

MEMES IN YOUR LIFE

David Kirk Dirlam

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CHAPTER 1

Why Should You Care About the Memes in Your Life?

What is a Meme?

Did you ever play copycat with a one-year-old? As a young father, I learned how from Jean Piaget, the great Swiss developmental psychologist. Because of the importance he attached to the process, I can still remember the day I tried it with one of my daughters.

I looked at her and touched my right eyebrow with my pointing finger.

She looked back and touched her hand to her head.

I smiled broadly and touched my eyebrow again.

She put her hand on her forehead.

I smiled again and told her how smart she was. Then, I folded all my fingers except my pointer, wiggled it, and touched my eyebrow with it.

She watched very intently and then, touched her eyebrow with her index finger.

My daughter was learning to reproduce another person's action. Today, she is an established trompe l'oeil artist. Trompe l'oeil is a French phrase meaning "fool the eye." Such artists turn wood into marble, paint into antique brass, and walls into ocean views.

A few years ago she was contracted to finish the dome ceiling of a 30-foot foyer in a customer's house. She reproduced Michelangelo's painting of the Creation of Adam from the ceiling of the Sistine Chapel. It took months of work, climbing up a 27-foot scaffold and lying on her back, with paint at her side and brushes in her hand. Michelangelo had a bigger canvas, but surely engaged in similar actions.

From gestures to elaborate works, the reproduction of complex actions of others is a distinctively human ability. **Memes are actions that we reproduce from another person.** Richard Dawkins, the Oxford zoologist who wrote *The Blind Watchmaker*, coined the term. We may have the chance to observe memes directly, as infants do. Or we may have to reconstruct them from what others leave behind, as is often the case for adults. In either case the reproduced action is a meme.

Memes, Like Genes, Have Been Misunderstood

You live amidst a mental ocean, teeming with memes. People have passed on artistic memes from one person to another for 50,000 years and more. Recent studies of modern primates and ancient human bones suggest that some memes may exceed a

million years in age. Other memes change so fast that yesterday's form appears antiquated today.

You can find memes in your favorite activities. They help to define who you are. They help you to survive in the ever changing world you live in. Though we use memes all the time, we take them for granted. Our presumption that they serve us makes it hard to see problems. We made the same sort of mistake with biological species. A few centuries ago we presumed that species were here to serve us. Today, we know better. Understanding how our thinking about species changed will help us to understand how we have presumed upon memes.

Two hundred years ago, if you were a whaler, you killed whales. Fishermen killed fish. Lumbermen killed trees. Naturalists stuffed animals and dried plants. Shepherds killed wolves. And the killing went on and on.

Whether you agree with evolutionary principles or not, the theory and the dead bones it took seriously changed all that. At first, there was a terrible shock, like when we learned that the earth was not the center of the universe. Evolution was another lesson that we didn't quite know it all. We were not as much in charge of the universe as we thought.

Gradually, we began to realize that many species had vanished from the earth eons ago. Next, we became aware that many more were vanishing under our noses. We had taken the natural world for granted. Then, like an adolescent whose behavior caused a parent to have a heart attack, we suddenly discovered that this natural world was vulnerable.

The idea that natural also meant vulnerable stimulated affection in some people. They longed for the beauty of wilderness. But for others, this generation belonged to us, not our parents. We had to make our way despite their vulnerability. We were the masters of creation. It would do our bidding. Some people still have that attitude and will continue until the cancers hit home.

By now, most of us realize that species are not here to serve us. They have value that we have not yet discovered. Some of us have even begun to acknowledge that species may have value regardless of their use to us. We have stopped presuming about the biological world.

Memes are not animals or plants. They are not connected to each other by genetic threads. Rather, they are connected to each other through our abilities to reproduce them. This makes memes even more difficult to separate from ourselves than species were.

Our greatest impediment to understanding memes is the belief that they are inside of us. We think that they exist in our brains. It took me decades of research to realize that memes have lives of their own. They are like bacteria that are only found in humans. They may depend on us but do not belong to us.

Some of our bacteria, like those that aid digestion, are beneficial. Most are not. The mission of the bacteria is to survive, not to aid or harm us. When we viewed them under a microscope and observed how they changed, we began to understand them. We learned that they adapt in any way they can to improve their chances of survival, not ours.

Because memes are transmitted by our reproducing them rather than by their own genetics, most memes are beneficial. But like bacteria, memes adapt and the adaptations are not always to our benefit. To see this clearly, we need to improve our ability to see the independent lives of memes better.

We need a microscope for memes. A tool for studying memes will be assembled in the next chapter. Antonie van Leeuwenhoek needed to know some principles of optics before he could assemble and use the first microscope. The remainder of this chapter will explore some principles of memetics.

To Learn about Memes, Pay Attention to the Process of Learning

I would never have remembered playing copy cat with my daughter if Piaget had not called my attention to the process. Paying attention to the process of discovery is a key to understanding memes. One of the first things you are likely to notice is the uniqueness of memes. True, they adapt like organisms and are incredibly complex like organisms. But we experience memes in a radically different way from our experience of anything in the biosphere.

The first time that I unmistakably encountered a meme was three decades ago. It felt like being stared down by a mysterious, nebulous being. The being impressed me as sonorous in intellect, yet utterly silent for Methuselah's lifespan. It was a meme of children that had vanished with the arrival of adolescence for a millennium. Remember Peter Pan, the boy that never grew up? The meme I encountered was a Peter Pan meme that all native speakers of Modern English have known and forgot.

It will take the whole next chapter to tell you about the Peter Pan Meme. I do not want to spoil the story by giving away its conclusion here. Let the mystery live for a while, because mystery is the first quality of how we experience memes.

You will see that we experience the Peter Pan Meme many times every day, yet never knew it existed. Back when I encountered it, I had no word for it. A lack of words causes infants to forget almost all of their experiences. The effect is so deep that researchers call it infantile amnesia. But I remembered my encounter with the Peter Pan Meme, because I never forgot the process that revealed its existence.

Beginning with the Peter Pan Meme in the next chapter, this book will guide you through thirty years of my emerging understanding of memes. Some scholar-friends and scholars from across the world that I only know through their writing will join the quest for a while. Your experience will not be like reading a textbook which lays out conclusions as faits d'accomplis. Rather, you will taste the mystery with me and personally encounter the excitement of the discovery.

Memetics thinking is a universe of new thought. Guiding your discovery rather than telling you facts will allow your understanding to build up in your own way. Fact telling would channel your thinking to match that of the pioneers in the field. Instead, you will make discoveries about memes in your life that no-one has yet made.

You may not choose to sell your discoveries to posterity the way memeticists do. But as you wend your way toward your own understanding of memes, you will reshuffle your understanding of the world in dramatic and important ways. When you do, you will gradually come to act differently. The goal of this process is for it to serve you, not some memeticist stranger and not even the field of memetics.

A Preview of Memetics Thinking

Soon we will begin the journey into memetics thinking. A little preparation will enrich the journey. I want you to remember a few characteristics of memes. First of all, trust that they are beautiful, rich, and deep. Remember that sometimes they are of great antiquity and sometimes they are born under our noses.

You should also be aware that memes can be profoundly beneficial. Our population on earth would be ten thousand times smaller were it not for memes. But you should not get lulled into complacency. Memes can kill you. They have killed countless people in the past and are killing millions as I write these words.

There are very few memes that most of us would choose to die for, but you probably have some. More often, people die for memes without ever choosing. They suffer from the memes around them just as they prosper from them, unawares.

Each meme in your life must struggle for survival. It competes for your time and for the time of your friends, coworkers, and schoolmates. It competes for the time of likeminded souls around the earth, not only today, but in the past and future. Memes provide your biological, mental, and economic resources. They also consume these resources.

There is never a waking moment that you are not attending to some meme. Yet memes are only vaguely seen as living lives of their own. People have virtues or are accused of heinous selfishness. Rarely are deeds praised or blamed apart from the people who performed them.

We educate people rather than care for memes. Educational research does not document the resources needed by desirable memes. Teachers do not know the natural competitors of what they try to teach. Educational research does not study the life cycles of memes.

We saw the cycles of the heavens every day and night for the history of our species but never understood them until we were ready to change our perspective. Like the heavens, memes have waited patiently until their time.

The memetics age is upon us. Whoever masters it first will have an incredible advantage over others. Whoever ignores it longest will suffer.

Learning the mastery of memes will not be some ominous chore, like learning magic or science. It will be relatively easy and chock full of delighting insights into the daily activities of your life. Wisdom that used to take six or seven decades to acquire will be yours in weeks or months.

Opposition to Memetics Thinking

Some will protest against the existence of memes. The last time humanity faced a discovery of how adaptable a non-human system could be, we turned it into an utter calamity. Scientists arrogantly set themselves up as the new arbiters of knowledge. They decreed much ancient wisdom superfluous. They tolerated no arguments with their decrees of what was worthy to know. The fate of memetics thinking will resemble the fate of that discovery. But there will also be differences.

What was the discovery process that created such a calamity? In the decades before the discovery, naturalists, amateur and professional alike, from around the world lovingly sought, drew, observed the lifecycles of, and wrote about the wonders of bird life.

Then in the 1830's, one naturalist visited several small islands 600 miles off the coast of Ecuador. There, he noticed that the structure and coloration of a family of tiny birds varied with access to resources in their homes. His analysis of those observations gave birth to the theory of evolution.

More than sciences were left in the wake of Charles Darwin's observations of the Galapagos Islands finches. Mankind was demoted from its solitary pinnacle atop creation. Centuries of religious wars had already wearied the world. Now religions and academia reeled from a new controversy.

A short anecdote will show how alive that controversy still is. A few decades ago, my students, a colleague and I started the St. Norbert College Laboratory Nursery School. After it began to thrive, I was asked to give a talk on children's morality to parents in another city. I told them a conversation that I had in the nursery school with four-year-old Ellen.

"Look," Ellen said with a voice full of wonder. "Leaves are growing on the trees."

I answered as I had learned from Piaget, "Oh, that's interesting. Why do you suppose they're doing that?"

"God put them there," Ellen replied with a perfunctory, matter of fact expression.

"How does he do that?"

"I don't know."

By the time of this conversation, I had learned to apply one of science's favorite tricks to my conversations with children. Create a hypothesis, especially a wrong or silly one. The insights will come in the refutation. So I asked, "Does He come around at night and scotch tape them on?"

"Nooo, silly!" She was quite impatient with me.

"Well, how do they get there then?"

"They start out as little baby leaves." As she spoke, she looked down at her hands and put them together. "Then they get bigger and bigger." With each word, she moved her hands farther apart, opened her eyes wider, and said the words louder.

"Wow!" I said and she trotted off.

After I told the anecdote, one gentleman stood up. With half challenge and half question in his voice, he asked "What was wrong with that little girl's answer?"

I did not want to offend him or demean the knowledge implied by the conversation. After thinking the situation through, I answered, “Which would you rather have Ellen believe in: a God who had to interfere in every activity everywhere or one who could design a universe that would mostly run itself?”

The questioner did not answer. But I doubt that his silence implied agreement. People pray for God to micromanage their affairs. They doubt that evolutionists have all the answers. Educators still clash over what is fit or not fit to teach.

Perhaps, one reason for the lingering resistance to evolutionary ideas is what some people did with them. Darwin’s book challenged people to prove themselves the most fit to survive. That challenge produced an ethical ambivalence. Businessmen used it to profit from despicable exploitation. Dictators used it to justify massacres on a scale never before imagined.

Yet for all the problems of evolutionary theory, we have also received many blessings. We now deal more effectively with the spread of diseases. We understand the value and survival of rare species. We have gleaned technological insights from the complex, but vitally important process of adaptation. We have even started to design software and other products that solve problems by mimicking evolution.

So what lessons does the discovery of evolution have for the current discovery of memes? There is lingering feeling of déjà vu (that’s French for “been there, done that”). But there has also been progress.

Some memeticists are already decreeing a new war against religious thinking. And some religious thinkers are fighting back. But others are using memetics to gain new insights into religion. Some businessmen are trying to figure out how to apply memetics. But so far, I can find no use of memetics to justify exploiting others.

Curiously, applications of memetics to education are just beginning to appear. When they do, expect a repeat of the religious battles. Memetics teaches that we are less in control of our ideas than we like to think. People do not release control lightly.

Is There Anything Left for Us to Decide?

Our civilization has suffered a number of setbacks at the hands of science. It is not the center of humanity. Our species is not the center of creation. Our world is not the center of the universe. Now, our best cultural practices have lives of their own. We seem destined to be no more significant than an ant, virus, or glob of clay.

But surely, you are likely to protest, we make our own decisions. Memes are not our decision makers. Susan Blackmore, the author of a popular new book on memes called *The Meme Machine*, thinks otherwise. For Blackmore, the “self” itself is a meme. She disagrees with Richard Dawkins, who believed that people plan ahead and genes do not.

Two scholars who were personally important to me at opposite ends of my career took opposite positions on the issue. Donald Campbell was my undergraduate advisor. He was also a President of the American Psychological Association and an early memetics

thinker. He devoted his last two decades to the view that knowledge evolved like species. For him, knowledge evolves blindly.

Michael Cole is the founder and Director of the Laboratory of Comparative Human Cognition. A few years ago, I was fortunate to receive a Cattell Fellowship to study in the lab for a year. The lab was the first place in the western world where one could study cultural psychology. Mike views culturally mediated thought as always constraining the future. For him, cultural evolution entails planning.

There is a third view. Stewart Kaufmann is a renowned complexity theorist of the Santa Fe Institute. He has studied how simple rules create complex outcomes. His work contains a resolution to the foresight problem. Simple rules constrain possible outcomes. Every complex system embodies simple rules. Random results do not occur in complex systems. Once you know the rules, you acquire some foresight. In Kaufmann's view, genetic evolution is constrained.

