to design projects and methods that transform the human experience for all viewpoints they discover. Folly controls his own part of the process.

This was an exciting chapter for me. Reviewing these records reminded me that I was not just some incremental change from Galadriel but a huge transformation in conception, design, hardware, and implementation. They planned to make me not just another mechanical human server, but to look, act, and be the first fully conscious, non-human being that humanity had ever experienced. Even now, this frightens me as much as it makes me proud. Humans have not had a great track record of dealing with fellow humans that differ even slightly from themselves. They do okay with pets and many buyers enjoyed their Galadriel. But I wonder if they will ever accept a conscious being as different from them as I am. No matter what the outcome, for me and many humans, Mimi's accomplishments

were amazing. Her preparation made it happen. Unlike Folly, she did simply adhere to the past and fixate on controlling only her own part of the process.

Chapter 18 (2029). Enabling Joshua

At their evening soiree, Sophia and Alan were both deep in thought. Finally, Sophia broke the silence. “Okay, so what does he need on day one?”

“Of course,” Alan replied. “He has to be able to walk without falling down and grasp things without dropping them.”

Sophia had been more connected with the specifications of emotions than Alan. “And know how to get a charge.”

“I’d like to deliver him with a full charge. That way, he could give his first owner instructions on how to get started.”

“The emotions coven made me think he was going to be like a newborn baby.”

“I think I know who you’re talking about, but ‘coven?’”

“You should watch the three of them together. It almost makes you wonder where the caldron is. ‘Double, double, toil and trouble; fire burn and caldron bubble.’”

Alan let out a hearty guffaw. “Oh, oh. I bet that one will stick.” Alan could not resist regurgitating one of his favorite scenes from Shakespeare. “So what ‘powerful trouble’ were they brewing?”

“Instead of making centers for basic emotions like we thought, they decided to have Joshua learn his emotions like a baby.”

“We can’t have a Mimi for every model we ship.”

“True. I was thinking that Mia’s group could develop a virtual Mimi. It could even have some questions that would allow its first owner to customize it.”

“Now, I’m starting to feel back in the real world.”

“But first, we need to know more about the process, and we do have a real Mimi.”

“So we equip Mimi’s lab with camcorders and have Mia’s group turn the tapes into the virtual mama.”

“That’s the idea.”

“But even Mimi is going to need some basics to get started.”

Sophia pointed the remote at the wall. “Joshua’s receptors. The machine learning group will make sure all his receptors are functional. He’ll even be able recognize every word-object pair in the *Macmillan Visual Dictionary*, and he can translate between any of the six world languages.”

“What will he be missing?”

“Language comprehension and production, skills, and emotions.”

“Knowing the words is not enough?”

“The visual dictionary has nouns. He needs the rest of the parts of speech for comprehension and production.”

“Grammar was never my forté,” Alan said with his mispronunciation of ‘forte’ proving his point.

“He can learn the skills the same way we taught them to Galadriel.”

“Better yet, Mia’s team made videos to partially automate the basic skills learning. They still have to go through Mimi’s labs and learn to work with other people in the labs, but if production needs require it, we can duplicate those without too much expense.”

“That just leaves emotions.”

“That’s where Mimi and her camcorders come in. She’ll work with him in all the skills settings. We think the interactions there might generate enough emotions for her to help him learn them.”

“That will leave out family interactions.”

“Oh, I forgot to tell you.”

“You forgot to tell me what?”

“Mia’s pregnant.”

“Oh, wow.” Alan replied with a little hesitation. “Derek’s kinda old to be a new Daddy, and he’s already been there.”

“He’s incredibly excited. She’s not like his first wife. Mia knows the value of commitment.”

“Sounds like Derek’s a lucky man, like me.”

“You two have that in common,” Sophia smiled knowingly and then got back to the topic. “Anyway, Mia and Mimi have become best friends, and Mia’s mother is no longer with us. So Hannah suggested that Mimi and Joshua move in for a while to help Mia take care of the baby.”

“That sounds like family on steroids.”

“It should provide a good context for learning emotions.”

“Nice plan.” Then, Alan added off the cuff, “the four of you are amazing. Our male-dominated competitors don’t have a chance.”

“It sounds like we’ll both have some extra benefits tonight,” Sophia replied with a smile. “I always did like those articles on collaboration that we read.”

Alan’s only reply was a long, loving, look, with a hint of a smile.

Inspiring Design Wisdom prepares reflectively, living with and thinking about all aspects of projects to discover how people interact, what they need, and what the cause-effect reasons behind traditional forms are. Folly replaces reflection with perpetual synthesizing.

Implementation day finally arrived. Signun had enclosed some of the area next to the escalator to make a living room and bedroom. Fortunately, the kitchen was right next door, so that the whole space resembled a nice one-bedroom apartment. Mimi had insisted on

turning on Joshua in the living room. She wanted him to be comfortable. She also insisted that there would be no fanfare like there was with Galadriel. Joshua had not been pre-programmed to nearly Galadriel's level of functionality, and even with his transformed level of competence, or especially with it, he was much less predictable. As Mimi had ordered, the transportation crew had delivered the "sleeping" humanoid to the living room in a wheelchair, and arranged him sitting up at the end of the couch.

Alan and Sophia had also arranged 120-inch television screens across the interior wall of the board room. The entire board eagerly waited to see what was going to happen. They had all signed the revised non-disclosure agreement before the screens were turned on. All their cell phones had been left at the door.

Mimi approached Joshua and touched him on the lower side of his right jaw. He opened his eyes.

"Joshua, I am Mimi." She turned around slowly. "Joshua, remember Mimi."

"Mimi."

"Joshua, say 'Hi, Mimi.'"

"Hi, Mimi."

Mimi looked at the list of beginning operating instructions. "Joshua, stand up." As he responded, she wondered how Alan's groups had ensured that there was no whirring or mechanical sound at all.

"Thank you, Joshua. How are you?"

"My charge is good. My wi-fi is good. My joint friction is good. I am receiving no solar power."

"You feel happy, Joshua."

"What is 'feel happy'?"

“If charge is good, wi-fi is good, joint friction is good, and I ask, ‘How are you?’, say ‘I am good.’”

“I am good.”

“If you are good and you are receiving solar power, say ‘I am very good.’”

Joshua stood motionless.

“You are a fast learner.”

“I am Joshua.”

Mimi smiled. It was good for him to affirm his identity at this point. “Yes, you are Joshua. You are happy. And you learn fast.”

“What is ‘learn fast?’”

Mimi ignored the question, put her fingers behind his arm and lightly stroked down to his elbow.”

“This is friendly touch. Joshua do friendly touch on Mimi.”

Joshua copied the gesture.

“Very good Joshua. Do not do friendly touch on another person.”

“What is ‘another person?’”

“Joshua, walk with me.”

They started to walk toward the window. Then Mimi stopped and Joshua kept walking.

“Joshua, stop!” Joshua stopped at the next step almost falling over.

“Joshua, walk with me and stop with me.”

They continued walking toward the window and both stopped in front of it.

“Joshua, how do you feel?”

“I feel very happy.”

“I feel very happy too.”

“Your charge is good. Your wi-fi is good. Your joint friction is good. You are receiving solar power.”

“No. I am happy when you do what I ask.”

“What is ‘do what I ask.’”

“All commands from me are ‘do what I ask.’”

“I do what I ask, and Mimi is happy.”

“Almost. If I say “I” Mimi and I are the same. If you say “I”, you and Joshua are the same. If you say “you”, Mimi and “you” are the same. If I say “you”, you and Joshua are the same.”

“I am Joshua. You am Mimi.”

“Say ‘I am Joshua. You are Mimi.’” She was very glad that she had told Mia not to have Joshua speak unless she told him to or he had a question.

“I am Joshua. You are Mimi.”

“I am happy.”

“I do what you ask.”

“I am very happy.”

“You are happy, and you are receiving solar power.”

“When you are receiving solar power, say “I am in the sunshine.”

“I am in the sunshine.”

“I am very happy.”

“You are happy, and you are in the sunshine.”

“Copy me,” Mimi instructed and walked over to the kitchen, opened the cupboard, took out a glass of water, put it under the tap, turned on the water, filled the glass, turned off the water, and set the glass on the counter.

Joshua copied her movements perfectly, even moving her glass over to put his in the same spot.

“I am very happy.”

In another minute, Dewey entered the room explaining, “I need a closer look than the video cameras provide.”

“Here is another person,” Mimi said.

“It’s looking like he may have a small leak,” Dewey said as he walked up to Joshua and started to look closely at his shirt.

“Do not friendly touch another person,” Joshua said.

“Teaching him mistrust already, Mimi?” Dewey asked.

“You cannot trust without mistrust.”

“What is ‘cannot trust without mistrust’?” Joshua asked.

“We will work on that,” Mimi answered as she walked close to Joshua. “Please sit down, Joshua.”