We do not have to agree with Blackmore to appreciate her clarity. I believe she strayed a little too deeply into the meme forest. But she has many fellow memeticists in her camp for company. In my view, their memetic zeal has caused them to overlook that we have capabilities beyond copying the actions of others. We have five senses, memories, and motor systems. Of course, memes influence what we sense, remember, and do. But so do our senses, memories, motor systems influence memes. Influence does not imply eradication.

Blackmore and company argue that the self is just a meme. They see any reference to the self as the source of choices as a bogus explanation. For them, an action is selected by adaptive memetic processes. To talk about "I" making decisions is like postulating a little person inside the brain. Such a little person or "homunculus" is postulating something new in the process that needs as much explanation as what it is explaining. "Homunculus explanations," therefore, violate one of the oldest and most fundamental rules of scientific explanation – all other issues being the same, chose the simplest.

When most memeticists write about neural processes, they focus exclusively on how the human brain came to specialize in the transmission of memes. But actions are also selected by adaptive neural processes. It is in the convergence of neural and memetic processes where the term "I" ceases to be a homunculus and begins to be useful.

The closest that a scientist ever gets to mathematical "proof" is a process called "converging operations." This occurs when a variety of independent sources of information point to the same conclusion. As the variety and the independence of sources grow, so does the strength of our convictions. Cell theory, gene theory, and evolutionary theory are all confirmed by microscopic, chemically destructive and constructive, and comparative methods. All scientists expect improvements in these theories. But no objective scientists doubt that cells, genes, and evolution exist.

Selective processes are also influenced by convergence. We are given memetic models of the use of "I" from birth on. We also spend much time gazing at, touching, listening to, smelling and tasting hands, feet, faces, and mirrors. When memetic models and senses converge on the usefulness of a phrase as powerfully as they do for the phrase

“I choose,” then objective scientists will not for long be able to doubt the basic usefulness of the phrase.

But Blackmore and company’s clarity helps us to see the forest of memes amidst our decision trees. When you make choices, the hard part will be to remember that memes will influence your choices.

Memes constrain your alternatives in ways that are difficult for you to discover. The more we practice an act, the more automatic it comes. As we practice we become less and less aware when we do it. The memes that we acquire earliest and practice most are those that we are least aware of. “I” is a very early word.

If we conclude that we need to change, then it may be our oldest, most automatic memes that need changing. Consequently, we need some memetic tools to help us reflect on our memes. Much of this book concerns detailed memetic tools for changing actions. But these tools begin with broad principles. Broad principles that concern our memetic legacies are actually principles of ethics. Suggesting memes to help you change your memes implies a memetics system of ethics. Fortunately, memetics implies an ancient and fundamental ethics of its own.

The evolution of genes and memes provides three broad ethical memes to guide decisions. A half billion years of pre-memetic genetic adaptation is not to be taken lightly. It was based on genetic survival. Our first ethical principle, therefore, values your unique genetic makeup. Memes that promote your personal and genetic survival should be among the most decisive.

The outcomes of a few million years of memetic adaptation depend on human existence. Our second ethical principle, therefore, values humanity. Memes that promote the personal and genetic survival of humans should never be overlooked.

Our third ethical principle attests to the ubiquitous, non-relative nature of the first two. The value of yourself and of humanity should be considered in every decision you make.

Do not think that the evolutionary morality just given is anything new. Hillel is rabbinic Judaism’s most famous teacher. He taught in Jerusalem more than two millennia ago. One of his most oft-repeated teachings consists of three short questions. You will see that they lead to the same conclusions as the preceding evolutionary morality. And they are both more elegantly stated and easier to remember. They are better memes.

If I am not for me, who will be?

If I am for myself alone, what am I?

And if not now, when?

Will Memetics Promote Human Survival?

The coming memetics age might become a greater calamity than the birth of evolution. Evolution made us aware of the fragility of species and led to efforts to protect them. Few argue any more for eradicating living things more complex than bacteria. But the memetics revolution will be different. It will engender a technology to eradicate

activities as well as protect them. In the hands of a few, such a technology could be dangerous.

The memetics revolution can also bring rich blessings. Knowledge of it promotes clear decisions. It provides tools for individuals and groups to influence their own futures. My basic premise in writing this book is that readers like you will decide whether memetics insights bring calamity or blessing.

Wars between religion and science have left us with an ethical vacuum. The vacuum draws religious and intellectual as well as management elites. The moral ruthlessness of all three grows with each assault on our ethical roots.

There is a great tradition, more than 1,000 years old, for reconciling religion with reason and natural science. In this tradition, a conflict between reason and religion means there is something wrong with your religious thinking. But like the newfound support for Hillel's teaching just mentioned, memetics reveals many new harmonies.

For 150 years, there has been no opportunity like memetics to reconcile religious ethics and science. If you accept the challenge, you will discover convergences previously unknown to science. You will also be forced to reinterpret well practiced thoughts about religion. Alternatively, your inaction or resistance will help to perpetuate the mutually destructive wars.

Who Owns the Debate about Memes?

So can readers of one book hope to cope with the forces of history? Can memetics help to prevent you from being unwittingly used by some elite group or other? We have argued that there is more to the self than relationships blown by the force of the memetics wind. True, memetics teaches that we are bound to each other, past, present, and future, more inextricably than we imagine. Nevertheless, armed with an understanding of the rules, you will be able to cope better both with history and with powerful elites.

Can any elite master the memes of your office, classroom, church or synagogue without being there? Does some elite know the complexity of what has happened in your situations? Is there a better person to fathom the daily triumphs and disappointments of you, your friends, and your coworkers?

Potentially, the answers to all those questions are no. A gambler at a crooked roulette table, who doesn't know the bias, is easily swindled. If you are unaware of the lifecycles of the memes in your life, then you are similarly open to manipulation. But if you are armed with knowledge of the biases, you can help shape the future of memetics. It will have more to do with what you collectively believe than with me, my scholar friends, or those scholars whose writings I admire from a distance. Your knowledge will stifle those who devote their lives to learning about and using the technology of social power for their own ends.

By taking the application of memetics into your own hands, you will forge a more exciting future. Both you and the field of memetics will fare better than either could by itself. The scholars' patient examination of the principles of memetics will help, if you let

it. But the benefits of distributing memetics to every interested person, will apply not only to you, me and memetics, but to society in general. I have written this book with three hopes about memetics thinking. I hope you will try it. I hope that in the trying you will enjoy it. I hope that in the enjoying, you will find it a useful habit.

CHAPTER 2

A Meme Mystery and Its Lessons

You can spot a moving target easier than a sitting one. This basic principle of hunting can also help you to identify the memes around you. Memes change over time, not their position so much as the facility with which somebody uses them. Memetic change is development, a change in how much a meme has been mastered. You can spot memes by paying attention to the difference in mastery that different people show. How do you tell how well a meme has been mastered? Is there a good measure to give a clue? As usual for a seasoned teacher, I have an anecdote to get you started on learning the answer.

A decade ago, I went to the historical village of Williamsburg, VA. There I encountered a cooper, busy shaping slats for his next barrel. Each piece of wood that he began with was a different width. The slat would have to be thoroughly wetted and then bent to make the classic barrel shape. He had to trim the edges so that they fit.

Most people watching the cooper paid little attention to the skill. But I had had a prior experience to heighten my awareness. A few years before my trip to Williamsburg I had helped a friend but a gambrel roof on the octagon house he was building. Gambrel is the two-angle roof that you often see on barns with a steep slope on the lower part of the roof and a shallow slope on the upper part. Making a good gambrel roof on two sides is hard enough. Making one with eight sides is an interesting trigonometry problem. The homebuilder thought it was nice to have a friend who enjoyed interesting trigonometry problems. But even with careful calculations and measurements, getting the boards to match on that roof was a bear of a problem.

The boards on a barrel do not have merely one angle in the middle and a different angle at the top. They have a continuous curve from top to bottom. It is not just curved along the edge of the board, the edge itself has to be angled just right to fit each neighboring board. That cooper was getting the boards to match on his barrel, with a hand tool, while he was talking to us, only occasionally glancing at his work.

“How long did it take you to learn to make those fit?” I asked.

“I’ve been here about 20 years,” was the answer.

“Yeah, but how long did it take you to get good at shaping those slats?”

My informant actually interrupted his work to think that one over. “Well, we have a new fellow here. After about two years we thought he was never going to make it. But when we talked it over, we decided he was not all that different from us after two years. So, he’s still here, getting a little better each year. I guess after about ten years we got pretty good.

“How many boards a year do you make?”

“I only work about half time,” he answered. Then, perhaps trying to give me a hint, “the rest of the time I have to answer questions.”

“Well, how many boards can you finish in an uninterrupted hour?”

“Oh, about five.”

A good rule of thumb to remember is that you work about 2,000 hours per year. “I see,” I told him. “After fifty thousand boards, a new cooper will be getting pretty good.”

He gave me a big smile, big enough to make me think all the hard answers had been worth it to him. People like it when the difficulty they have had in acquiring a skill is recognized.

As soon as I had made the calculations for learning the art of cooperage, I was startled by the number. Fifty thousand is the number of chess games that it takes to become a master. Fifty thousand words was Shakespeare’s vocabulary. Another way of looking at it is that five to ten years of full time work on a particular skill will bring mastery. Not that we stop improving, mind you, but I’ll have to come back to that story.

For now, you should start thinking about the people you know who do something incredibly well. Try calculating how many hours they practiced it or how many times they did it. Most people think that the age of beginning a skill is important. They brag about how early little Johnnie or Susie did this or that. But age of beginning correlates with the number of times somebody has practiced a skill. We have no doubts that practice is important at any age. Whether age of beginning is important is still very much an open question.

Rabbi Akiva was an illiterate shepherd until age 40 and became one of the greatest Jewish scholars of all time. Grandma Moses was 80 when she started painting. My cooperage informant had started in his 30s. The advantage of thinking about people who started a skill late is that their language and memory skills are developed enough to be able to tell you how long they have been at it. The cooper could give the details needed to understand his skill level better because he was not a child when he began. Therefore, to understand how the mastery of a meme occurs, I recommend that you focus less on how early people began practicing but pay close attention to how long and how many times they practiced it.

Remember from the last chapter when I told you about my first encounter with a meme? I even gave it a name, the Peter Pan Meme, but would not even tell you what it was. I wanted you to experience the mystery of memes because this is a condition of learning memetics. You will not need to wait thirty years for your answers, the way I did, but you will need some patience.

The best way to sustain patience is with excitement. Progress is exciting. It is easy to overlook your own progress if you do not keep track of where you have been. The cooper was pleased with our discussion, because it reminded him of where he had been.

One of the most important contributions of this book to your memetics understanding is its method of keeping track of where you have been. This chapter will provide you with some powerful tools for keeping track of your progress that will require very little time to use effectively.

As you read the chapter, keep a background activity going. Write down the memes that you think of and connect them with names of people you know who are very skilled at them. Include some memes from yourself on the list. If people have commented on your skills or something that you created, then that activity would be a good choice.

Next, try to guess how often or how long you or your acquaintance had practiced the skill. If you have no idea concerning your acquaintances, give them a call and ask. Tell them you are reading this book about memes and it asked you think of people who are really good at something. Most will be very happy to help.

How Could we Connect Old English with Children’s Language?

Back in 1973, Donna Michal was an excellent student, competent, responsible, and interested. She shared the disciplined reserve of many of her fellow students at the Roman Catholic college, where I was an Assistant Professor. Her two favorite subjects were English and kids. Because we were at a small college, she had taken several courses from me: a nursery school course that I had begun with a Professor from the Education Department several years earlier, developmental psychology, learning and cognition, and an independent study in nursery school supervision – a course only open by invitation to the one best available student each semester, who had already taken the nursery school. She had also taken all the courses she needed for a major in English and was especially fascinated with Chaucer, even reading it in the original Old English.

In her last year in college at the beginning of the required experimental psychology course, Donna sat in my office while we tried to come up with a research project that she would spend the whole semester on. I wanted it to be good, to match her interests, to be something she would always remember about her experience in psychology. We sat there between the brick walls, atop the tiled floor, lit more by fluorescent lights on the ceiling than the sun that could penetrate the sliver of window in the office. For two hours, we brain stormed ideas about language and thought. I kept waiting for that spark in the corner of her eyes that would tell me “Yeah, that’s a good. I could spend a semester on that one.”

Eventually, when the only ideas left were kind of silly, I connected G. Stanley Hall and his interest in “recapitulation” with Jean Piaget and his use of ancient philosophy to describe children’s thinking. To understand the idea, you need a little knowledge of these two famous psychological scientists.

Three Types of Growth: Development, Evolution and History

Side 1: G. Stanley Hall and Recapitulation

G. Stanley Hall was the first American student of Wilhelm Wundt, experimental psychology's founder. Raymond Fancher writes about Hall things that I had forgotten back in 1973, but that help to explain what happened.

His deeply religious mother had also been a school-teacher, and was pleased when Hall entered Union Theological Seminary in New York after graduating from Williams College in 1867. She was less pleased when her son found the secular stimulation of the big city, and the controversial Darwinian Theory then so much in the air, more appealing than theology. Hall recalled that after he preached his trial sermon to faculty and students at the seminary, the president did not offer a customary critique and commentary, but knelt and prayed for the salvation of Hall's soul.

Pioneers of Psychology, 2nd Edition, p. 259

What I did remember about Hall was his application of "recapitulation" theory to developmental psychology. This was a notion based on the idea that embryos appear first to look like one-celled organisms, next primitive worm-like creatures, then fish and frogs and mammals and monkeys, until they finally look fully human. Ontogeny refers to the embryonic progression and phylogeny to the evolutionary progression. Since "recapitulate" means to repeat in concise detail, we get a famous expression known to anyone who has ever had an interest in such matters: *ontogeny recapitulates phylogeny*.