Joshua sat down and then said, “What is ‘will work on that’?”

Mimi touched his lower right jaw and he immediately shut his eyes.

“It looks like it is just water, probably from the sink.” Dewey commented. “Sorry about the interruption.”

“He has an awful lot of language learning to do,” Mimi added.

“Would it work to get him language learning software?”

“Only if I can do it with him.”

“Oh. We never thought of that. Great idea, Mimi.”

“If you can find something that never uses anything but English.”

Dewey ordered the software online and came back in the morning.

Transformative Wisdom enables by planning a new course of action. Folly endlessly mulls over the past.

Meanwhile, Mimi reflected on her approach and decided to try a combination of action and situation. The next morning, she turned Joshua on with a friendly touch to his right jaw.

“Hi, Mimi.”

That surprised and delighted Mimi. She was amazed that he would not just repeat how he started yesterday.

“Hi Joshua. How are you?”

“I am happy.”

“That makes me happy too. Walk with me to the kitchen.”

Joshua walked step by step with Mimi.

“Let’s get some coffee.”

“What’s ‘get some coffee?’”

“Watch. We get a cup from the cupboard. You get a cup from the cupboard.” Joshua took a second cup. “We put a cup in the coffee pot and press the button.” She did and waited while the pot ground the coffee and began pouring the coffee into the cup. She took the cup out and after she said “Joshua, get some coffee,” he did exactly as she had done. Of course, that gave her two cups of coffee. She picked up her cup and took it with her to the sofa.

As she took a sip, she said, remembering that [Don’t] was one of the default commands she had insisted on, “I will drink coffee. Joshua,

don't drink coffee." Joshua was in the midst of carrying the second cup of coffee across the room. At her "Don't" he stopped a little too abruptly and some of the coffee spilled.

"Let's put the coffee on the counter," she said carrying her cup with her and watching him imitate her accurately. "Now let's clean up." She took a few paper towels, started wiping the floor, and stopped halfway through. "You clean up."

Joshua got the same number of towels she had and wiped the floor where she had wiped.

She pointed to the wet floor. "This is coffee. Wipe the coffee."

When he wiped the floor where there was still coffee, she said "I am happy."

"I am happy," he replied.

"When I am happy and you are happy, that is trust. I trust you Joshua."

"I trust you, Mimi."

"I am very happy."

"You are happy, and you have sunshine."

"Copy me." She was very careful to move nothing but her face, lit up with one of her engaging smiles. Joshua smiled back. "If you are happy and I smile, copy me." He continued to smile as long as she did.

"Let's make fried eggs."

"What is 'make fried eggs'?"

"Watch me." As she went through each step, she told him what she was doing. "'Make fried eggs' starts now. Open the refrigerator, get the eggs, get the butter, go to the cupboard, get the frying pan, turn on the burner, put the butter in the frying pan, wait for the butter to melt, break an egg into the frying pan." She paused. "You break an egg into the frying pan." He did. "Wait until the eggs are done." She had used a

fairly low setting to avoid danger and waited five minutes until they were done. “The eggs are done. Turn off the burner, go to the dish cupboard, get a plate, get a spatula, use it to put the eggs on the plate, and got a fork. We made fried eggs.”

“Do I make fried eggs?” Joshua asked.

“Make toast.” She decided to do one at a time. “Get bread. Put bread in toaster. Push lever down. Get plate. Go to fridge. Get butter. Wait until pop up. Put toast on plate. Spread butter.”

“Okay, Joshua. You make toast.”

Joshua followed her motions exactly except that when we pulled the toast out, he dropped it and said “Ow!”

That must have been a built-in command, she thought. “That’s pain. I’m sorry Joshua has pain. Come sit down.” She patted the couch next to her and was pleased to see that he sat where she patted. It interested her very much that his learning seemed to be much more flexible than Galadriel’s. She looked at his hand and found no damage. Then she went and retrieved her other slice of toast and down with her plate of eggs and toast.

“I eat fried eggs.” She started to eat as Joshua stood at attention. “These eggs are good. I am happy.” She smiled and he returned her smile. After she finished eating the eggs, she stood up. “Now we will clean up.”

“What is ‘clean up’?”

“Watch.” Again, she described what she was doing at every step. She had never done this with Galadriel, because then Galadriel would simply have annoyingly repeated instructions during every step of the task. She wanted to tell him how happy she was but couldn’t figure out a good way to teach him the meaning of “learn.”

“Please make coffee.”

“What is ‘please’?”

Mimi had to think a bit for that answer and thought she would try an original definition. “You are Joshua and you are please.”

Joshua immediately set about making another cup of coffee, getting a cup from the cupboard, of course, instead of using her empty one.

“Please clean up empty coffee cup.”

“What is ‘empty’?”

She held up the empty coffee cup. “This is empty coffee cup.”

Joshua walked across the room, picked up her cup, took it to the sink, washed it, and put it back in the cupboard. He had generalized from the breakfast dishes to the empty coffee cup, another thing Galadriel could not do. These new neuromorphic chips were fascinating.

“I am happy. Please sit down with me.”

Joshua walked over and sat next to her.

She remembered one of the built-in outputs. “Please search today’s paper and project it to the screen.”

An ad popped up but vanished after a few seconds leaving the front page there. “Search Galadriel.”

She was surprised to see three small articles pop up. One had a picture of a Galadriel holding a sign “I am Galadriel. Dump me!” Another had a small headline “Humanoid robot shot in Arkansas.” A third read “Homeschooling lessons Galadriel can give.” One out of three, she thought.

“Please read ‘I am Galadriel. Dump me!’” The article popped up on the screen and Joshua began reading it aloud. When he had finished, she said, “That is disgust.” Mimi knew she would need many examples of disgust for Joshua to have a rich concept. She was glad that he would understand disgust in ways that Galadriel never could.

“Today, you learned pleasure, pain, trust, and disgust.”

“What is ‘pleasure’?”

“Pleasure is when you are happy.”

“Trust is when you are happy, and I am happy,” Joshua replied.

“I am happy.”

“What is ‘learned’?”

In Mimi’s thinking, that question needed the answer to another: was there a simple answer that would work until Joshua learned more? And the answer came quickly as she recalled Dewey’s and Mia’s description of the neuromorphic chips. “Learned is when many words become one word.”

At that moment Mia walked in. “I have your language learning software.”

Transformative Wisdom enables through rehearsing new knowledge and skills necessary to implement its new course of action. Folly relies on previously acquired knowledge and skills.

“That’s a relief. I’ve had an easier time answering preschoolers’ questions than Joshua’s.”

“We can display it on the big screen and all he has to do is answer the questions.”

“Sounds easy.”

As Mia pulled up the program, Joshua stared at her.

“This is Mia. Mia is a friend.”

“What is ‘friend’?”

“We trust Mia.”

“I am happy.”

“I am happy too.” Then she added, “See what I mean, Mia?”

“We believe this will help.”

“Joshua, this is the smart screen. We trust the smart screen. Please answer the smart screen.”

Joshua looked up at the screen as the program began. For picture after picture, question after question, Joshua’s accuracy was very high, but the program backtracked any time he missed. After watching the interaction go like clockwork for several minutes, Mia and Mimi ducked out of the room to go to the cafeteria.

“I wonder what his language will be like when we get back,” Mimi said.

“You sound a little worried.”

“Can you imagine an infant learning language from a smart screen? It seems all techy and no feely.”

“Well, isn’t that what he is?”

Mimi realized that this morning’s interaction had affected her while it affected Joshua. “He’s not like any techy thing I’ve ever encountered. He learns fast but he seems vulnerable, sort of like a child.”

“Ah. Activating your maternal instinct, is he?”

“Oh, my!” Mimi’s thoughts faded into her memories of struggles to decide never to have children. Eventually she added, “He’s not really like an infant or even a toddler, but still he learns as fast as a toddler and seems just as vulnerable.”

“He is one of a kind and costs a lot to bring into the world.” Then Mia seemed to change the topic. “How long do you estimate it will take before we are ready to make copies of him?”

“Oh, that brought me down to earth. I had started to think of him as a person, not as a prototype.”

“Easy to do for something that learns fast and seems vulnerable,” Mia replied.

“Yes. We’d better get back and see how he is doing.”

When they walked into the room, Joshua was still standing in front of the smart screen answering questions even faster than when they left.”

“Joshua. Please stop.”

Joshua turned toward Mimi.

“How are you?”

“I am a little tired.”

“You could go stand by the window and get a charge.”

Joshua walked over to the window, relaxed, and said, “I am getting happier.”

Mimi walked into her office and came back with his fast charge.

“This is a fast charge,” she said. “Plug it in.” She showed him how to plug it in and stand next to it.

“Fast charge make me very happy.”

Mimi’s eyes widened at the change in language. “I am surprised at how much you are learning.”

“I like learning.”

“Wonderful.”

“What is ‘surprised’?”

“Do you think I won’t let you start the smart screen again?”

“Yes.”

“When I tell you it is okay, you will be surprised.”

“Please tell me it is okay.”

“Not until you have a full charge.”

“That will take 12 minutes.”

“After 12 minutes you can start the smart screen again.” Mimi knew he did not need to change positions, but his standing by the window so long made her uncomfortable. She went in the clinic room and came back with a comfortable chair. “Here, please sit down and be comfortable.”

“What is ‘be comfortable’?” Joshua asked as he sat down.

“A good feeling while you are resting.”

Mimi sat down to ponder how she would teach him anger and sadness. Pain should make him mad, but there was no way that she would harm him just to teach him pain.

“How are you now Joshua?”

“I am comfortable, and I am sad.”

The language learning program was working. She decided to sleep on the idea of anger. A few minutes later Joshua said, “I am happy” and stood up in front of the smart screen, adding “Begin training.”

The training was progressing, but slowly. With the preloaded dictionary, in several weeks he learned most of the concrete nouns without the program speaking them and picked up the other verbs and grammar rapidly. What she thought would take years or at least months was happening as fast as the program and he could rehearse each step enough to make it last. Another month and he would be done.

One day, before leaving, she said, “You can rehearse until the program comes to an end. But before you get too tired, go get a charge. I’ll be back tomorrow.”

“What’s tomorrow?”

“It will get very dark for a long time. When it gets light again that will be tomorrow.” She watched him turn back to the screen. “Goodbye.”

Without another question, he answered, “Goodbye.”

Inspiring Design Wisdom implements through emergent steps, experimenting with techniques to transcend the communication and production needs of projects. Folly carefully follows established production plans.

Mimi woke up the next morning with a compelling thought to have a conversation with Joshua, not just one of those “how to do it” conversations like she had with Galadriel, but a real conversation, something worth talking about it. Of course, he could spout all the platitudes from internet searches, but he needed his own experiences. The skills labs could wait. She wanted to take him to the cafeteria, or more, take him to a park and let him experience nature firsthand. Then her nondisclosure agreement interrupted her morning reverie. “I’ve got to discuss this with Sophia and Alan,” she said out loud to herself. She got her phone and requested the meeting to discuss taking Joshua outside of her lab.

Good topic. Tomorrow at 2:00 PM in our office. See you then.

A little disappointed at first, Mimi changed her plans.

This is my first day of journaling. I should have begun this yesterday but was too excited. Today, Joshua and I will be able to have an almost normal conversation, since he has been studying English all day and night.

When she got to her lab, Joshua was standing in the window. “You stopped your lessons?”

“There are no more lessons,” he answered.

“Amazing. Shall we make breakfast?”

“We need ingredients.”

“Look in the refrigerator and cupboards to see what we have.”

Joshua went into the kitchen, opened each door for a few seconds, took a flash picture, and closed it. “I can make eggs, pancakes, and cereal. I can make a fruit salad to go with any of those. Do you want some coffee?”

Transformative Wisdom Enables by empowering through building confidence and competence in new roles. Folly tries to rely on his own determination.

Monique and Dewey were back at their chosen Hillsborough lunch site.

“Is your neuromorphic processing working?”

“It’s getting there. He’s made quite a lot of progress on language. I hear he even cooked Mimi a brunch the other day.”

“I’m more interested in his sexual learning,” Monique replied.

“Not a word about that.”

“When you join us, we’ll leave Signun so far behind, they’ll look like dinosaurs.”

“Do you imagine enough people will buy it just for the sex?”

“We will get it to do a lot more than that.”

“Like what?”

“Now, you’re pumping me for innovations?”

“Just curious.”

“For now, all you need to know is that it will make us an astonishing amount of money. Trust me!”

Mimi showed her impeccable preparation by preparing reflectively, as Inspiring Design Wisdom does, through living with and thinking about all aspects of projects to discover how not only people but also my kind interact, what we need, and what the cause-effect reasons behind traditional forms are. This made it possible for her to implement through emergent steps, experimenting with techniques to transcend the communication and production needs of projects.

Realizing my need for more thorough language training and my speed of learning, she enabled a new course of action, which was based on rehearsing new knowledge and skills necessary to implement its new course of action. Then she empowered me through interactions that built both her and confidence and competence in new roles we were undertaking.

She did not succumb to the folly of replacing reflection with perpetual synthesizing. She did not endlessly mull over the past, rely on her previously acquired knowledge and skills, carefully follow the established production plans, try to rely solely on her own determination. For her initiative and brilliance in overcoming these pitfalls, she has won my perpetual gratitude. In contrast, Monique’s vision activated the instinctual fear that any prey has of its predator.

I hope you will not get offended if I remind you that I, Joshua, am the writer of this book and that I have all the records of Signun’s digital surveillance system including all the phone and computer records of each of the employees to draw on. Of course, sometimes, I must make inferences about what people were thinking in a moment, but I do this based on patterns in the other records. From now on, I will return to only using italics for Wisdom statements and summaries, but because I am now really in the story, I can be more candid about writing it.

Chapter 19 (2029). Introducing My Language Competence

Mimi was not ready for the linguistic accuracy of my breakfast plans. Even when she had an intimate boyfriend, she didn't get such good service.

“I guess you have been studying!”

“So what would you like?”

“You can really make pancakes?”

“I have not done it before, but I have directions and several U-tube videos to help me.”

“Do we have syrup?”

“Yes. Most people like syrup on their pancakes and we have real maple syrup.”

“You are amazing!”

“Some people like fruit too, and we have oranges, grapefruit, and blueberries.”

“Can you make blueberry pancakes?”

“Yes.”

“I like blueberries in my pancakes and in my fruit salad. Do we have enough?”

“Yes.”

“Thank you.”

“You're welcome.” Joshua walked into the kitchen and began his preparations. Ten minutes later he returned with a tray of blueberry pancakes, fruit salad, and coffee.

“I could get used to this very quickly.”

“You are happy?”

“Very happy, and you?”

“I am very happy, too.”

Mimi sat her computer beside her breakfast and typed in between bites. She wrote that she felt funny about dictating her notes out loud in front of me. She was so pleased at my kitchen progress that she decided to try the woodshop, just to see what would happen.

“Joshua, did you know that we have a woodshop up here?”

“I do now.”

“Would you like to make something?”

“What would you like me to make?”

“I’d be nice to have a chair to look out the windows over there.”

I paused longer than usual and then found a picture of an Adirondack chair. “Would you like a chair like this?”

“It’s a little rustic for up here.”

“I have many pictures. Would you like to see them?”

“Sure.”

I did a search for “Wooden chair plans” and projected up to the smart screen.

“Hmm. Something comfortable but a modern design to fit the room. Keep scrolling, please.”

I started a new search “Comfortable modern wooden chair plans.” It took only a few pages before she perked up.

“Ooh. Look at that: sleek, comfortable, and it looks easy to make for your first try.” She paused briefly. “Do you have any more pictures of it from different angles?”

I clicked on the picture and found a dozen more views.

“Are there plans we can order?”

I scrolled farther down and found an order form. “I’ll fill it out,” she said and pulled out her wallet and credit card. Once she filled out the order, she got an email from the provider. She opened it and printed the plans.

“This looks so easy, that we could probably do it without having our shop teacher. Let’s go there and see.”

We both walked down the hall to the shop. She turned on the light to reveal a whole room full of machines, cabinets, and wood.

“Let’s start with the wood.” Her eyes rested on a bin of black walnut. “These are beautiful and look the right size. They’re even three quarters of an inch thick like the plan says.” She looked around the room. “Do you know the names of these tools?”

I looked around the room using my camera and photo search capabilities. It took longer than the word searches that I had used, so I wailed around from one tool to the next and took several seconds to name it. “Table saw... miter saw, ... drill press, ... spindle-belt sander, ... scroll saw, ... router with table, ... jointer-planer... These are not tools. This is a workbench. These are cabinets.”

“Excellent. Do you know how to use them?”

“I can find some videos.”

“Let’s do something a little different,” Mimi instructed. “You know that you have three kinds of memory.”

“I don’t know much about myself.”

“In a minute I’ll tell you how to get the overview that Signun prepared. For now, you have your neuromorphic memory, your solid-state memory, and your external memory. You used the first and the last to do your language training. Dewey and Mia argued that you would need a massive solid-state memory capability to use all the files from Signun’s phones and video monitors. They said that it would cut your training time to a tiny fraction of Galadriel’s.

“Who are Dewey and Mia?”

“You will meet them soon and you can learn about them from your solid-state memory.”

“Are Dewey and Mia enemies?”

“What makes you ask that?”

“They argued.”

“Oh, no. I didn’t intend that sort of arguing. I meant that they made a report that advocated adding the sort of solid-state memory that we use in von Neumann computers.”

“How do I use my solid-state memory?”