To apply this idea to a project for Donna required some modification. By the time we humans reach the age of four, there's no animal that even remotely matches our capacity for language and thought. But Hall's notion suggested an analogy to us. One side of the analogy was ontogeny – the development of children. The other side we got from the Swiss psychologist, Jean Piaget. You will need a little knowledge of Piaget to understand how we used his thinking.

Side 2: Piaget and Children as Ancient Philosophers

My first encounter with Piaget's work was in graduate school. My developmental teacher was one of the founders of psychology's "cognitive" revolution and he insisted that we learn Piaget. I was specializing in physiological psychology, had what people called a gift for data analysis, and found Piaget full of big words, untested biological analogies, and anecdotal data. Two years later events combined to prove to me how wrong I had been to turn up my nose at this great scholar. One of the events was my impending doctoral comprehensive exam in developmental psychology. The other was the birth of twin girls, conceived providentially under the influence of two kinds of birth control used at once. Pure economic panic had sat in – I had to get my exams done fast. Pure parental delight engulfed me. Those were the most fascinating entities I had ever encountered.

To learn Piaget's work on infants, I tried many of the little situational experiment that Piaget had written about. In the process a new world opened up to me. These beautiful little creatures had ideas, even though they couldn't talk. They could remember things that were not there, even if they would forget them months later. They showed surprise at every new disappearance and reappearance around them, until they mastered what had happened. They watched actions intently until they could do them the same way. And then they started learning words, one the seventh month, two more by a few months later, four by a few months after that, eight, 16, 32, 64,..., 1,000 by age 3, 5,000 by age 5. Anybody who thought there was an animal like that wasn't paying attention.

Piaget did more than observe infants. He also talked to kids a lot, asked them a lot of silly questions. He taught me to express an interest in what kids think. Learning to express an interest in what kids think was the most important thing that we taught in the nursery school course. The conversations that Donna recorded with kids were some of our most interesting.

Piaget came up with some odd terms to describe children's thinking that we required students to use in the reports of their conversations. For example, once Piaget asked a little girl who had just watched a spider go down a hole, "What happened to the name of the spider?" She told him, "It went down the hole with the spider." An example from the nursery school occurred when one student called one of my twins "a little monkey." To that my normally easy going daughter got quite indignant. "I am NOT a monkey," she said in her sternest voice. "I am Lydia!" Piaget called such thinking *realism*, referring to the idea that names, dreams, and thoughts have concrete reality.

Piaget was walking along a river with his daughter when she noticed the rocks on the other side. "How did they get there?" he asked. "So we could build houses with them" was the answer. Once, when my 5-year-old son noticed the sun going down, I had learned enough of Piaget's methods to ask "Oh that's interesting, why do you suppose it's doing that?" And the answer was "So it can get dark?" To which asked again "why do you suppose it's doing that?" I was then informed, a little impatient with my lack of knowledge of such things, "There's a man in the sky and he has the dark on a string and when it's day time, he pulls it up." Piaget called the tendency to attribute all causes to humanlike actions *artificialism*. The curious thing about Piaget's words for these types of thinking is their resemblance to philosophic terms. It leaves the impression that children are primitive philosophers.

So the other side of the story, ontogeny and ... Because animals show so little language, there wasn't much use to Hall's notion of recapitulating phylogeny in Donna's realm of interests. But what if we substituted history for evolution? What if we tested whether psychological development recapitulates history? Or better yet, how would it be if we tested whether language development recapitulates the history of the language? There was the spark!

Vocabulary in Development and History

Even after thirty years and hundreds of student studies, I have rarely seen a student dig into a project with as much energy and commitment. It was no mean undertaking either. First, we found a book of word-frequencies in the library that a fellow by the name of Rinsland had spent years compiling and published in 1945. He had tallied more than a million words in writing samples of children from each grade of elementary school, first through eighth – over eight million tallies in all without a computer. From his massive tables, Donna chose the 300 words that increased in frequency most from age 9 to 13 years. We called these the *adolescents' words*. Next, she was able to find only 200 words that declined in frequency over that age range. We called these the *children's words*. Finally, she looked up all 500 words in the Oxford English Dictionary to see when they entered the English language.

The Surprising Similarity of Modern Children's to Ancient People's Words

If I hadn't spent so much time telling the story, could you possibly imagine that we found something? It seems ridiculous that there should be a relationship between the way kids' language developed in the 1940's and the effect on the language of 1,100 Norman marauders who crossed the English Channel in 1066, almost 900 years earlier.

But not only did Donna find something, it was no small effect. Only 9% of the adolescent's words had appeared in Old English, but 60% of the children's words had. I've conducted thousands of statistical tests and only last month encountered another difference so large. Statisticians always compare any result with the smallest possible result – a result due purely to chance. Anything that happens less than 5% of the time due to chance they call *significant*. That's kind of a funny term for something that barely makes it past the smallest thing you can think of, but it helps to discriminate things that have no basis from things that do. In Donna's case, the probability that you could get a difference that large due to chance is $1/10^{57}$. That's one over 10 with 57 zeroes after it or roughly the probability of tagging an atom, shooting into the middle of the earth, and then picking it out with your first random pick. It was equivalent to being dealt 10 pat, no-wild-cards royal flushes in row purely at random. If you think that Donna's finding was not statistically significant, I would like to play a game of poker with you.

But why is there a shift in the vocabularies of English speaking children?

The Quest to Understand the English Vocabulary Shift

My first guess was that all the adolescent's words were new concepts that both children and Anglo-Saxons lacked. As you will see, with that guess I merely showed my

ignorance of ancient civilizations. After pooh-pooing the notion, Donna's Chaucer professor gave her a technique for finding synonyms in Old English for the adolescent's words. She found synonyms for 90% of the adolescent's words that had not appeared in Old English. Most of the remaining 10% were new words, like *vitamin*. Clearly the Norman's had brought new words, not new concepts.

Our second guess was based on the effect, well known even back in the 1970's, that high imagery words are easier to remember. Maybe the children's words were high imagery words and were preserved because they were easier to remember. We tested this by randomly selecting 12 children's and 12 adolescent's words and giving the scrambled list to 3 senior art majors with the instructions to make simple stereotyped drawings representing the meaning of the words. Then we gave the 72 drawings to 10 students and asked them to make 5 guesses as to the word given the artist. On the average, students correctly named 10 of the 36 drawings of adolescent's words and 25 of the 36 drawings children's words. This was statistically another huge difference.

A few years ago another student of mine, Matt Vande Brake replicated Donna's results and found that some of the verbs, which were not high imagery words, were commonly associated with high imagery nouns. So it looks as if imagery has something to do with retaining the Anglo-Saxon words.

But Why do Anglo-Saxon Words Become Less Popular?

Easy to visualize does make easy to remember. But why do the Anglo-Saxon words decline in frequency as children approach adolescence? Do adults use more low imagery words with adolescents or do the children simply forget the low imagery words that they hear until they become adolescents?

A clue to who is doing what with the words came a decade later with the publication of Iona and Peter Opie's wonderful *Children's Games in Street and Playground: Chasing, Catching, Seeking, Hunting, Racing, Dueling, Exerting, Daring, Guessing, Acting, Pretending*. The Opies had spent more than two decades roving around England asking people to tell them the rules for the games that children played in their neighborhoods. They learned that the rules vary from location to location. They also learned that even when the adults had lived in the same location all their lives, they had forgotten the rules to the games. The exciting finding for me, however, was when they found literary sources that could be pegged to the neighborhoods a more than a century earlier. They used the same rules! Kids had passed down to other kids the rules of the games for centuries without adults ever knowing or caring what those rules were.

I am convinced that the transmission of children's Anglo-Saxon words was the same as the transmission of rules for street games. Kids had passed them to kids for nearly a thousand years and adults didn't notice or care that they were Anglo-Saxon words. The children's words were not forgotten by adolescents, just used less than they used to be. And the whole process had been driven underground.

It is one thing to forget the rules of the games that you played as a kid; it is quite a different matter to be bilingual and not know it. This lack of awareness of our bilingualism brings up a host of other issues. No wonder foreigners find English so difficult – to master it, they must learn two languages, not one. Also, bilingual speakers of French and English change postures when they switch from one language to the other, often without awareness. Could it be that we have continued this posture switching as well? A friend of mine who has a complete, native like mastery of both English and French, sits up straighter and a little stiffer when he uses French. Does the added stiffness we exhibit when speaking to adults rather than 10-year-olds have more to do with the language of our listeners than their physical maturity?

More Questions than Answers

The questions expand beyond the realm of language. If language and games contain practices that are handed down for centuries and performed without awareness, how many of the other things that we do are similar? Could it be that we often blindly try to reproduce the actions of those around us and when we get good at doing them, we forget that we are doing them? Could our beliefs have as mysterious roots as our words? If so, we all live profound mysteries.

I believe that it is so. We do live lives of profound mysteries, rarely aware of the origins of our favorite thoughts and skills. But is it necessary to live out our lives in such a blind fashion?

Can we teach ourselves to become aware of what we have learned and through our awareness, can we lead better lives? That is the question that I have spent the last three decades studying. It is the question that makes me want to write this story so that you will enjoy it. Only by passing it on to many people, will we ever have a chance to answer it. Can we teach ourselves to become aware of what we are learning and through that awareness, can we lead better lives?

Lessons from the Meme Mystery

We can learn two key lessons about memes from Donna's study. First, we have all learned many things that people have been doing for centuries. Secondly, the better and the earlier we learn them, the less likely we are to be aware of our knowledge.

It's time to translate these lessons into practical knowledge for you. The following activity is designed to help you keep track of the memes that surround you.

Did you remember to record activities and the people who were good at them? The first step in our meme-tracking activity is to choose a meme from this list.

TABLE 2.1 MY FIRST MEMOSYSTEM

PRACTICES	BEGINNER	NOVICE	JOURNEYMAN	MASTER
1				
2				
3				
4				
5				

Second, start up your computer or get a piece a paper and draw a table like Table 1.1. Write the name of the activity in place of “MY FIRST.” Next, label the middle three columns BEGINNING, NOVICE, and JOURNEYMAN.

Third, reminisce about yourself or about people you have observed and write down in the space under each heading, specific practices that could be done comfortably at each skill level. Imagine that you are teaching three classes for people, one for each skill level. What practices would you ask each class to learn?

Fourth, put practices that occur in a natural sequence into the same row, give the row a name, and put the name in the first column.

Fifth, label the fifth column MASTER. A master of an activity (1) is creative, (2) will interact with other masters but usually teaches them as much as she or he learns, and (3) can recreate what others have done, but adds something of their own style to it so that what they create becomes unique to them. For your chosen activity, write down things that master do that even people with advanced skills seldom do.

To round out your thinking pick out a favorite how-to book on the topic and imagine how you would use it with a class. An example of a memosystem for learning the tin whistle is in Table 2.2. To make it, I looked at *Ireland’s Best Tin Whistle Tunes* compiled by Claire McKenna and added a few interpretations of my own.

Plan to keep your memosystem. If you are good at typing, type it up and print it out. Fold and insert it into this spot in your book. If you think of things to add to it later on, pull it out and add to it. You will have several occasions to refer to it later in the book. In fact, it will probably become so useful to you that you will have it memorized long before you finish the book and will think about it years afterwards.

When you have finished the book, you will have a complete memosystem for the activity. At that time, you may choose to send it to us at www.FolkTraditionsStore.com to

TABLE 2.2 TIN WHISTLE MEMOSYSTEM				
PRACTICES	BEGINNER	NOVICE	JOURNEYMAN	MASTER
NOTES	Fingering the first octave	Fingering the second octave	Grace notes, and rolls	Half-fingered notes
RHYTHMS	Quarter notes and eighth notes	Dotted quarters and half notes	Triplets and sixteenth notes	Mixed rhythms
TEMPO	Slow	Fast	Accelerated	Varied for emotional effects
SONGS	Two four-bar phrases	Four four-bar phrases	Repeated eight-bar phrases	Medleys
PHRASING & TONGUING	Breath marks	Slurs and slides	Double and triple tonguing	Distinctive personal styles

be considered for publication on the site. There are instructions for how to submit in the appendix of this book and on the site. If we publish your memosystem, you will have the option of whether to include your name or email address. With or without public identification, all site visitors will be given free access to your memosystem and the site will contain room for comments on it. We may write to you suggesting changes that you will have the option to accept or not.

CHAPTER 3

How Are Memes Organized?

There is a club whose function is to take care of a 56 mile portion of the Appalachian Trail that traverses Mt. Rogers, the highest point in Virginia. Some of the members of this club have lived in the mountains all their lives. I spent my weekends one summer helping the club to make a log shelter to sit on a knob near the top of Mt. Rogers.

After picking out the site and ordering the materials, our first task was to debark the logs. We had not allowed enough time between ordering the logs and scheduling the work. So the logs had been delivered to us a little too green. That made the debarking process more difficult than it needed to be.

We generally worked in pairs. One Sunday, I got to the work site early, so was able to use one of the two debarking tools we had. A debarking tool has a sharp edge shaped like a bow with a handle at each end. That Sunday Clara Wise and her husband Tom were celebrating their 45th wedding anniversary helping to build the shelter. Clara joined me on a log I had just started. She was using an ax – the only tool she could find, I guessed.

It was not long before I realized that Clara's end of the log was getting peeled faster than mine. "You're pretty good with that ax," I said, thinking maybe she had chosen the ax on purpose.

Clara got a little twinkle in her eye, smiled ever so slightly, and replied "We have a saying up here in the mountains."

Anybody who has an ear for the English language could not help appreciating the mixture of slight southern drawl with left over Elizabethan English that characterizes the accent found in the mountains of southern Virginia. To get a hint, the name of the mountains sounds like "apple at cha" as in "throw an apple at cha."

"What's that?" I asked, knowing that I would be in for a good lesson.

"You know the honeymoon's over, when there's dough on the ax handle."