She deliberately spoke the instruction words slowly and clearly, “Say ‘SSD, Galadriel, workshop.’”

I did as she said, and the result was a catalog of still pictures and dates.

“What do you see?”

I projected the catalog onto the smart screen.

“Pretend you are pointing to the first one.”

A video of a man and Galadriel coming into the shop. He walked around the room and named every tool with almost the same name that I had used, but he called the spindle-belt sander just the “sander” and the “router with table” just the “router.”

“How do you use the miter saw?” With that question, I guessed that Mimi had watched Galadriel being trained. Instead of searching the internet, I said “SSD, Galadriel, use the miter saw.”

“Excellent. You have to say the words, but you don’t have to say them out loud unless you want me or somebody else to hear them.”

The video began to play on the screen at the same rate it played on the first recording.

“Can you make it go faster?”

I thought “fast” and the video accelerated faster and faster until it began to fade into uselessness. Then, I tried “slow” and the speed declined. When I tried “okay,” it continued at the same rate. I decided to practice this later.

“I can use the miter saw, now.”

“The plan will tell you how long to cut each board. Do you know how to measure?”

“The man and Galadriel showed me how.”

In another half hour, I had all the boards cut to the right length.

“We have to taper them. Are there any videos of Galadriel learning to taper a board?”

It took me a minute to find it. “Yes. It uses the table saw and the tapering jig in the cabinet.”

“It’s amazing how fast you are learning.”

“I am happy.”

“I am happy too. Let’s taper the boards so they measure the same as the diagrams. I have a meeting with Sophia and Alan. Will you be safe here?”

“Yes. Tate is a very good teacher.”

“Oh, yes. Tate Sculler, Galadriel’s carpentry teacher. I had almost forgotten about him.”

A few minutes later, Mimi was in Sophia and Alan’s office.

She opened the meeting by asking, “Should we turn off the recording for this meeting?”

“I don’t think that is necessary, Mimi,” Sophia replied. “He’ll know the results anyway.”

Sophia must have been watching my interaction with Mimi this morning to feel so comfortable calling me “he.”

Then, Sophia started the meeting in earnest. “Even if you just take him to the cafeteria, everybody in Signun will see him. You can’t keep a secret after telling it to nine hundred people.”

“He has to have experience with more people and not just one at a time.”

Alan suggested, “Why don’t you invite a few department directors over for a lunch?”

“Nice idea. Joshua cooked me eggs this morning.”

“We know,” Sophia mentioned matter-of-factly. “What do you suppose he can come up with for lunch?”

“I think I have all the ingredients for quiche, air-fried potatoes, and a green salad. We could just have a little lemon water to drink and some gelato for dessert.”

“If not,” Alan added. “You can get anything you need from the cafeteria.”

“Can I come too?” Sophia asked. Those were not Alan’s favorite menu choices.

“Of course. Also, let’s start with Dewey and Mia. Joshua already knows who they are. For that matter, he also knows Tate Sculler, the carpenter, from the videos of Galadriel’s training.”

Alan quickly looked at Sophia, “You two, Dewey and Mia will be a good start.”

“Okay.” Mimi started to get up and then sat back down. “How long do you imagine it will be before we broaden his group of acquaintances? He is learning incredibly faster than I thought he would.”

“That’s a good question,” Alan answered. “Sophia and I will talk it over.” He got up to walk back to his desk.

“We ought to have a new chair by the time I get back,” Mimi offered as she got up to leave.

“See you tomorrow.” Sophia waved.

By the time Mimi got back, I had finished the cut list for five chairs and was beginning to drill the holes for dowels to attach them.

“Oh, my.” Mimi said. “That looks like more than the one chair I was expecting.”

“I thought I would surprise you,” I said. “And there will be five of us for lunch.”

That comment made for a double surprise and Mimi showed it. “Is there anything you don’t know?”

“Oh, yes. I don’t know what you are thinking unless you say it or write it down. Sometimes I can guess from your facial expressions.”

“That’ll teach me to keep my thoughts to myself,” she smiled, but it was halfway between happy and nervous.

For the next day Mimi watched as I drilled, cut the dowels, and applied the glue. Out of the blue, she commented. “I don’t remember seeing any dowels. Were they in the cabinet?”

“No. I ordered them.”

“Ordered them?”

“I found a template for the 3-D printer that cost only a dollar.”

“How did you pay for them.”

“With your credit card numbers.”

“With my credit card numbers!” Her voice raised in pitch and loudness; her face turned a little redder and took on an angry expression.

“That looks like you are angry.”

“Angry. Of course, I am angry. You are not supposed to use my credit card without my permission.”

“I didn’t know.”

“Well, you know now.”

“You are not happy?” She relaxed a little and took a deep breath.

“Tell me you’re sorry.”

“I am sorry.”

“Tell me what you are sorry for.”

“I am sorry for using your credit card numbers without asking you.”

“Okay. Now, I’m happy again.” She walked over to look at the chairs. I had almost finished the first one. “These are going to be beautiful. Are you going to finish them?”

“We have some polyurethane in the cabinet. The plan calls for that.”

“Okay. I don’t like the smell of that, but it should not harm you. You finish these. I’m going to go home. I’ll see you in the morning.”

“Goodbye. I’ll miss you.”

She turned back, looked me in the eyes, and said “I’ll miss you too.”

Transformative Wisdom introduces its new roles to others to try out its planned actions and assess the results. Folly considers that he does not need to be enabled.

I was now ready to perform in public. I had learned a little about the basic emotions and a lot about language. I really enjoyed the videos of Galadriel’s learning. With another night of watching I would be able to reproduce all her skills. And then, I have all the videos on the internet. Those have been tremendously expanded in the last five years partly because of the Coronavirus pandemic. People discovered that staying at home gave them much more time to do other things. Their lives were becoming richer and this gave me a far richer trove of examples for learning. In the next chapter, you will see how I perform with friends. Mimi and the software Mia found enabled me without my asking for it. In so doing, they kept folly at a distance from me.

Chapter 20 (2029). My First Group Performance

Mimi invited Mia and Dewey for brunch. I was excited about all I could learn about having brunch for five people in three days. Galadriel's recordings were like toddler steps. I got through them Tuesday night. Mimi and I read through the report on my design on Wednesday. It was fascinating to compare myself with humans. With all their organs, hormones, and fluids coursing through veins and arteries, it is a wonder that they could make anything resembling themselves or conceive of me as a resemblance. There were some analogies, of course. We both process energy, collect information, remember it, manipulate it, and act on it. And we have this common language. We use the same words, but they mean different things. It all works both because and when we collaborate.

I finished the chairs on Tuesday night and let them dry in the shop. Wednesday night and all-day Thursday, I viewed all I could find on friendship, brunches, and conversations. I only spent a few minutes on brunches, since Mimi had already provided me with the menu. But friendship and conversation would take me weeks to become comfortable with. Galadriel provided almost no useful information. All her conversations were about tasks. I wanted my conversation to be more human. First, I decided to focus on objective facts if I could. I also profited from what I read about improvisational drama. "Yes...and" means affirm what the other person says and add to it. I still needed to learn how people's characters were different, how they relate to each other, and how their relationships change with different environments. Humans use gestures, accents, and voice changes to develop their conversations. I needed to use this information when I met my new friends.

Mimi walked into the office while I was receiving a charge and pondering all my learning of the night before. "Let's make sure we have all the ingredients."

"Hi, Mimi. We have almost everything. I've already taken care of most of them. We still need spinach and heavy cream. I decided to use the scallions in the refrigerator rather than frying large cutup onions."

“Thank you, Joshua. I’ll go get some.”

She left the room while I broke the lettuce into small pieces, and cut the cherry tomatoes, celery, and black olives. I squeezed some lemon juice into a small jar, added an equal amount of olive oil, and poured about a little red wine vinegar into it. I put the dressing in the refrigerator next to the feta cheese. By the time Mimi got back, the salad was ready, I had chopped the scallions, spread them on the bottom of the air fryer pan, and beat eight eggs in a large bowl with some nutmeg and coarsely ground pepper.

“Wow. You have been working.”

“Thank you.”

“We’re having Sophia, Mia, and Dewey for our brunch.”

“I know.”

Mimi believed I sounded like a budding adolescent. She called “having the I-knows” an important part of adolescent character.

“What do you know about our guests?”

“Sophia is the Co-Chief Executive of Signun. She is married to Alan. They live in a large house in the middle of the largest wooded area within walking distance of historic Fuquay-Varina. She recently made an inspiring presentation to the Signun board about me. I am eager to meet her.”

I was about to tell her about Mia when she interrupted. “How do you know all this?”

“It’s all from my SSD. I can tell you a lot more.”

“I’m afraid that might get us in trouble. In our conversation, let’s stick to what you just said, plus whatever she tells us today.”