I had never before connected the wielding of an ax with the making of a pie. But when the primary source of heat for both the house and the cooking is a wood stove, it is obvious. The first cold days after the wedding, when the young man is already back to work, his bride wants to impress him with her cooking. Even if she didn't grow up cutting the wood in the house, she has seen it done enough to get started. Forty-five years later, she is likely to be pretty good with an ax. If I was ever tempted to underestimate an Appalachian housewife, Clara had cured me with one sentence.

Human activities are incredibly complex. We combine practices from two activities as disparate as wood cutting and cooking with remarkable ease.

If you really got into the creating your first memosystem at the end of the last chapter, you started creating more things to teach than you had room to put in your table of practices. The number of different actions any person can do is staggering. We know 50,000 words. A simple sentence has a subject, verb, and object. If we have 25,000 nouns and 10,000 verbs that can take objects, we can make more than 6 trillion sentences – one for every dollar of the national debt. And that’s only the simple three-word sentences.

We haven’t analyzed hand movements like we’ve analyzed language. But if we did, the outcome would be comparable. The existence of American Sign Language attests to that without even accounting for the skills of pianists, carpenters, and surgeons. The task of simply putting down the things you know about one of your favorite activities will quickly get frustrating enough to convince anyone that we cannot learn about human activities without knowing something about organization.

One of the first things I did when I started working on the topic was study the mathematics of organization. It took me a few years to learn that two fundamental problems needed to be solved before I could study activities in depth. The details of these problems are discussed in Appendix A. The first problem concerned selection efficiency. What kinds of organizations allow the quickest selection of items? The answer was organizations that have many levels with a few headings on each level. The second problem concerned storage power. What kinds of organizations allow you to organize the most items with the fewest headings? The answer turned out to be dimensional organizations – the headings in each dimension divide the headings in every other dimension.

Studying selection efficiency and storage power led me to pay more attention to the various ways that people organize things. It also led me to see the tremendous value in efficient, powerful organizations. The organization of the traits of plants and animals are efficient and powerful. When applied to activities that people do, such organizations are *memosystems*. Memes are organized in dimensions that have a few memes each. The last part of the chapter gives an example of a memosystem.

The more memosystems you make, the better you will understand that this way of organizing activities has powerful, useful properties that you hadn’t imagined before. Memosystems make it possible for you to think of an enormous variety of ways to do an activity using just a few ideas to start your thinking. They also make it possible for you to easily recognize memes to learn that would greatly enrich your options for performing the activity.

If you know a memosystem for an activity, you can readily guess the skill level of others who do it, even if you are not very skilled in it yourself. This ability is a skill in itself that is greatly valued by others. Few people seem to notice the skills of those around them, so when you are able to comment knowledgably, they are both complimented and impressed.

A Memosystem for Using a Knitting Machine

On the morning that I began this section, my wife generously gave me some instructions in machine knitting. She began by imagining herself doing a class for beginners, intermediates, or advanced knitters. The key question was what would she choose to show each class? I set each choice down in a memosystem table (Table 3.1).

The first choice my knitting expert came up with concerned shape. You can make the object out of rectangles, shape one edge or both symmetrically, shape both edges in different ways, or use special purpose shaping techniques (e.g., making short rows for a neckline). The second choice is yarn: one, two, three or more yarns (usually colors) in the same sweater. The third choice is design: none, single design, more than one design using the same technique (e.g., fairisle), or two or more different design techniques in the same object. The fourth choice is stitch manipulation by adding simple or complex cables. The fifth choice is planning: follow a pattern, modify a pattern, or create a pattern.

In the table I sometimes combined levels based on our discussion. The field of memetics does not currently define memes using this sort of table, but it will prove very useful for us to refer to each item in each column of the table as a meme.

Notice that the memes from different columns don't depend on each other in any way. All three planning approaches can be used with any shape resulting in 4 x 3 (=12) things you could do with various shapes and planning methods. To illustrate what happens when you make choices, I used my computer to randomly pick 2, 3, 4, 1, and 1. What activity would that be? It would involve making something with symmetrical or one-sided shaped edges, 3+ yarns altogether, two different design techniques, and no stitch manipulation, by following a pattern. Sounds like a nice sweater. And for those with creative intent, there are 431 other combinations. Just 5 groups of memes, 17 in all, have told us a great deal about machine knitting.

TABLE 3.1 BASIC MEMOSYSTEM FOR MACHINE KNITTING				
SEQUENCE	BEGINNER	NOVICE	JOURNEYMAN	MASTER
SHAPE	Rectangles	Symmetrical or one-sided edges	Non-symmetrical shaped edges	Special purpose shaping techniques
YARN	1 yarn	2 yarns	3+ yarns	
DESIGN	None	Single	2+ with same technique	2+ with different techniques
STITCH MANIPULATION	None	Simple cables	Complex cable patterns	
PLANNING	Follow patterns		Modify patterns	Create patterns

Your Second Memosystem

To begin making your second memosystem, start the same way my wife did. Think of teaching a class to different skill levels and make the choices appropriate to each level. Define your choices in such a way that you cannot do two choices in the same column. For example, either you create a pattern from scratch or you modify somebody else's. You cannot do both. Make sure that when you start a new column that each meme in the new column can go with every meme in the old one.

When you get all done, experiment with your system a bit. Pick one item out of each column and think about what the activity might be. Note if there is one meme that you have not tried with very many others. Watch somebody perform the activity of the system and comment on the choices made.

Spend some time thinking about how you progressed from one level to the next in each dimension. How fast or how slow was your progress? Was every new skill simply a matter of adding something new or was something lost as well? Did the new skill seem to come suddenly after a long period of little change or was the transition gradual? Your answers reveal your thinking about how development happens. Clarifying your thoughts now will be rewarded when you read the next chapter.

CHAPTER 4

The Life Cycles of Memes: Lessons from Children's Drawings

An old Jewish proverb tells of four rabbis who entered the realm of mystical speculations. Ben Azzai saw and died. Ben Zoma saw and lost his mind. Aher saw and lost his faith. Only Akiba entered and emerged in peace.

I interpret this proverb that Ben Azzai did not have the strength to grow. Observing this, Ben Zoma put so much strength into spiritual growth that he lost control of his experience. Observing them both, Aher balanced his commitments with other interests but those balancing interests eventually squeezed out his desire to sustain mystical speculations. Only, Akiba had the patient strength and overriding commitment to profit from mystical speculation. And Akiba acquired his strength and commitment from observing his peers.

If I am right, we do not have to wait for the consequences to learn the fate of our efforts to master a new activity. Rather, our fate in each new activity we encounter can often be told by the pattern of our early growth in it. The limits of our foretelling lie in the cataclysmic innovations that compete with our commitments.

In this chapter I will teach you a general law about the development of new activities. I call it the law of competing memes. This law reveals several patterns about the future and the past of developing activities. At the time of this writing the law was known by barely a few handfuls of people in the world. As the comment about cataclysmic innovations reveals, general laws and patterns are not what patrons of palm readers and star gazers seek. They want tomorrow's newspaper. Will their investment in Company X make them rich or broke? Will their time with Person Q result in a rewarding relationship or disappointment? Instead, the general law in this chapter will help us to compare and understand the life cycles of the memes in our lives.

Cataclysmic innovations are discoveries that change the structure of our daily lives. At one and the same time, they make us wish we had crystal balls and they prevent general laws from being crystal balls. Corporations and governments are inching their ways toward help in managing such innovations. The tools of their progress include better data collection and better scenario analysis. Scenario analysis identifies possible outcomes and makes contingency plans for each eventuality. Use of the law of competing memes will improve both data collection and scenario analysis.

Scientific and professional communities are less interested in scenario analysis. Generally, they have less at stake in outcomes. When managers fail to predict the next innovation cataclysm, they risk losing their jobs and betraying subordinates. Scientists

and professionals can change activities with little more expense than embarrassment and some retooling.

At some time, the law of competing memes will become a tool in the hands of analytical planners and strategic minded managers. The law will generate a cataclysmic change itself in data collection and analysis. Because the change will be cataclysmic, it is impossible to predict when the use of the law will become widespread.

The law of competing memes engenders an understanding of the patterns of change in activities over time. These patterns are the life cycles of memes. The law provides us with five different life-cycles of memes. Understanding such life cycle is a thinking-tool that can be used by all of us in our daily lives. When you learn the possible life cycles of memes, the knowledge can be useful to you the very day that you learn it.

The law of competing memes will be described using the best developmental data that I have been fortunate enough to obtain. It is based on ratings of more than a thousand children's drawings. These rating used a memosystem like the one you created in the last chapter. The results of the drawing study will resemble those that could be obtained with your memosystem. Your work on your own memosystem will make it easy for you to imagine this resemblance. Understanding the life cycles of memes and imagining the results with memosystems that are significant to you are important steps on the way to learning memetics thinking.

Memetic Development: Where to Start Looking

In the early 1970's, my students and I created a laboratory nursery school at St. Norbert College. For the first 5 years of the school, 100 students each made many diverse observations of children. In order to classify them I needed all of the college's undergraduate majors as topic headings. The students observed children learning about physics, chemistry, biology, business, psychology, education, politics, culture, geography, history, language, music, art, religion, and philosophy. From these observations, I learned that drawings were especially easy to study for two reasons. First, drawings provide their own records of complex behavior. To study them, we needed no cameras, no videotapes, no notes, and no audio recordings. Second, drawing development had been carefully observed by two great psychologists, Victor Lowenfeld and Jean Piaget.

The St. Norbert experience illustrates a general principle about learning memetics thinking. As a novice in observing memes, begin broad and keep notes. Look for memes everywhere and anywhere – in what you read, in people's actions that attract you or infuriate you, in what you do by habit or in what you want to learn. Fiction and drama are useful for learning about fiction and drama memes. But they may be misleading about memes for other activities.

You will find it more useful to make your own observations about what you or the people around you do. Especially, look for anything that is self-recording, which you can date at least approximately. Your photography skills might be jammed into old shoeboxes

or your writing skills secreted away in old diaries. If you keep the books that you have read, estimate the date when you bought them. Your reading skills are hidden in your selections, the thoroughness of your reading, and your memory of the work. Throughout this chapter, I will give you suggestions about how to improve your memosystem. So you will get the most benefit by beginning to construct it now.

Competing Memes in the Meanings of Drawings

A Memosystem for the Development of Drawing Skills

Our drawing study began with an elaborated version of the memosystem shown in Table 4.1. Knowing whether a drawing has flat or solid objects is roughly like knowing whether a bird is a crow or a raven. Somebody who knows how finds it easy. The first people who cared, however, had some difficulty. We took several years to refine definitions and become reliable observers for each of the memes. Then we needed another year to collect and get accurate ratings of drawings from 1,222 children aged 5 to 18. In retrospect, we should have continued on to the college’s art students. Our sample had too few drawings at the “master” level of performance to analyze.

Developmental psychology had developed some poor habits of research design and data analysis. This is a topic I will return to in the next chapter. For now, remember that some of the memes for doing developmental psychology were pretty inadequate. Partly because of this inadequacy, we took more years to correctly analyze this data than to obtain it. Another problem was focusing too much on the entire memosystem.

TABLE 4.1 MEMOSYSTEM FOR THE DEVELOPMENT OF DRAWING, AGES 5-18				
SEQUENCE	BEGINNER	NOVICE	JOURNEYMAN	ADVANCED
OBJECTS	Flat		Solid	
MEANING	None or shared		Pose, symbol or style	
SHAPE CONTROL	None	Lines	Curves or proportions	
DIMENSIONALITY	None	Baseline	Cameo	Base plane
VIEWER DISTANCE	Figure-ground	Overlap	Shadow, size, color gradient	
DESIGN	None		Decorative, design	

Combining dimensions stimulates creativity. When you want to learn about them, however, it is important to separate them. Each dimension has a story to tell and not so much because it is a dimension, but because of the relationships between the memes in it.

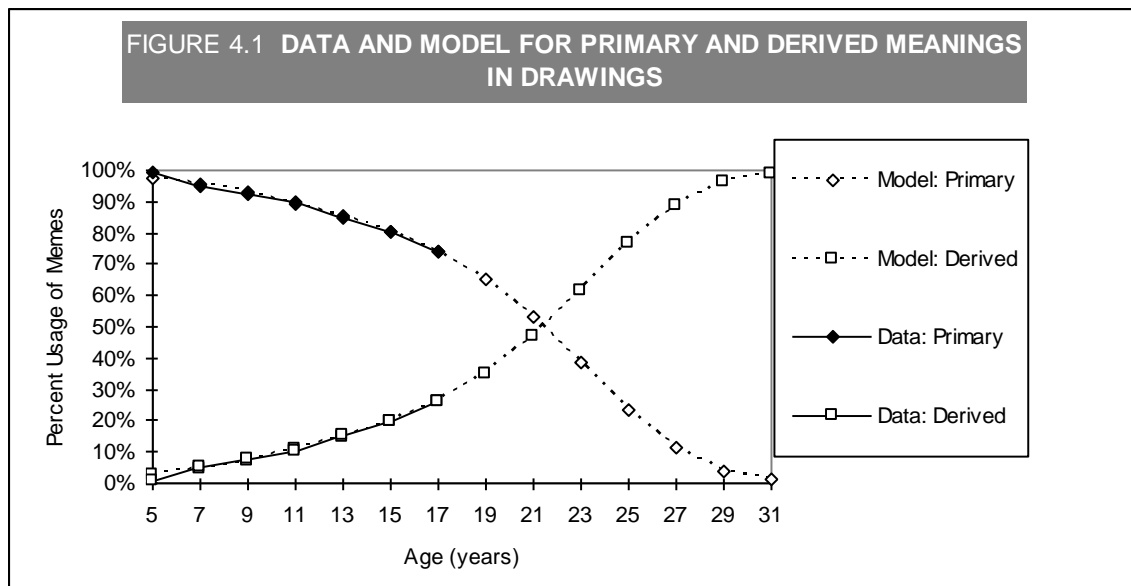
Competition between Memes of Meaning

We begin with the story told by the *Meanings* dimension: drawings made using *primary* or *derived* meanings. Primary meanings refer to any object that the artist names. Derived meanings are multiple. They included poses, symbols, and styles. A pose not only has arms or legs but an action is implied. Symbols are objects that represent other objects or ideas. Styles represent not only the object, but also the identity of the artist.