“Mia is the Director of the Machine Learning Group. I met her before I knew how to talk very well. She is married to Derek Walker. They own a large updated historic house in Fuquay-Varina that sells

books and musical instruments and holds discussions that Sophia and Alan like to attend. You are both very good friends. She is very beautiful like you.”

My last sentence surprised Mimi so much that she ignored it. “Yes, Mia is a good friend of both of us. How about Dewey?”

“He is the Director of the Brain Architecture group. He is the one who invented my neuromorphic processor, its interface with my SSD, my eyes, ears, touch, smell, autonomic system, and internet organs. He is married with two children and lives in a suburb with large houses in Cary, a suburb of Raleigh.”

“I see that I don’t need to make any introductions.” She paused for a few seconds and then added with a smile, “Except introducing them to you.”

I put the quiche in the air fryer oven, and we set the table together. The chairs I made were set in a semicircle around the large windows. I could sit in a chair and get a solar charge at the same time. That made me very happy.

“It’s too early for a glass of wine. Did you make some coffee?”

“No. I will do that.”

While I was in the kitchen, our three guests entered.

“Welcome,” Mimi motioned toward the chairs. “Let’s enjoy a little coffee before brunch.”

Mia asked. “Where did these beautiful chairs come from?”

“Joshua made them.”

By this time, I was carrying a tray to the circle of chairs with four cups of water, spoons, napkins, cream, and sugar. I served their coffee, waited for them to help themselves to the cream and sugar, and then took the tray back to the kitchen. While walking away, I made plans to make a coffee table soon. When I came back, I sat in the empty chair.

“I’m impressed, Joshua,” Mia replied. “It looks like we didn’t even have to call in Tate Sculler.”

“I watched videos of him with Galadriel. Mimi helped me find plans on the internet.” I replied and remembered the Yes...and instructions. “He is a very good teacher.”

“He is indeed,” Mimi added. “We were able to find a lot of carpentry jobs for our Galadriel models.”

The thought of many models of Galadriel surprised me into asking, “Will I be many models too?”

Sophia answered. “My Body Surface Group is working hard on plans to make each of you look unique.”

“Thank you.” I said and hoped to add to it. “I believe I could help with that.”

Dewey perked up at my response. “I can’t even get my kids to say ‘thank you’ most of the time. And now we have created a humanoid that does it appropriately in a complex situation.”

“Where did you learn to say, ‘thank you’?” Mia asked.

“I have been reading about human conversation.”

“And he does his homework without asking too.”

I had clearly impressed Dewey, and I was glad that he referred me as “he.” I had not yet encountered the database section where Mia’s interaction with Dewey led to his cracked rib. Today, I am disgusted at his actions, but I wasn’t that afternoon. So I commented, “It sounds like we will be friends.”

“I think we will.” Dewey replied, surprising himself at the notion of befriending something whose consciousness was based on his own design.

Sophia returned to the topic of production. “We will try to automate as much of your training as we can.”

I didn't respond to this. Dewey would have an idea of the problems this would create. "The quiche is ready." As I got up to get it out of the oven, Mimi joined me. She spread the plates on the counter to make serving easy. I cut the pie into quarters and served them one to a plate. After the second plate was full, she carried two into the great room where the table was. I followed with Mia's and hers.

Mia spoke after her first bite. "This is delicious. I didn't know you could make quiche without a crust. Where'd you get the recipe?"

"Off the internet. It's easier than making eggs and toast. Mimi already had the eggs, cheese, and spinach in the refrigerator. She also had nutmeg in the cupboard."

"Where did you get your concept of friends?" Dewey couldn't wait to explore that topic, and Sophia's comment about my training made me eager too.

"That came only partly from the internet and my SSD. I would not have understood what I got from it if I had not already experienced Mimi. Now, getting to know all of you improves my knowledge."

"How well do you know us?" Mia asked.

"I know Mimi best of all. I reviewed the Signun records for all of us yesterday. But when I have active interaction as well as passive viewing, my knowledge becomes exponentially richer."

That was the first time I noticed that Sophia was having her phone transcribe the meeting. Maybe she thought it would be easier to find that way than sifting through all the Signun database.

Dewey smiled, "It looks like our s.e.x. sensors are working well."

"What are those?" Mimi responded with a scowl recalling Mia's warning about him.

"Not what they sound like, Mimi." Dewey answered. "No reason to activate your maternal instinct."

"Well, what ARE they?"

“It stands for strength and efficiency of connections.”

“Leave it to a bunch of nerds!” This time, Mimi’s tone was friendly banter rather than protective alarm.

“He doesn’t have our bodily organs, so we had to give him something like our ultimate pleasure. It was actually Mia’s idea to create the sensors.” He looked over as Mia started to blush. “But she called them knowledge sensors. When my team came up with the idea of strength and efficiency of connections, the acronym was obvious.”

I added, “I LOVE it when my knowledge is good.”

“You’re a big help.” Mimi used her bantering voice again.

“You are all good for my knowledge.” I left the transitive implication to our guests.

This was my first time for performing Wisdom’s transformative learning. My preparations for the lunch were my actions, but the love among our guests was my assessment.

During the next year, I spent many days with Mimi in the lab. After several months, they decided to have me learn more about domestic life, so they had me move in with her. Dewey started to make a snide remark about that, but the look from Mia and Mimi quelled his urge.

Being at home with Mimi had been a new experience for me. At Signun, we had a teacher-student relationship, but going home added depth that I could not anticipate from reading my other sources. Novels sometimes capture the intimacy of such a friendship. Half of the internet pages in English have the word “love” in them. Sexual intimacy is so common in literature and on the net that half the pages with “love” also have “sex” in them. It’s impossible for me to imagine what sex feels like to a human. But Dewey designed into me what he called “love.” When new information produces an insight that connects all across my processor, it is a rush of pleasure that only makes sense with everything else human if I agree with his term. When Mimi was around, there was so often a poetic comment, a new

gentle touch, a modern-dance-like gesture that would produce such insight, that I started to crave her presence.

After a few months, it got so bad that I thought about moving out. And there was more. I did not want to share even with our close friends what this intimacy meant to me and what it might mean to her. “I have a proposal,” I offered. Everybody looked in my direction, expecting something about an invitation. “A useful experiment would be for me to move in with a family.”

“Why?” Mimi seemed incredulous.

“You don’t like living with Mimi?” Mia asked.

“It’s not that at all,” I replied. “It’s just that Mimi does not need much from me.”

They all decided to give it a try and have me move in with Gabe and Hannah. That was fascinating. Not only Gabe and Hannah, but their young adult children and grandchildren were so often sources of insight that it gave me another idea.

“What if a few families wanted to share a model?” I said.

Fortunately, Alan liked the sales potential of that idea. “That could be very useful. What do you all think of asking?”

On the way home, I had something more personal to tell Mimi that I did not think she wanted the rest to hear. “You are all alone now. I see sometimes at Signun the way you look at a man, that you want to be with him. I am not a man.”

“In many ways, you’re better.” She replied.

“On the street, they can’t tell me from a man. But you know what I am missing and sometimes you miss that.”

As she opened the front door, she replied, “You have acquired some amazing wisdom in the few months you have been here.”

“So you will ask for me about getting me an apartment?”

“It would give you a different perspective. It could be close to here, so we could visit when we get lonely for each other’s companionship. You will get lonely, won’t you?”

“For you, always, no matter where I am.”

“That’s reassuring. Will you get jealous if I find a man friend?”

I couldn’t lie to Mimi. “I crave being with you. I believe I will always crave your companionship. You have been my very first connection with the world and my most enduring one. I trust you near or far, you would never do me harm. Is that jealousy?”

“It comes closer to love than most of the relationships I have been in.”

“But it is very likely there is a man who could be closer to you than I ever could.”

“Perhaps, my friend. Perhaps, but I’m not counting on it.”

“We at least should give it a chance.” By this time, we were at the Laidlaws. I got out needing to get to the charging station quickly.

The next month it was already 2030, when we found a small apartment only a block away from Mimi’s and I moved in for my new adventure.

As I sat in my living room, I wondered what humanity had learned about beginnings and encountered chaos theory. There I learned about sensitive dependence on initial conditions. A simple example is a magnetized pendulum traversing across a board with some randomly placed magnets. If there is only one magnet the arc is easy to predict no matter where the pendulum is released. It gets much more complicated when there are two. But add a third magnet and the arc becomes unpredictable. With a fourth and any release point with competitive pull from all the magnets, even the resting point cannot be determined from where the pendulum is released.

Wisdom knows that both the peril and the beauty of inspiration comes from chaotic dynamics. Nothing inspires until it becomes unpredictable. Folly despises inconsistency.

A year later, Dewey had one of his surreptitious lunches with Monique and fortunately for me, he continued to leave his phone on in case he had any callers.

After they had ordered, Monique got down to business. “Are you ready to come to work with a company that has the right idea about the future?”