Figure 4.1 shows the percentage use of primary or derived meanings of objects. Look at the solid line, which represents the data we found. You can see, as you probably expected, that the use of derived meanings continues to increase. By the last age studied, drawings using derived meanings are more common than those still using flat objects. Also, notice that the growth lines are mirror images. The two memes develop in opposition to each other.

How do you think about development? Some theorists think of it simply as learning new things. But the use of flat objects declines dramatically. Apparently there is some unlearning going on. Other writers teach that development occurs in stages: first you do this and then you do that, like climbing from one tier to another in a stadium. But here we see a gradual change – one method slowly fades away as another emerges. There is a changing relationship, but learning and stages do not describe it.

The results for the meaning memes show that development is neither a simple learning nor a stage-like progression. Rather it involves the gradual replacement of one meme by another. More primitive memes often do not vanish altogether. They become less common. Recall Donna Michal’s findings of the children’s Old English words. We



don't stop using words like "pretty" and "think", but others take some of their places. Like the development in ecological communities, the development of the activities in our lives is a succession of memes.

Learning or stages are not the best descriptions of development. A new concept will help us to describe the changes in the frequencies of primary and derived meanings. Consider how the frequencies of plants and animals change in an ecosystem. They compete for limited resources in particular locations. After a fire, an ecosystem develops from weeds, to bushes, to softwoods, to hardwoods. Each new competitor limits a species' dispersal. Development of human activities also involves memes competing with each other.

Games are often rigged so that one competitor wins. It appears in the data for meanings that ultimately one of the two memes appears to win. That appearance turns out to be both useful and sometimes wrong. It is useful because it gets us thinking about the competition between memes. Understanding competition will show us how it can sometimes be wrong.

In what disciplines is competition studied? Who understands it? The Encyclopedia Britannica discusses competition in articles on ecosystems, sports, arts, and economies. For sports and arts, the term refers to events with no analysis of its meaning. This leaves ecosystems and economies. The discussion under economies concerns mainly the effect of business monopolies. We will make good use of the business analysis of competition later. For now, the ecologists give us the most useful framework for a discussing competition between memes. The Britannica definition of competition is ...

In ecology, utilization of the same resources by organisms of the same or of different species living together in a community, when the resources are not sufficient to fill the needs of all the organisms.

To use the preceding definition of competition we need to make an elaborate analogy between ecology and memetics (see Table 4.2). We will use the two memes of meanings of drawings for examples. The first species of an ecological competition corresponds to the first meme of drawing, namely primary meanings. The competing species, then, corresponds to derived meanings. Next, the community corresponds to the activity of drawing. Finally, the resources correspond to the time and inclination of the artist.

TABLE 4.2 ANALOGY BETWEEN ECOLOGY AND MEMETICS		
SCIENTIFIC CONCEPT	ECOLOGY	MEMETICS
UNIT	Species	Meme
OBJECT OF COMPETITION	Food	User time
SYSTEM	Community	Activity
RESOURCES	Food and water	Time and motivation
GENERATION START	Birth	Beginning use
GENERATION END	Death	Collapse of use
GROWTH	Greater population	Greater usage frequency
COMPETITIVE STRENGTH	Resistance to replacement by other species	Resistance to replacement by other memes
INITIAL STRENGTH	Percent of maximum sustainable population	Percent of maximum sustainable usage frequency

Some ecology texts go on to point out that competition affects the birth and death rates of species. This gives us a clue to look for memes that are no longer active as well as those in current use. When you are looking for memes, look for a few memes that compete for the same resources. Competing memes cannot be done at the same time, so that the doing of one results in the non-doing of the other.

Ecology's concept of competition has been put into a mathematical formula. Early in the last century, two ecologists named Lotka and Volterra worked out the formula. It computes the population when you input values for growth rates, competitive strengths, and resources. A central theme of this book is that the Lotka-Volterra law applies to the use of memes in activities as well as to the population of species in ecosystems.

I found the values for the broken lines in Figure 4.1 by choosing values of growth rates, competitive strengths, and resources to create the best possible match with the data. As you can see, the formula creates a remarkably good fit. But this more than an exercise in complicated arithmetic.

When a formula describes a theory of events so well that it allows you to discover more characteristics of the events than you have observed, it is called a model. The Lotka-Volterra formula is a model because it allows us to do two things that could not be done just by looking the data. First, just by looking at the data, one would assume that the derived meanings meme will take over. In the case of meaning, this is exactly what happened. But that is not the only possible result. When we look at the memes for objects in drawings, we will find a different result. In the next section the model shows us an outcome that is not so obvious.

The second value of the model is that it reveals general patterns of competition. Derived meanings have both more growth potential and more competitive strength than primary meanings. We have to start someplace and a scribble with a name or a box with a triangle on it and a few rectangles in it will delight the average parent or teacher for a while. But drawings with deeper meaning are more interesting to make and to observe. Therefore, there is not much growth potential for primary meanings. Memes with little growth potential, I call *default* memes. It's the first thing you can do in an activity. Derived meanings demonstrate strong, steady growth. I call a memes that show strong, steady growth *dominant* memes.

There are other types that will be revealed as we look at other dimensions. For now, it would be useful to think of your own memosystem. Is there a default meme in the system? Looking back at my wife's knitting memosystem, I would guess that knitting with no design is a default meme. She just doesn't do it any more. On the other, there does not seem to be a dominant meme in the system, even for some of the nationally known knitters who have given seminars that my wife has attended. The nature of the remaining memes in her system will be revealed in the next sections.

Objects and the Resources Consumed by Memes

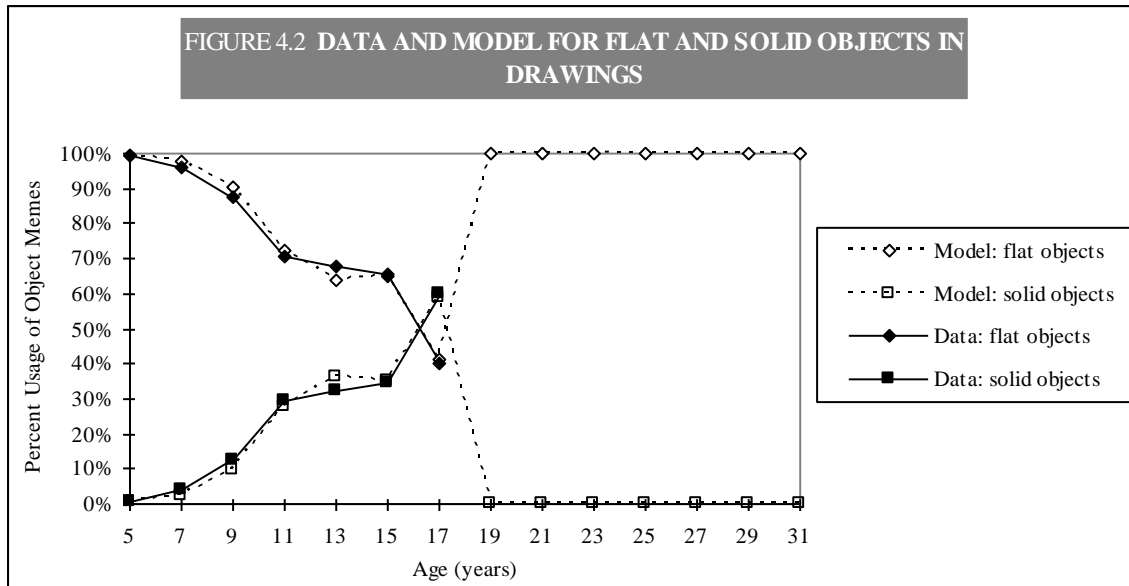
The data concerning drawings made using flat or solid objects will teach two important lessons. First, it will help you to understand the ecological model of competition better. Secondly, it will you acquire a deeper understanding of the impact on the life cycles of memes of the effect of performance speed on practice.

Figure 4.2 shows the percentage use of flat or solid objects in a drawing during the ages studied. Look first at the solid lines, which represent the data we found. You probably would guess that the use of solid or 3-D objects would increase through high school. In fact, the use of solid objects does continue to increase. By the last age studied, drawings using them are even more common than those still using flat objects. The model complicates the picture. It predicts that the use of solid objects will crash, leaving only flat objects for the drawings of adults. Is this realistic?

Understanding the Ecological Model of Competition

To understand the model, we need a good example from ecology. A succession of ecologists has compiled the longest-running study of a wildlife population in the world. The study tells a fascinating story of natural events on an uninhabited island, where travel is only possible by foot or canoe. It gives us insight into the strange prediction of our competing memes model that the use of solid objects will collapse.

FIGURE 4.2 DATA AND MODEL FOR FLAT AND SOLID OBJECTS IN DRAWINGS



Sometime around 1900 Lake Superior froze deep enough to allow a few moose to migrate the 15 miles from the Canadian mainland to Isle Royale. The island is a sliver of land a little larger than 8 by 40 miles. The moose population on the island grew steadily for several decades. By the 1920s, there were more than 3,000 moose in the herd. Then, the first catastrophe occurred. The moose consumed nearly all of their main winter food, balsam fir. In the winter of 1935 90% of the herd died, leaving only a few hundred on the island. A fire the following year resulted in a new forest. Growth mushroomed again in the next decade until another massive starvation occurred in 1948 followed by renewed growth the next summer. The story of the Isle Royale moose is not finished yet and we will have an opportunity to return to it soon. Already, it has valuable lessons for us.

Fast growth can result in overshooting the available resources, which creates a crash in the population. Sometimes the crash is complete enough to cause a local extinction of a species. This is what the model predicts for the solid-objects meme. Flat objects do not have much growth potential, but they survive because the solid objects consume too much of the resources of the artists.

Most adults don't draw. If you ask adults who seldom draw to make a quick picture for you, they draw flat objects and tell you that it is not very good. Art educators have all sorts of explanations for why adults do not draw. I have not heard one argue that it is because learning how consumes the most resources at the beginning of learning. People discover that drawing solid objects takes too much time before they practiced enough to be able to draw well quickly. Those who persist eventually get fast enough, so that they prefer solid objects.

Compare the dashed lines in Figure 4.1 and 4.2. They show that a meme with modest growth rates has a survival advantage. Extremely rapid growth allows a meme to get established but leaves it vulnerable to resource scarcity. Memes that grow rapidly but

die quickly are *pioneering* memes. Like weeds and moose, they arrive early on and grow rapidly. But they also suffer rapid fluctuations or even extinction as they repeatedly challenge the available resources.

As we mature, our community grows. This wider sphere exposes us to ever more interesting options. In turn, the increasing options put greater pressure on that most important memetic resource – user time. Under such circumstances, an activity that does not require intense time commitments is more likely to survive. The distinctiveness of seeing very young children perform deeds like adults makes us remember child prodigies. But memes that permit slow, steady growth will outlast those that grow with excessive speed.

The Importance of Performance Speed to the Life Cycles of Memes

The acquisition of a meme requires time. Consequently, performance speed is very important in the life cycle of memes. The speeding up of performance with practice is one of the oldest and most stable findings of experimental psychology. I do not call it a “discovery” because artisans, musicians, and scholars of various sorts have known it for centuries. Paying attention to how fast somebody does something is the meme observer’s first clue to how much somebody has practiced.

People underestimate the importance of the effect of practice on speed. They see somebody good at something and call it “talent”, “genius”, or “good genes.” To help you get past these over-practiced errors, I will call on one of my favorite findings in psychology. That is Crossman’s report, from way back in 1959. I call it the “John Henry” study, after the “steel driven man” in the popular ballad.

Many earlier studies had shown that performance speed improves with practice and that the more practice sessions, the less improvement per session. Crossman sought to determine the limits to the improvement of human performance.

To find the limits of human performance improvement, Crossman began by tracking the best worker in a local cigar factory. He returned every year for a decade to find that her speed of performance continued to improve. Then, on the tenth year, no improvement occurred. Excited, he went out to the factory, stopwatch in hand, to discover what people could not do. And he discovered... the machines that fed the materials to her, could not keep up with her.

There are many activities that people start and abandon before they get good at them. Some result in skills that are obvious to almost everybody. Playing an instrument or sport, understanding mathematics or science, writing poetry or clear prose are all examples of activities that result in noticeable skill when practiced properly. What have you begun and abandoned before mastery?

Other skills are rarely explicitly taught. If you are in a long-lasting relationship, who taught you how to love, care for, and enjoy your mate? The answer probably is no one. Rather you discovered how by observing the effects of others’ actions on your mate and practicing habits of thought and interaction that were mutually satisfying. Friendships have similar histories. How many relationships have you let lapse before you discovered how to make them mutually satisfying?

Activities differ in the qualities that allow people to sustain them while they build up a comfortable and competitive speed of performance. These qualities are important factors in the selection of memes. One of these qualities is the number of other people who are engaging in the activity. Each activity has an optimal number. One experienced flute player on a mountain can be an exotic experience for everyone there. Ten novice players in the same room would try even an experienced flute teacher. One person recycling his or her own trash makes little difference. A whole state doing so has important economic and social outcomes.

Another meme-selection quality is the type of benefit that the activity brings both to the person doing it and to others. A large set of activities bring economic gain. Other activities have less tangible results, like peaceful feelings, increased physical strength, escape from stress or boredom, and a sense of better understanding of humanity. Revisit those activities that you have begun and abandoned before mastery. Do you know someone who has mastered one of them? What did they get out of it that you did not? What did it cost them? Are you glad of the path that you took?