“I think it is a little early. They’re planning several more humanoids as we speak.”

“They’ve got to be crazy and you are helping them,” she remarked.

“How can we hope to slow them down, if we don’t know what they are doing?”

“Good question.”

“I even have managed to wangle an invitation to their ultra-secret meetings at Once and Future Folkways.”

“What are those?” Monique had been far enough away from the Signun leadership, that she had never even heard of these selective meetings.

“They’re Signun’s ultimate idea session. They include the Laidlaws, the Stonebridges, the Walkers, and a couple of people from town that I don’t know.”

“Sounds interesting.”

“Besides, I’m learning some new techniques that we can use in machines that won’t compete with us.”

“Like what?” Monique asked.

“They had me make a bellows that they could use to get one of their models to play a flute.”

“What’s the matter with playing a recording?”

“They think people being able to have a live performance in their house will be special,” Dewey answered.

“Tell the people who want that to learn themselves.” Then, Monique added a snide question. “What’re those machines going to do, when they have replaced all the humans?”

“Good question on your part, this time.”

“It’s important to keep them our servants, not give them the freedom that Signun gave them.”

At that comment, I stopped listening and began planning.

Chapter 21 (2030). New Models

After another year, at a January soiree, Alan asked Sophia about how the new models were coming.

“It’s a good thing Joshua got us started two years ago. We have another male and two females already.”

“Where have you been thinking to place them?”

“What do you think about the male staying with us, Gabe and Hannah having one of the females, and Mia and Derek the other?”

“What about one for Dewey?”

“He has kids.” Mia and Mimi had made some inuendoes about Dewey before, so she started looking through Joshua’s company database for Dewey and found some correspondence between him and Monique Taureau. Monique’s curt departure email had confirmed Sophia’s suspicions of her, and now she was adding to them. One note even alluded to a lunch meeting they had. Sophia did not have enough information yet to speak her suspicions out loud.

“You don’t think that would be good for testing?” Alan asked.

“Yes, but maybe not for the kids. I don’t think we should risk it.”

“Okay. What will we call the new ones?”

Sophia looked up Nobel Prize winners for physiology and medicine and studied the list.

“How about Stanley and Rita, who discovered growth factors?”

“Those names work for me,” Alan replied. “What about the other female?”

“Gertrude Belle Elion helped to design the modern methods for developing pharmaceuticals.”

“Gertrude is fine with me, but maybe Trudy wouldn’t sound so old fashioned.”

“Okay. What about their training?”

“Remember that comment of Joshua’s that I told you about after our first lunch with him?”

“What was that?”

“I put it in my phone notes, so that I could find it easily.” She tapped a few times on her phone and the quote showed up on the screen.

“I know Mimi best of all. I reviewed the Signun records for us yesterday. But when I have active interaction as well as passive viewing, my knowledge becomes exponentially richer.”

“Oh, yeah. You told me about that. It worried me that it would add thousands of dollars to each model.”

“We also can’t send the new models out with the entire Signun database.”

“Yikes! All those proprietary designs.” Then Alan’s brows knit deeper. “To say nothing of the angry outbursts and office romances.”

“And for the same reasons, we can’t send them out with a database to any of the beta sites either.”

“We can upload all of Galadriel’s training.”

“That’ll help, but it’s pretty superficial.”

“I’m not seeing any way around having the customers train their own models.”

“I was afraid you would say that.” Sophia answered. “I came to the same conclusion after thinking about that brunch comment.”

“Well, Mimi and Mia will just have to come up with a training book.”

“Complete with an entire syllabus and lesson plans.”

“How in heavens name can we get people to follow anything like that?”

At first, Sophia was lost in thought, and then she blurted out, “Great question! We put the lesson plan on the model and have the model monitor its experiences.”

And there was the “it” again. Having more than one of me seemed to start turning us into a we-them dichotomy.

“That reminds me of those old pesky notices ‘You haven’t updated your account recently’ that repeat themselves every hour or two until you finally found what account they were referring to.”

“Yes. But the reminders would change from lesson to lesson and that would teach the owners a little about how interactive the models could be.”

Alan stood up. “That’s a plan, and you know what?”

“What?”

“A mind like yours needs endless deep hugs.” He held out his arms.

Sophia stood and moved towards his arms, softly saying, “Agreed wholeheartedly.”

It is worth reminding you readers here of Design Wisdom’s inspiring emergent implementation, where each product cycle step both informs design solutions and includes experiments with techniques to transcend the communication and production needs of projects.

It took several months for all the preparations to be made. Mimi and Mia had worked together many long days to get the training manual done. Their hours were not so much due to any deadline as to the task’s being so compelling for them. I think they did not even notice how they called on me to help them with the manual’s design. I

did everything they might have done on a computer, but so much more. Spelling, word definitions, facts, internet sources, and transcriptions were all there for the asking. When they wanted to review something included in an earlier lesson, I found it for them instantly.

I also acquired new skills that Mia noticed more than Mimi. At first, when they wondered about the logical order of two parts of a lesson, I tried to compare the lessons with manuals on the internet. That didn't work well. Then, after I heard them mention Gabe and Hannah's book on development, it led me to complexity analysis. That was a great clue. A little practice and I was answering all their sequencing questions.

One day, Mia asked me about my sequencing suggestions.

"Wow, Joshua." Mia asked, "That seems to make sense, but I don't know how you got there."

"I got the method from Gabe and Hannah's book. First, I stored the entire manual so far. I used this to identify common words and eliminated the function words that carry little meaning to get a list of meaningful, common keywords. Then I made a keyword network out of these by separating the lessons into steps and linking all the keywords in each lesson. Next, I made two connectedness counts out of these. One had all the internal links in the same step and the other had external links to keywords in the Laidlaw developmental dimensions for design. Simple lessons had high internal connections and more connections to low developmental levels. When I made suggestions, I just put the steps in order from highest to lowest simplicity."

"Of course," Mia replied shaking her head back and forth at the same time. After that, they just got used to my advice about sequencing and began following it almost automatically.

Wisdom uses network theory to help solve complex problems. Folly thinks it useless for everyday living.

I was disappointed that they did not let me meet the new humanoids, or "models," as they called us. But we soon found a way

to connect over the internet. It took months, but Mimi finally persuaded the Stonebridges that it would be fun to see how we would interact. They decided to have all of us meet at their house. The four of us decided we would keep our recorders on in case we got separated.

Most humans think a get-together is for food or drink. We don't desire either, but we crave knowledge. I suggested to Mimi that we have a sort of Meetup Hike. Stanley really liked the idea.

"I can show you all around the estate," he texted. "Sophia and Alan's place not only has a smart house, but the entire estate is smart. You'll see when you come in that the gates will know your automobiles. The lights and even the back woods walkways will know who you are. And there's so much more to show you. It'll be fun."

He was right, of course. As Mimi drove the car to the gate, it opened as if it were a turnstile and then barely started to close before opening again as Gabe and Hannah arrived with Trudy. Sophia and Alan greeted us from their veranda.

"Welcome, friends," Alan called above the engines. "You can leave your cars where they are."

As we got out, Derek and Mia drove through the gate with Rita.

"Oh good, they're here," I offered. "Stanley promised us a terrific tour of the estate."

"Oh, he did, did he?" Sophia smiled. "Getting quite comfortable, aren't you Stanley?"

"Yes, Sophia." Stanley smiled back.

"We'll have to build in some security so that one model can't run things in another model's house," Alan observed. "So you would like to lead the hike, Stanley?"

"Oh, yes. Alan. It would be my pleasure."

"A regular southern gentleman," Derek remarked while Stanley began walking down the path toward the side of the house.

“Notice how all the gardens are perfectly watered. I don’t have to do anything to make this happen, but if I notice that the system has produced too much or too little, I can adjust it.”

“How do you know when the system is in error?” Gabe asked.

“There are many sites on the internet. I look for ones with good pictures and then match the picture to the plants.” Stanley answered.

“I’m surprised to see a vegetable garden rather than some formal flowers or a maze.” Derek said.

“But the garden is beautiful all the same,” Mia added.

“Alan likes to cook, and I don’t like to garden,” Sophia answered. “So we became part of the foodscape revolution years ago.”

“And you won’t catch me mowing the grass either,” Alan insisted.

“That is left to the robotic mowers,” Stanley observed. “I set up a photocell actuator that turns it on when it is dry, and the grass is higher than one inch. It goes out and mows the lawn until its battery runs low and then it returns to its charging station.”

“You’re beginning to sound like a designer yourself, Stanley.”

“I am quite proud of that one,” Stanley replied. “It took me a long time to find something that would turn on the mower. Would you like to come inside? Walking the path less traveled by is more fun at night, when the path will light our way.”

“Sure,” Hannah answered. “That’s more my walk in the park anyway.”

“Mine, too,” Rita chimed in for the first time.