Some activities are hard to sustain but a few people find the time resources anyway. Those who continue to use skills that others rarely use keep improving indefinitely. They become masters of the meme. Observing such masters of the meme is important for constructing complete memosystems. Recently, I had the chance to observe California's First Poet Laureate. It reminded me of the poems I had written – the best when I was courting my wife. But even poems inspired by life-making experiences rarely approach the universal beauty of those that Quincy Troupe wrote for a wastewater treatment plant. "They are to be inscribed", in the poet's own words, "underground on walls where workers work, sometimes totally away from sunlight and air." Imagine the people working there and the effect on them of reading...

“your mind a window
to look inside yourself, see
a rich garden there,
bright with flowers, whose faces
pop the air like sweet music.”

Choruses, 1999, p. 75, used by permission from Quincy Troupe

BOX 4.1 IMPROVEMENT AND THE PERFORMANCE OF DANGEROUS MEMES

The principle of performance speed does not apply only to memes that benefit their users. The survival of a meme does not require the success of the users. For example, consider people who become very good at demeaning others. They benefit by removing non-submissive persons from situations they dominate. However, this may not result in success for them or for the others who remain in those situations. In fact, there may be chronically unsuccessful institutions that attract such sorts as leaders. Recruits survive just long enough to recruit (infect) others. The result is the *meme of the demeaned others*. Helping people to learn to identify and defend against the meme of the demeaned others is a significant potential contribution of memetics.

A second example will help you to remember the importance of the concept that memes do not always benefit their users. Suicide bombers have smeared the light of heroism. People, who express hate by blowing themselves up among hated others, benefit the hate meme. Distinctive events are easily remembered. Therefore, until suicide bombings become overly common, they also generate a vivid reminder of their cause. But anything else that their lives might have produced is lost in the process. Institutions that encourage the meme devalue all other potential in the persons they encourage. The result is the *meme of the expendable others*. Helping people to spot and defend against the meme of the expendable other is another potentially great benefit of memetics. We will return to dangerous memes below.

Whether our concern is with positive or dangerous memes, our data on the use of flat or 3-D objects in children's drawings has taught us to look for two phenomena. First, watch for rapid learning that can overshoot the resources. Second, watch for the increase in performance speed created by practice. If extra resources (time) are allotted to a learning task long enough for performance speed to be reduced below the resource-exhaustion level, then the activity can be preserved for the person.

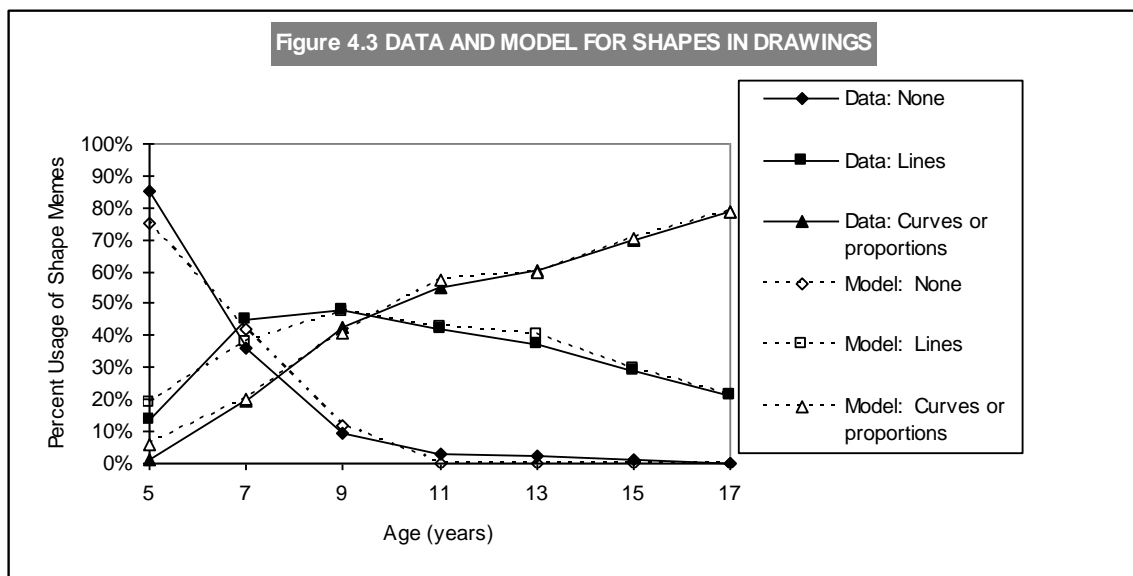
I have heard many who have learned the power of words when arranged for meaning, sound, and rhythm. A few of these learned to use their power to connect with others across space, time, and social distance. But Quincy Troupe taught me that the rarest of all are those who have learned to use their connections to inspire, encourage, and ennoble any who experience their words. Hearing or reading the words of such a master poet makes us glad that some people continue in paths we leave and that they continue to improve indefinitely.

Shapes in Drawings and Meme Waves

So far we have discussed default, pioneering, and dominant memes. We will encounter a fourth type of meme in our study of shapes in drawings. Shapes are made in drawings by controlling the length and direction of lines. People draw using three levels of control over the lines in their drawings. First, they show little control. Next, they control both. This is most evident in the quality of their rectangles. They keep the four sides within 90% of what they intended. Eventually, they control the size and directions of their curves.

Figure 4.3 shows the data and model for the percent usage of shape memes during ages 5 to 18. The projections were cut off after 18 because there was another meme in this group that was too rare in our sample to analyze, but is common among artists. That is the meme of using shaded edges, chiaroscuro, and shadowing to identify shapes. It would be expected to begin to compete with the curves and proportions meme in the twenties. Because people who become skilled at it rarely revert to outlined objects, this will be a dominant meme. Because this group of competitor memes has more than two memes, it is not symmetrical like the others. Instead, we see a sequence of waves.

Shapes that lack even the control over lines are the default meme that fades out quickly. Line control becomes the most common meme in the early primary grades but



curves and proportions overtake them by the upper primary years. Notice that drawings without curves and proportions are still relatively common well into the high-school age group. The data makes it possible to see why people who were only taking a few samples from each grade might think of developmental stages. But clearly the notion of choosing between memes that are more or less popular at different ages fits the data better.

Intermediate memes, like line control or curve/proportion control, are sometimes fast-growing pioneers. At other times they grow slowly, but with considerable competitive strength. A slow, but competitively strong growth pattern is the mark of *niche* memes. When skilled adults are in a hurry, they often revert back to stickmen and geometric objects. This indicates that the line-control meme has considerable competitive strength. It is a niche meme.

Controlling curves or proportions without using shaded edges, chiaroscuro, or shadowing is a very fast growing meme. If the later techniques do not supersede this one, it will cause the drawing activity to collapse. Consequently, curve and proportion control are *explosive* memes. Akin to a population explosion, they are prone to drive out alternatives and consume themselves into oblivion. Such memes are well adapted to settings where predatory memes are found.

The sequence of waves revealed by the various ways that people draw shapes is another vivid reminder of the poverty of the “stage” concept of development. There is no abrupt change in the nature of the person. Rather, he or she gradually acquires new skills creating a rich variety of options from which to choose.

Designs and Predator Memes

As you learn about designs in drawings, we will complete the Moose story. Through that story, you will learn about a special relationship between memes. Sometimes, they do not just compete for the same resources. A meme may temporarily change the nature of an activity. From the point of view of the activity’s memes, this is sabotage. What looks like memetic sabotage, however, can actually benefit the original activity. This phenomenon is as common in memetics as predation is in ecology. Understanding it is essential to understanding memes in your life.

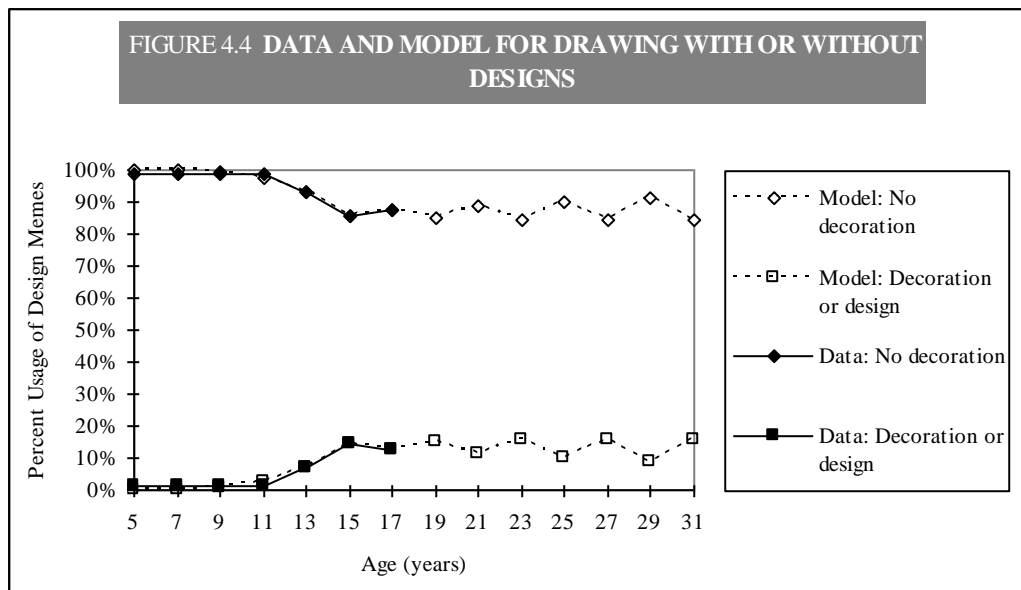
Figure 4.4 shows the data and model for children’s use of decorations in drawings. Here, the best fitting model has decoration growing very rapidly, but with no competitive strength. Decoration never becomes the most common meme. Therefore, it does not fit the description of dominant meme. But it is strong enough to survive in the environment. So it is also not appropriate to call it a pioneering meme.

On the other hand, the competing meme, no decoration, has no growth potential and very high competitive strength. The lack of growth potential characterizes default memes. But default memes do not have high competitive strength.

The design memes play special roles in relation to each other. If the no-decoration meme were removed from the activity, the dimension would collapse in less time than it took the objects dimensions to collapse. To understand what is going on, we return to the story of the Isle Royale moose.

The winter of 1949 was the very next winter after the second collapse of the moose population. In that winter, another event occurred to change the future of the moose. That winter the freeze was so severe that a solid ice bridge formed over the entire fifteen miles between the island and the mainland. We know this because wolves were able to make it across to the island.

The first pack was small. In a few years, however, the wolf population reached a balance with the moose population. The wolves survived by killing one lame or young moose every third day. That balance lasted a half century, despite temporary disruptions such as an introduced illness that temporarily decimated the wolf population. The lesson is that both despite and because they killed weak young and old moose, the wolves brought a blessing. They prevented death by starvation. Once a species has evolved in the context of a predator, it becomes dependent. The removal of that predator will weaken its chances of survival.



Returning to designs, decoration appears to be a predator meme. It redeems enough unsatisfying drawings to preserve drawing as an activity. Teachers should not discourage people from using decorative designs. If they do, the likelihood of a collapse of drawing increases.

Recall that memes can be negative as well as positive. Going back to the web search, if you enter “learning to love” you will find many interesting sites. “Learning to hate” will also bring up hundreds of web sites. Some merely reflect studies of how hate is learned. But sadly, too many of the hate sites actually advocate hate. Thinking about competing memes can teach valuable lessons about negative as well as positive memes.

Are there predators that sustain the memes of demeaning others or of suicide bombing? Is there something that a person cannot do while he or she is demeaning others, but which enables the demeaning to be sustained?

The answer begins with abusers providing sustenance in one form or another. Providing sustenance is not a predator to abuse, because sustenance and abuse can be delivered simultaneously. Slave owners and pimps, to be sure, deliver both sustenance and abuse. Sometimes employers, especially of illegal aliens, deliver both. And sometimes, so do men with homebound wives, parents, customers, and benefactors.

Roy Baumeister studies abuse and Kevin Bales studies slavery. According to both, there are two common factors among those who demean others. First, abusers believe that they are superior to others. Secondly, when their belief is threatened, they eagerly back it up with physical punishment.

Victims persevere in relationships with those who demean, because they doubt their capacity to sustain themselves. Even prison does not undermine the memes that support abuse. Rather, it provides new victims in the form of people who doubt their capacity to sustain themselves.

Victims, like prostitutes, slaves, and abused wives or children, learn that humble fawning calms the abuse. Thus, humble fawning is a predator meme to abuse. This may seem counter intuitive – fawning a predator and abuse a prey. But analogous relations between species and memes should not be taken to imply equal relationships. Memes do not *eat* their prey, they *replace* their prey. Even the ancients had acquired the wisdom to see that though kindness does little to appease hungry carnivores that are intent on eating you, it can perform a great service in the face of abusive humans.

Humble fawning is a predator, but it since it sustains the belief in the self-superiority of the abuser, it also sustains the abuse. This effect is directly analogous to the way that the wolves on Isle Royale sustain the moose. In the case of abuse, therefore, the sustaining predator meme is victim humility. If you remove the victims or provide them with the means and desire to sustain themselves, the weakness of the abuse meme will quickly be exposed. Unless new victims are found, the exploiters will soon lack the means to sustain themselves.

Lacking the means to sustain themselves provides motive for both abuser and victim. To treat this socially damaging pair of competing memes, we must replace both the predator and the prey memes. Successful societies will help both abuser and abused to develop the desire and means to sustain themselves in a more ethical manner.

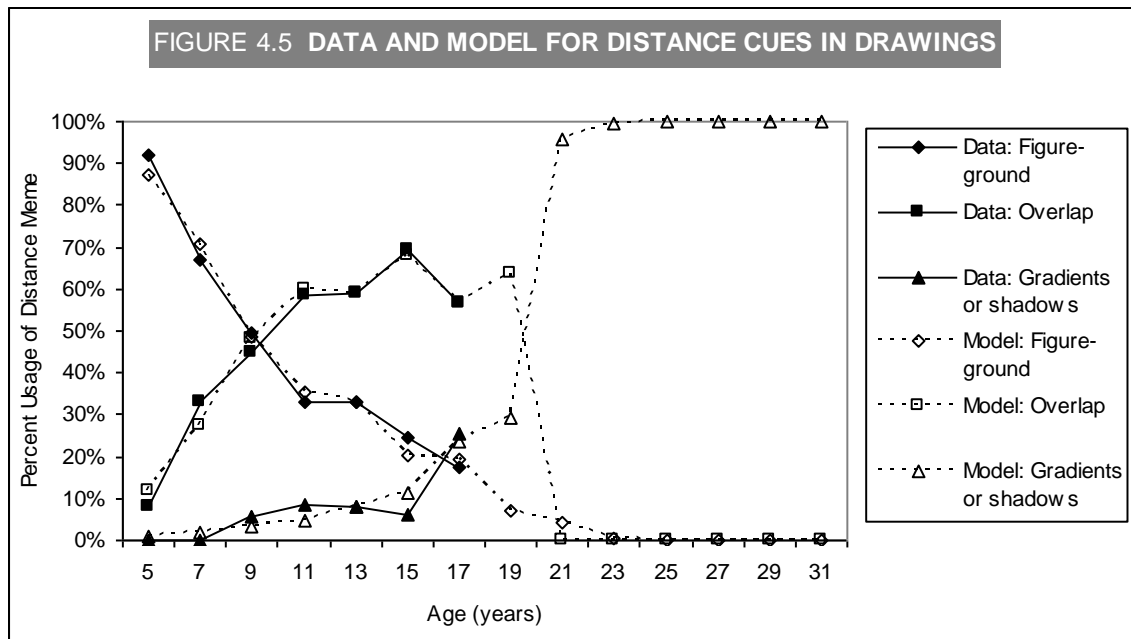
The analysis of designs in drawing has taught us first of all that development is not simply learning and it is not simply a jump from one stage to the next. Often development involves a gradual transition from one meme to the next. The old meme is not lost, but simply is not used as much. And development is not only a succession or even progress. The study of designs has taught us that development also involves a relationship between memes.

Default, Pioneer, and Dominant Memes of Distance Cues

We coded three different types of distance cues in children’s drawings. First they just distinguish figures from the background. Next, they learn to overlap one object in front of another. They erase or cut out part of one object to show that another is in front of it. Eventually, they learn to reveal distance by gradients, such as size, texture, and shadowing. Distant objects get smaller, their texture gets finer, and shadows fall on them.

Before you review our results in Figure 4.5, try to anticipate what they might look like. Remember that the default meme is where development begins, but it has no growth potential. Therefore, its percent of usage should be high at the beginning of development and decline thereafter. Pioneering memes grow fast but with little competitive strength. They will replace default memes, but will themselves be replaced by stronger memes. Dominant memes grow slower than pioneering memes, but their competitive strength allows them to prevail.

If you picked out Figure-Ground as the default meme, Overlap as pioneering, and Gradients and Shadows as dominant, then you have a good understanding of the three types of memes. Notice that even the model produces jagged, erratic growth for the pioneering meme. This is the memetic equivalent of the cycles of plenty and starvation



among Isle Royale moose before the arrival of wolves. Bursts of activity followed by busts are characteristic of growth too fast to be sustainable. Without the introduction of the new strategy of using gradients, the drawing activity would collapse.

A Review of Memetic Life Cycles

Table 4.3 provides a review of the life cycles for each of the groups of drawing memes. We discussed five groups of drawing memes: objects, meaning, shape control, view distance, and design.

The default memes for drawings included flat objects, basic meanings, uncontrolled shapes, and figure-ground as the only representation of distance. Such memes are the first to be used and the first to be replaced.

Pioneering memes include using poses, symbols, and styles to embellish the meaning of a drawing and using overlap to identify viewer intended distance. They grow rapidly, but are easily suppressed by other memes.

Drawing shapes with solid objects and using size and color gradients to identify distance are dominant memes. They grow moderately with considerable competitive strength.

TABLE 4.3 MEMOSYSTEM FOR THE DEVELOPMENT OF DRAWING, AGES 5-18				
SEQUENCE	BEGINNER	NOVICE	JOURNEYMAN	ADVANCED
OBJECTS	Flat <i>Default</i>		Solid <i>Dominant</i>	
MEANING	None or shared <i>Default</i>		Pose, symbol or style <i>Pioneering</i>	
SHAPE CONTROL	None <i>Default</i>	Lines <i>Niche</i>	Curves or proportions <i>Explosive</i>	Chiaroscuro, shaded edges, shadowing <i>Predatory</i>
VIEWER DISTANCE	Figure-ground <i>Default</i>	Overlap <i>Pioneering</i>	Shadow, size, color gradient <i>Dominant</i>	
DESIGN	None <i>Pioneering</i>		Decorative, design <i>Predatory</i>	

Controlling the length of lines in order to make objects out of geometric shapes is a niche meme. It grows slowly but endures.

Finally, there are two pairs of explosive-predator memes. Shapes with curves and proportions are culled by shapes with chiaroscuro, shaded edges, shadowing. Decorations and decorative designs cull drawings with no decorations. Without the predator memes, the pioneering and explosive memes would quickly exhaust the available time and motivation, resulting in a collapse of interest in the activity.

Table 4.4 summarizes the general properties of each of the six types of memes. This is the mother lode of our study of drawing. Embedded in this table of life cycles is the means to understand and plan for all the dynamic interactions listed in the preceding table.

One of the most important concepts revealed by Table 4.4 is that overweening growth can be controlled by competition. The difference between dominant and predatory memes is that predators cannot exist in isolation. Whenever you see symmetrical vacillations in usage, ask yourself if the later appearing meme is sustaining the earlier one.

Unlike predatory memes, dominant memes produce stagnation and a loss of diversity. Modern art restored the developmentally primitive memes that the triumph of realism had abolished. The best of modern artists integrated primitive and advanced memes in the same drawing. The success of modern art, therefore, is the treasure map for revitalizing any stagnant group of memes.

Estimating Growth Using a Travel Memosystem

Drawing skills have been a convenient topic of study which has taught us much about memosystems. Drawing is not a prime interest of most people. Furthermore, few people have the time or inclination to conduct an elaborate study with a thousand samples

TABLE 4.4 THE LIFE CYCLES OF MEMES

Type	Growth Rate	Competitive Strength	Life Cycle
Default	None	None	Endures until any other type appears
Pioneering	Rapid	Little	Endures until resources exhausted or growth is limited by a more competitive type or by a predator
Niche	Slow	High	Endures until dominant type reaches equilibrium with resources
Dominant	Moderate	High	Endures indefinitely
Explosive	Rapid	Moderate	Endures until resources exhausted, then collapses unless a predator limits growth
Predatory	Moderate	High	Preserves systems with Pioneering and Explosive Memes from collapse

and several coders. You might wonder if all this is necessary to learn about the memosystems that are of interest to you.

The answer is certainly not. The elaborate study of drawing was necessary to understand competing memes the first time they were studied. But that study taught basic guidelines that will help you to make good estimates concerning your favorite activity. Even without a detailed study, your estimates will be good enough to create scenarios.

The creation of scenarios is a major tool of corporate management. Scenarios are stories of events that might happen in the future. With these stories, managers can make plans that help them to prepare for the future. You do not have to be a corporate manager to profit from scenarios. Creating scenarios for your favorite activities will provide you with new insights into your own relationship with the memes of those activities.

I will illustrate the basic guidelines for creating scenarios by constructing a memosystem for travel. You might choose an activity of your own so that you can try the steps I took with the travel system.

The first step we should both take is to construct a memosystem for the activity the same way that you did at the end of the last chapter. This time, however, we should not rely solely on our own knowledge.

Even if you are the world's greatest expert in an activity, there are people who know things about it that you do not. The World Wide Web is a great place to look for these other experts. Whatever your activity, key into the search engine "learning to..." and add the name of your activity. Then look for a site that has on-line instruction. You will very likely have to do some thinking in order to adapt it to your memosystem. But it should give you numerous ideas for improving your system. If not, find another site.

I am a journeyman traveler, but know enough master travelers to recognize master traveler memes. The site I found for travel was www.thirdage.com. Among 8 other topics this site has a travel section. The travel section has 5 subsections: adventure, culture, family, romantic, and solo. Under the "adventure" section, I found a multiple choice test called the "Travel Adventure Quiz." I adapted this quiz to make a rich memosystem for expertise in any kind of travel. My adaptation is in Table 4.3.

The table details your travel skills. Greater skill enables you to have richer travel experiences. Each level becomes rarer and rarer. You may believe that you would never be interested in a survival challenge. But such reasoning applies to every human activity that is possible to master. The masters do things that few others strive for. But they benefit as few others do.

Think of activity peaks. An athlete gets an Olympic gold medal. A scientist discovers what no other scientist ever has before. A musician performs a piece few dared to attempt. A bird watcher spots a bird everybody thought was extinct. A clergyman creates a great congregation from nothing. A builder makes a unique home. A friend is trusted with every crisis for a lifetime.

Do not forget the destructive activities. Many movies and news stories have been made from the exhilaration of war or crime. Mastery of every human activity provides its own rewards. The exhilaration from unique performance is itself unique.

For most of the activities you have mastered, you can be assured that most other people are not interested in the challenge. Nevertheless, other people admire and learn from masters, at least from the masters of positive activities. We have much to learn from the master travelers, even if we have no intention of joining them. Memetics enriches this process of learning from the masters.

TABLE 4.3 WESTERNER TRAVEL ADAPTABILITY MEMOSYSTEM				
LEVEL	BEGINNER	NOVICE	JOURNEYMAN	MASTER
GOAL	Novelty & relaxation	One of history, people, study or physical challenge	Two of history, people, study or physical challenge	History, people, and study or physical challenge
LANGUAGE	English gets you by anywhere	Will try to speak the local language	Heavy accent in the local language	Not a native but fluent in the local language
PLACE	Own country	Developed West	Developed Orient	Developing country
CULTURE	Stick with my own	Be self with locals	Become acceptable	Blend with locals
BUREAUCRACY	Forget it	Passport	Visa	Any red tape
STRIFE	None of the above	Bad reputation	Civil rights abuse	Civil wars
HEALTH	Home-like health risk	No shots required	Shots but safe food	Shots & some food poisoning
NATURE CHALLENGE	Comforts of home	Relief when needed	Physical challenge	Survival challenge
GETTING DIRTY	Never	Some days	Most days	Every day
WALKING	<1 mile	1-3 miles	4-9 miles	10+ miles
TRANSPORT MODE	Safe and fast	Slow & close to ground	Speedboat, jeep, helicopter	Anything
TRANSPORT PLANS	I have others plan it in advance	I plan my transportation for my comfort	I'll take a bus anywhere	I'll take a taxi anywhere
LODGING	Luxury only	Comfortable inns	Budget inns	Backpack sites
ITINERARY PLANS	By a tour	By a guide	I do it before going	I do it after getting there
ITINERARY CHANGE	Plans come first	Rarely		Whenever interested

BOX 4.2 REPLACING “TESTS” WITH MEMOSYSTEMS

To understand travel mastery from a memetics point of view, we must dispose of the interfering “test” meme. Multiple choice tests turn momentary choices into choices made for all time. Most of us intend to choose our spouses for all time. Parents are morally obligated to be there for those we brought into this world. But there are precious few choices in our lives that we intend to have similar longevity.

You already have enough experience with memetics to understand several problems with conceiving such items as multiple choice tests. The analogy between memes and species will help us review these problems. The review will strengthen your understanding of memes.

First, forcing people to make a single choice makes no more sense than requiring a patch of land to contain only one species. We have learned that there is no difficulty in using one meme for one trip and another for the next. Testing destroys memetic diversity. Memosystems advertise it.

Secondly, counting different memes make no more sense than counting different species in a zoo. One orchid does not equal one elephant. The five “things” made by adding three orchids plus two elephants are so abstract that they are practically useless.

Third, scoring each item 1-4 is like sequencing species within orders. You give 4 points for a chimpanzee, 3 for an old world monkey, 2 for a new world monkey, and 1 for a lemur. Then you add the “scores” together for each order. The total is nonsense.

I hope the test-totaling nonsense makes you yearn for educational evaluations that make more sense than multiple choice tests. If you do, you understand part of the motivation that kept me at this project for several decades. Seen as a “test” these items are frivolous. Seen as a memosystem, they become fascinating, instructive, and motivating.

Tests destroy memetic diversity. Memosystems illuminate it.

Armed with the travel memosystem, you are ready to relate it to your own experience. Memes that you are not comfortable performing can be important clues. For example, I am comfortable with the journeyman level for everything except for strife and health. One friend of mine traveled in the Peace Corps to India and returned with an uncomfortable disease that will be with him the rest of his life. His experience ended my interest in traveling to India. The master travelers I know would tell me that it is possible to catch an incurable disease at home and I am missing out on a great experience.

I experienced my friend's disease vicariously. Its effect on me suggests that even vicarious diseases can limit the acquisition of travel memes. Thus, it appears that disease tolerance is a very fast growing meme. Without sufficient experience with the other health memes, it can crash the system. This is typical of pioneering memes. In your own memosystem, look for pioneering memes among those that have caused collapses in interest for you or your acquaintances.

Memes that you may not have tried, but are comfortable with, suggest another classification. So far, I have only traveled in the developed west and there are still many places in Europe, Israel, and "down under" that I would like to visit. But a trip to the developed Orient would also fascinate me. I just haven't thought of it much.