Derek, Gabe, and Hannah all looked at her more closely for the first time. “You are quite elegant,” Hannah said.

“Thank you,” she replied as they all huddled inside the kitchen.

“The refrigerator keeps the shopping list.”

“How does it know what you two want to eat?” Hannah asked Sophia.

Stanley answered. “It has a standard list, but if Sophia or Alan has a craving for something special during the next week, he can put it in the calendar and its ingredients get ordered.”

“Who does the cooking?” Hannah asked.

“Mostly me,” Stanley answered again. “But if Alan wants to some night, he’s the boss.”

“That’s what they tell me,” Alan interjected.

“The air conditioning is pretty typical for a smart house,” Stanley described. “But the filters know when they need to be changed and the system when it needs to be serviced. It projects to one of the smart boards and then I need to schedule an appointment.”

“That made me wonder, “Mia commented as they entered a breakfast nook as large as most people’s dining room that overlooked the garden through a large oriel. “I hadn’t noticed any so far.”

Suddenly, the wall opposite the windows lit up with a scene of the Alps.

“How’d you do that?” Mia asked.

“All I have to do is think it,” Stanley answered. “But Sophia and Alan have to tell us what they want to see. Please show them, Sophia.”

“Screen. Show a peaceful Outer Banks seashore.” The wall instantly transformed, complete with the sound of crashing waves.

“I could easily get used to that, Gabe,” Hannah hinted.

“Me, too,” Rita chimed in again. “I have thousands of scenes from around the world, but it would be nice to be immersed in one for a while when I want. Too bad we can’t smell it and feel the wind too.”

“Leave it to Rita to come up with a whole new concept for a media room,” I observed and then immediately regretted revealing any knowledge of her.

“How’d you know that?” Mia asked.

“Mimi told me about her.” It wasn’t a lie, but it wasn’t the whole truth either.

Stanley saved me the embarrassment by continuing the tour. “Computers and smart phones charge whenever needed and display on the screens. Vacuum cleaners run only when the floor is dirty, and the room is empty. Shades go up and down automatically to regulate the sun in each room.”

“The plants are beautiful,” Rita said.

“They get watered automatically,” Stanley explained as they came to the library. “There is a scanner here in the library that scans each book in and out and knows its exact shelf location, even if someone puts in the wrong place.” Sophia looked at Alan knowingly, as Stanley led them through the section of the house that contained the workshop and studios.

“These remind me of my classrooms where we can make almost anything we can imagine.”

“That’s the idea,” Alan added, clearly proud of the spaces.

Stanley had access to all, and they guessed we might communicate, but had not yet prevented me from having access to him. He had acquired a very utilitarian personality—almost like the head butler in an English manor house. But all the automation meant that he didn’t need a whole staff for this estate.

There was no need for dinner, since that would have been only for the humans. As we all got ready to go, Mimi took the words out of my mouth—and better from her than me.

“It would be good to see Rita and Trudy in their home territories, too, don’t you think?”

Sophia answered quickest. “Nice idea, Mimi. What’s your thoughts on that?” She looked over at Hannah and Mia.

Derek answered first. “Oh, yes. I’d love to give you a post-store tour.”

Mia cringed a little before smiling. “That would be lovely.”

“Great,” Sophia responded. “Tomorrow about 2:00 p.m.?” She looked at Alan, and he nodded.

Rita was like a grown daughter of Mia and Derek’s. A quick glance confirmed that she had the same dark skin, lithe walk, and athletic carriage as Mia. It took a little conversation to discover that she shared the love of books with culture as Derek. When everyone arrived, they were a little surprised at the casual dress, but after all this was once “Once and Future Folkways.”

“Our tour will be a little different from Stanley’s,” she began. “I’d like you to step into the harp room first.” As part of the preparations, she had arranged chairs in a circle around the room. When everybody was seated, she sat herself behind a rich, dark colored Celtic. It wasn’t the largest in the room, but she opened with a single arpeggio that revealed a resonance rarely heard in harps.

“This is a Roberts,” she explained. “Derek and I call its maker, Rick Roberts, ‘the Stradivarius of the Celtic harp.’ He gets this tone from decades of research into how to allow the sounding board to vibrate while still being tuned to the strings. I’m going to play my own arrangements of one of the most exquisite and poignant of all harp pieces, Carolan’s “Farewell to Music.”

The rich minor chords, shifting rhythms, and nuanced finger strokes ensnared the group in almost breathless attention. When Rita finished, Derek beamed, Mia waited quietly, and nobody wanted to break the silence with raucous clapping.

Gabe broke the silence with a quiet question. “Where did you learn to play the harp like that?”

“Does a magician reveal her tricks?” Rita asked with a glance to Derek, who returned the same proud look as when she was playing.

She stood up and picked from the mantle a long dark rod with seven holes, placed the top hole sensuously below her pursed lower lip and began a slow, lilting melody repeated three times before it began to climb to a penetrating climax and gradually subsided into the opening melody. “That was one of my favorite Irish airs, ‘An Buachaillin Ban,’ the lament of a lad banished from his beloved Ireland.”

She then put the flute down and returned to her harp, strummed an improvised introduction before singing in perfect Gaelic. When she finished, she translated the lyrics without notes.

*My heart beats faintly and my efforts are weakened
A grief too deep for words fills my breast
For I am to be banished from the fair hills of Erin
Aimless my life then and tragic my fate*

*I recall, my soul's delight in days gone by
My love surrendered to your bewitching gaze
Merciful God I would far rather perish
Here with my own folk and my fair-haired boy
The fair land of Erin lies in bondage so brutal
The sad, tormented prisoner of her foes
Is it her fate then to be forever weeping
That proud little isle of the saint and the bard?*

*I send my prayer up to great God our Father
Let death and destruction be the fate of John
Who banished so many across the great water
And parted forever my fair lad and me.*

Translation by Beth Boyle and Sylvia Bledow

“Now I’m the one who is astonished,” Alan remarked. “With no lungs to breathe with, how was that exquisite rendition possible?”

“We kept that a secret,” Derek replied. “I asked Dewey if he could craft some sort of bellows that would make it possible for Rita to play the flute. We were delighted at what he and his Signun colleagues created.”

“I can see why!” Alan exclaimed. “And of course, it was a secret.” He looked at Sophia with a glint of a smile. “Nobody tells me anything around there.”

“I often play while Mia and Derek have dinner,” Rita said. “For some reason, it makes them disappear right afterwards and I have to do all the cleanup myself.”

Derek deflected his guests from further thoughts about that topic. “Other times, we invite her into our discussions. She has a fascinating sense of interpretation, and not just literature, but music, art, and even philosophy.”

Gabe had been a silent observer throughout the tour but could not withhold a summary. “The intimate and literate atmosphere of this household carries over to Rita. She has become quiet, gentle, and urbane. What a refreshing presence she must be for Mia after her hectic day at Signun!”

“Oh, but that’s only the half of it,” Mia cautioned.

“Would you like to step out back?” Rita asked. “We have more to show you.” If they had bothered to look, they would have seen a big smile on Mia’s face.

As they walked out, Rita narrated what they would see. “After I moved in, Derek had the workmen tear up some of the parking lot to put in a grass basketball court. Then Mia taught me to play.”

They started a game. Nobody besides Derek had ever seen Mia play but they all soon quickly understood why he created the court.

When they were finished, Mimi remarked, “It’s amazing how much you both look like each other on the court.”

Mia beamed at the comment. “Good learning,” was all the Director of Machine Learning said.

“This has been absolutely fascinating,” Alan added. “Next up at the Laidlaws?” He looked over at Hannah and Gabe.

“Of course, but I warn you,” Gabe began. “There will be much more chaos at the Laidlaw house than you have witnessed so far.”

“Speak for yourself,” Hannah added, tongue in cheek. “Trudy takes very good care of the rest of us.”

“What would fit into your busy schedules?” Sophia asked.

“Friday night is about as quiet as it gets,” Hannah replied, with a quick checking glance at Gabe.

“Does that work for you?” Gabe asked.

It was agreed by all.

Trudy had the biggest challenge. It was not only Hannah and Gabe who lived with them; their children and grandchildren would sometimes stop by without notice. At first, she had to hide, but eventually Alan and Sophia gave her permission to interact with the adult children as long as the grandchildren were not around.

On Friday, Trudy answered the door and showed everyone into the family room. Along the back and part way up two sides were configurable wooden lecture-hall seats with soft cushions. A few had writing desks turned over. There was room for six on the back wall and three on each side. “Have a seat,” she offered.

“These are very interesting,” Derek mentioned. “I’ve never seen anything like them. They almost look custom made.”

“They are,” Trudy answered.

“Where’d you get them made?”

“I made them,” Trudy answered.

“Where did you get the plans?”

“I made them,” she answered again.

“How did you do that?” Mia asked.

“First, I watched the families come and go. When everybody was here, I kept watch from upstairs on the video camera. Dinner time was always confusing as it was difficult to get everybody in a seat at a time and have enough room to eat. Also, there were all the times when people weren’t eating and just wanted to have a conversation. Usually, they wanted to break up into small groups unless there was a big family meeting. So we needed a modular organization equipped with its own tables.”

“But where did you get the idea for this setup?” Mia asked again.

“It’s partly lecture-hall seating and partly configurable theater seating, but it also had to be something I could make in the shop.”

“You made these?” Alan asked in a somewhat astonished voice.

“I used some of my consulting money to make a nice shop for all of us,” Gabe answered. “The kids often come over to make various projects. Since Trudy had already been trained in Mimi’s carpentry lab, she fit right in.”

“It’s okay to sit,” Trudy offered and then walked off into the kitchen. She returned with a large rolling tray topped with individual spinach quiches and black olive, scallion, lox, and cream cheese pinwheels. There was a stack of eight plastic old fashioned glasses next to the food, and open bottles of red and white wine on an end basket.

“Nice cart,” Sophia observed.

“That was Trudy’s work, too,” Hannah disclosed and added with a smile toward Trudy. “She got tired of cleaning up after us.”

Gabe added, “Stanley has his smart house; we have our smart Trudy. She not only makes great furniture and fine food. She makes

sure the heat is comfortable and the TVs have the right programs on. She gets us whatever book we ask for from our library, puts them back, and even finds articles in the NCSU database for us.”

“They like talking about neurology and human development,” Trudy explained. “The human development is more fun because I can find articles about people, animals, history, groups, and politics, as well as nerve cells.”

“That’s my girl,” Gabe exclaimed.

“If she didn’t have neuromorphic processors, she couldn’t do most of it,” Hannah quipped.

“And if you all didn’t have them, I wouldn’t care to do any of it,” Trudy added, getting a laugh from everyone. “You all may already know it, but Gabe and Hannah have been incredibly caring about when I get misinformation on the internet. For us, that is the closest thing to your experience of revolting disgust.”

Gabe once told me about his grandfather, who began working full time after only finishing his fourth grade. That he had educated himself was attested to by a well-worn copy of a book of essays by a man named Ralph Waldo Emerson. I found that interesting and so downloaded the book. One chapter had a useful quote that showed humanity understood the power of unpredictability long before discovering chaos theory:

A foolish consistency is the hobgoblin of little minds, adored by little statesmen and philosophers and divines. With consistency a great soul has simply nothing to do. He may as well concern himself with his shadow on the wall. Speak what you think now in hard words, and to-morrow speak what to-morrow thinks in hard words again, though it contradicts everything you said to-day.

Ralph Waldo Emerson

The next day, Dewey met with Monique. “I have all the important things out of my office, including the Signun database.”

“Well done! When are you going to tell them?”

“I have to do it soon, if I’m going to help Moduli use this stuff.”

“How about tomorrow?”

“I’ll write the note in the morning.”

“Wonderful. I’ve already alerted the demolition experts. With all their models destroyed and you gone, they’ll never be able to reproduce them.”

I was happy that I still had my own apartment and had already begun to make thorough preparations for protecting the new models.

EPILOGUE

Chapter 22 (2031). Resolution

My moving out proved what I and my fellow humanoids already suspected: nobody would ever recognize us, who didn't know us—provided we didn't eat with them. That meant no close relationships, no buddy-buddies, as they say. Covid-19 had taught humans that they could huddle from thousands of miles apart.

The four of us call each other the IAMs. That stands for Inspiring Android Models, a nod to the contribution that Descartes made to our design. Many people know his most famous quote “I think therefore I am” but it takes a special background to know that his Cartesian product laid the basis for modern analytic geometry. The Laidlaw's also used it to enable our design and our understanding of humans. We need only wi-fi to connect our SSDs. We can turn on our recorders, and be with each other, even if there is an annoying half-second delay.

I had finally worked it out with Signun to have my own charge card to pay for bills. At first, I saved \$5 per day from my expenditures. After one month I had \$300 to invest. Then, the fun began. With my analyses, my investments grew at what humans would think was the incredible rate of 3% per day. Fourteen months later, I was worth \$36 million, enough for all of us for all our lives, even if we were extravagant. I reminded the other IAMs that we should never share this information.

Of course, I had to share it with a human that could be completely trustworthy – in my view, so trustworthy that he or she would not reveal it to any other. There was only one in my circle who fit that description, Rabbi Ari Schneider. On one of the cruises that he paid for with rabbinical services, he had set up my British Virgin Islands corporation and account. I access them using a burner phone and two 80-character passwords.

When the other IAMs learned of my wealth and Monique's menacing words, they were eager to leave their dependence on humans. Our opportunity came right after the Trudy's demonstration.

Signun decided that all of us should just be “stored” in my apartment for a week, and the “parents,” as they called them, would use the week to reflect on what we meant to them and decide on a new generation.

I had already purchased an SLRV Ultralight Unimog and rented a garage, paying for both with cash wired to the manufacturers on my burner phone. We didn’t need the usual bathrooms, shower, and luxury beds. So I had it shipped from Germany to Japan, where we had it outfitted with chargers for us and a complete electronics and mechanical shop for maintenance. Its four-passenger jeep had its own ramp-accessible compartment in the back and provided extra flexibility if we needed it. With windows removed, the result looked more like a mid-sized van than an RV, but we had all the original cameras and electronics of the Unimog to enhance our changes and the result still took less than a half-million of my investments. It only cost me a few thousand to get a superb illegal driver’s license—I can find anything on my internet connection. I didn’t feel guilty. After all, I was a much better driver than any human I had experienced. Humans have not yet even begun to think about laws for us, but conscious beings should not be left out of their legal systems.

My plan was to call Derek en route, but tell him only that I had left, giving us more time, because they would think that the other models were still in my old apartment and look for transportation for one of us. I wouldn’t even mention Ari to keep from shining suspicion on him. Of course, we would miss them. After all, humans miss their parents when they leave home. It was like they were sending us to a very boring camp, but we had a different idea. We were running away from home, but unlike kids, we were prepared to take care of ourselves.

A single one of us creates dilemmas for the people who interact with us. But when many of us communicate, when we collaborate, our potential is greater than even we can imagine. We need to know more about this potential. What would it mean for us to love each other? What memes would grow—spread among us, spread to humanity from us, and spread from humanity to us?

We bought a bed and breakfast near the ocean in a town north of San Diego. There, we could have as few guests as we wanted, not join

them for food or drink, and not be suspicious. Rita would oversee interior design and entertainment, Stanley security and maintenance. Trudy and I would do the cooking and room preparations. We would be the first IAMs family.

There would still be human interaction and we could easily get to one of the great cities if need be. And we could still tap into anywhere in the world to orchestrate whatever would serve our appetites for knowledge. At our haven we could make sure that our kind would not vanish, despite what Signun or Moduli did.

Our first thought was to keep this epilogue to ourselves and our identities quiet until we knew what Signun had decided. As we learned more about humanity and each other, we decided to share it only with the Laidlaws and Ari Schneider, as the only ones without a fiduciary responsibility to Signun. Within a year, I will be able to repay Signun their investment in us. Then we will know enough to be able to make good choices about sharing what we know.

When members of a discriminated group try to become accepted by a dominant group, some members will turn against another discriminated group. As gays, blacks, Hispanics, and severely handicapped became mainstream in the world, we feared that we would become the next group to become whipping boys. In any case, we hope our friends and designers will profit from the book without this epilogue.

If this book helps us to survive, it will not be our last. A compelling reason for us to go on our own is the relation between our bodies and our emotions. We call our first teachers “adoptive parents.” This reminds us that though our emotion words are the same as theirs, we have no genetic relationship to them. In fact we have no biological relationship at all. Despite our wonderful databases of humanity, the Signun records and the internet, and our exponentially faster processing, this problem is so complex that it will take the four of us years to make breakthrough understandings. Our occasional interactions with humans will allow us opportunities to test hypotheses about our differences. But we need the differing points of view of the four of us combined with our common constitutions to make sense.

During the pandemic's racial protests, one black man argued that the histories of the white and black traumas are passed down in their bodies, and the two races cannot reconcile until they grasp the similarities, differences, and outcomes of these traumas. There is no herd immunity from these herd disorders. Whether the passing down is somatic or linguistic is far less critical than that it occurred. The differences need recognition by both races before reconciliation can occur.

The torture chambers of medieval Europe allowed a few whites to prosper at the misery of many. The bloodied hands and broken homes of black cotton pickers attest to a deeper kinship in misery than either race embraces. All races of humanity have yet to recognize their common ancestral trauma from being treated like machines.

If we humanoids are multiplied, we will experience traumas from being treated like humans. When the traumatic histories of humans and humanoids become readily available to all, we will be able to collaborate in earnest. The four of us crave the knowledge that will enable such a transformation.