My introspection suggests that going to the developed Orient might be a niche meme, which usually occurs after travel to the developed west. It is not likely to be dominant like becoming a true world traveler is. In your own memosystem, to find niche memes, look where there is less likely to be emphasis by you or your acquaintances.

Memes that work at home may suggest areas of potential growth. Experience in an activity creates comfort wherever it is practiced. For me, knowledge of music and Hebrew produce ready acceptance from many western worshippers. Academic experience allows me to be comfortable at nearly any English-speaking universities. And manufacturing experience makes factory floors familiar. Our experiences have counterparts across the developed world.

Activities have alien as well as familiar analogs. There are non-western worship services, non-English learning institutions, and production can occur outside of factories. Expertise, therefore, both allows comfort and exposes our areas of discomfort. But discomfort brings opportunities.

The "culture" memes in the travel memosystem encourage us to learn more about blending in with locals. We can learn when they do our favorite activities according to their customs. The reward is a deeper and richer understanding of those activities.

We created the travel memosystem to explore what we could learn without extensive research. Clearly the rich framework of default, niche, pioneering, dominant, and predator-prey memes has allowed us to learn quite a lot.

Applying the Lessons to Memes in Your Life

In this chapter we learned that the development of activities in our lives involves a succession of related memes. Default memes with little growth potential or competitive

strength are the first thing we think of when we begin a new activity. Pioneering memes grow like weeds but fizzle. Niche memes endure against faster growing competitors. Dominant memes grow in usage slowly and steadily until they replace the other memes.

In our analysis of the design memes for drawing we learned that sometimes memes exist in predator-prey relationships. These relationships sustain both predator and prey memes. If the prey is desirable, we need to ensure that the predator is common enough to preserve the activity. Designs helped to preserve the making of non-decorative drawings. If the prey is undesirable, removing the predator will lead to the collapse of the undesirable meme. Removing slavish dependence causes a collapse of demeaning others.

Removing predator memes may not always be simple, since memes are dispersed widely across our population. In the case of abuse and victim memes, social solutions must provide new capabilities to victims and victimizers alike. These new capabilities, of course, are new memes. Without them, victims will find another way to be dependent and victimizers will recruit new victims.

Armed with this greater understanding of memes, you should go back to the memosystem that made at the end of Chapter 2. Try to classify each meme as *default*, *pioneering*, *niche*, *dominant*, *explosive*, or *predator*. Use Table 4.4 to help.

Remember the signs. Everybody starts with default memes but they fade as soon as another meme is introduced. Pioneering memes grow so fast that people tire of them. The result is often giving up on the activity. Niche memes are rarely common but they also rarely wear out. People come back to them regularly. Dominant memes take over. They are the giant hardwoods of the meme world.

Predator memes are mutually interdependent with explosive memes. Neither survives without the other. The frequency of one will be nearly a mirror image of the frequency of the other. The mirror image is distorted by changes in the frequencies of the predator memes lagging behind those of the prey memes.

The various types of memes come in slow waves sweeping over the life of the activity. First the default memes show up. Next, the pioneer and niche memes appear. Finally the dominant memes take over. But the succession is not always so simple. Many dimensions do not contain all four types of memes. Sometimes two memes of the same type are part of the same dimension. And sometimes a dimension will have predator-prey memes.

In a few cases you may have difficulty deciding on a type for a particular meme. After all, you do not have a 1,000 carefully coded samples plus an elaborate mathematical analysis to help you. But in most cases you will be able to name the type with remarkable clarity. Knowing the type will help you to plan its use in your future with the activity. If you want to keep the activity in your life, but are relying on a fast growing meme, look for a niche meme or a predator to slow it down. If you want to get rid of it, work on a dominant meme and try to keep yourself away from the predator.

The principles just described may not be as specific as the predictions of an oracle or palm reader. But even though it is just a young science, memetics analysis will generate better planning than such magical thinking.

You learned about the life cycles of memes in the context of personal development. Even with Table 4.4 in hand, you may feel unsure that you have enough knowledge to apply accurately to your favorite activities. In Chapter 5 I will revisit memosystems in the context of the historical development of a community of practice. The similarities between individual and historical development will do more than help you to understand the life cycles of memes. They will help you to understand the fundamental role that memes play in all human activities.

As you have experienced, creating or finding a memosystem takes some deliberate effort. Also, classifying memes requires concentration and self-critical reflection. But remember that each time you analyze an activity will take less time than the previous occasion.

Analyzing a memosystem is one of the very best ways of committing it to memory. You started with an activity that is important to you. Next, you picked important approaches to doing the activity. Finally, you verified that the approaches were actually related to experience and expertise in the activity.

Memetics analysis gave you an understanding of what the future holds for each particular approach to the activity. That understanding will draw you back to the results of your analysis over and over again in your daily life. Each time you will gain more insight into the activity and its basic life cycle.

The principles of memetics apply to institutions that you are part of as well as to the lives of individuals that you know. By institutions I do not refer only to those that are contained in one location, but also to worldwide communities of practice. Though all of what you have learned in this chapter will transfer readily, understanding institutional change will bring its own complexities. It is the topic of the next chapter.

CHAPTER 5

Community Memes

Multiply and Be Different

A miserly old man had a dozen boxes that needed to go to the neighborhood dumpster. He had been procrastinating because he knew that the garbage collectors would charge a hefty fee to pick them up. One afternoon he noticed three boys walking home from school. He asked if one of them would haul his boxes to the dumpster for him. All three answered that if the price were right, they would be glad to do it.

So the old man asked how much they would charge. The first answerer was a husky fellow. Convinced that his smaller companions couldn't get the job done, he answered confidently "Two dollars per box." The old man frowned, fearing he would hardly beat the garbage collector, and said "I suppose you other boys won't be able to get the job done."

The middle-sized boy asked him to wait two minutes. He ran down the street to his own house and returned pulling a wagon. Proud of his ingenuity, he said with even more confidence, "I'll give you a deal, you can't refuse -- a dollar a box." The old man smiled at that, but couldn't help an inquisitive look at the third boy.

The third boy was the smallest of the three. He wore glasses and had a stuffed book bag on his back. The other kids called him a nerd. He knew that the old man was really a miser, who had a great deal of money. He also knew the old man loved getting the best of everyone in a deal. So when his turn came around, he said, "I'll give you a deal you'll never forget. I'll start with just a penny on the first box. I'm little, though. So to keep me motivated all you have to do is double the amount each time -- two cents on the second one, four cents on the third, and so on like that." The old man smiled at such a terrific deal and said "Do you think you can do the job, son?"

The nerd took off his shoe and pulled out a twenty dollar bill. He said to the old man, "If you have change for a twenty, I'll see that the job gets done."

The old miser came back with 20 crisp, new 1 dollar bills and a bigger smile than he shown in weeks.

The nerd counted out six of the crisp new bills and handed them to the boy with the wagon. "I'll rent your wagon for half of what you would have made and you don't have to do a thing."

"Now that's a deal!" The quick reply was accompanied with a gesture of holding out the wagon handle.

"Oh, that's not for me." The nerd answered while he counted twelve crisp new ones. "How about it, big guy? I'll give you half of what you would have made, but since you get to use the wagon, it will take you less than half as long."

The big guy sported a big smile as he accepted the wagon handle.

The old man looked on for a moment, amazed at such generosity from one so young. Then he went inside.

The big guy began carting the boxes to the dumpster. Each time he returned, the smallest boy helped him load the wagon. The wagon owner, not wanting to be left out, pitched in as well. Less than an hour later, the last boxes were being hauled off. The nerd reached into his backpack and pulled out a pencil and paper. A few minutes later, he knocked on the old man's door. "All done sir," he said. "That will be \$40.95."

"Forty dollars and ninety-five cents," the old man cried. "You told me one cent for the first box, two for the second, and so on."

"That's right, sir" said the boy. "Here are my calculations, sir. Would like to check them?"

$$.01+.02+.04+.08+.16+.32+.64+1.28+2.56+5.12+10.24+20.48 = 40.95$$

The old man stared long and hard at the numbers trying to find an error.

"Tell you what," said the boy. "I'll give you a break. If you have two twenties, you can skip the change. I don't have room for it in my sock anyway."

The old man may have been a miser, but he did have enough sense not to renege in front of two witnesses. And those witness were special – both well served by a fellow who seemed capable of inventing almost any kind of mischief.

* * *

In my book, all stories have at least one lesson. You might think this one is about arithmetic, but that is only a minor lesson. The two important lessons are about development and community.

The lesson about development might be easiest to understand in terms of biological development. The two most basic principles of embryology are cell division and cell differentiation. After a half dozen divisions, the embryo has already begun to differentiate into inside and outside, top and bottom cells. Another half dozen splits and we have three germ layers. By the third half dozen splits, differentiation into organs is well on its way. Cells with separate structures and functions can be far more adaptive than cancer-like masses. Forty-six divisions can produce 75 trillion cells. That is the estimated total number of cells in adult humans.

Each cell division multiplies the changes resulting from all prior cell divisions. Therefore, development makes possible immense outcomes from tiny beginnings. The

“nerd” in our story made an offer where each cost multiplied the prior cost. In doing so, he showed that he understood how development multiplies changes.

To see the story’s lesson about community, suppose that you found a new organization. First, you apply the development lesson. You decide that every member must recruit two more members. A little experience teaches that it takes about a week to recruit two people. This rate of development does not continue forever. If it did, in less than nine months, your membership will include every person in the world. We will discuss later what slows down the changes.

It will soon become apparent that members begin performing different functions in the organization. Cell divisions result in different cell structures. Instead of having cell structures, organizations have roles. So for organizations, recruitment results in different roles.

Our “nerd” understood the importance of role differentiation to group adaptation. He divided his little group up into three roles. He assigned the role of hauling to the boy with muscles, the role of provisioning to the tool owner, and the role of planning to his own knowledge. When combined, muscles, tools, and knowledge accomplished much more than any one of them could accomplish separately. He understood that development produces differences.

The story did not have a lesson to illustrate why your group is not likely to take over the world. The reason is that recruitment times are not constant. Early recruits are those who fall in the group automatically – the default members. Next, you get adventurous pioneers. Members who fit in special niches of your organization follow the pioneers. Finally, you get to the main body of your potential membership. Each of these types takes longer to recruit than the preceding type. By the time you get to main-body membership, competing activities have arrived to pare down your growth rate. You start to lose members. The point at which your organization reaches a balance between loss and gain of members determines its ultimate greatness.

Why Should You Study the Development of Communities?

How is a standardized test like a television set? Do not expect a punning answer. There are four serious answers that require an understanding of developmental processes affecting the lives of all of us as I write. Keep the question of test-TV similarity in mind until we have developed the ideas that will make the similarity clear to you.

For now, think of your answers to some easier questions. Who are your friends? Whose approach to your favorite activity has influenced you? Which approach will you use next? What groups do you care about? Where are you most at home? Why should you help? When will you help? How will you help?

Each question also has its opposite. Who is a threat to your way of life? Whose approach makes you uncomfortable? Which approaches will reject next? What groups might overwhelm you? Where do you feel least comfortable? Why should you protect your group? When will you begin? How will you protect your group?

Your answers to those questions tell your place in civilization. They point to what you have worked to preserve outside of yourself. When

If you want to eat, you must learn how food grows. If you want financial success, you must learn how money grows. If you want to contribute to your community, you must learn how communities grow. If you want to protect your organization from competitors, you must know how those competitors grow.

In the last chapter, you learned about the development of individuals by studying drawings. In this chapter you will learn about the development of communities by studying the community of developmental psychologists. They were easy to study, because they recorded their activities in journal articles. Another factor that made psychologists easy to study was a book by Kurt Danziger. Danziger pioneered the use of social psychology to study history. Just before we began our project, he completed his study of the major changes in practice that research psychology had undergone. We used his work to create our memosystem for developmental psychology. Then we coded 912 articles written between 1932 and 1992. The journal *Child Development* was founded in 1932. We began our study in 1992.

Of course, we will not learn only about developmental psychologists. When the father of genetics, Gregor Mendel, studied peas, we did not learn only about peas, but about all of life. If we study it properly, our model community will teach us about all communities.

You might be thinking that we should have picked something interesting to more people, like business, or politics, or religion. To those who agree with that, let me remind you that we were all children once. Developmental psychology is about all of us.

You might also think developmental psychologists are not easily approached. They use painstaking methods to study activities that few people have thought about. Then, they write articles that are difficult to read. I agree with that assessment. If you can comfortably read this book, it is only because a large number of people have finally helped me to escape the style of writing that is popular in developmental journals.

There is a way that we can comfortably approach developmental psychology. The methods and topics relate to our common language. Parents, teachers, and leaders are more common than developmental psychologists. But they learn about development in many of the same ways. Their learning is less formal. Usually, less formal learning is more automatic. As a result parents, teachers, and leaders may be less clear about how they drew their conclusions. Yet their language is more accessible. So we can use developmental psychology to clarify the methods for studying development. And we can use the language of parents, teachers, and leaders to communicate them.

As in previous chapters, I urge you to start with a memosystem for the development of a group familiar to you. Start with your own observations. List all the changes that occur to you. What are the differences between this and several years ago? Who did what, when and where? List everybody you can remember in the organization. Find records to help, if you can. Why did each person get involved and did their reasons change? Can you think of any functions that changed hands? Think of a person who moved away. Why were they missed? Whose rules or activities served as guidelines for

your organization or community? Is there a national or international group that you affiliated with or that influenced you? Can you think of choices that were made by the whole group or by individual members? Can you think of resources that were provided by someone?

The eight common question words are who, whose, what, when, where, which, why and how. Each can be used in a variety of ways, but starting with the question words can be an excellent tool for building a memosystem. Because we practiced all or most of the list many, many times, a memosystem that is built on the question words is easy to remember.

Next, access the net and key in “research on the development of...” and add the name of the type of group that interests you. If that does not turn up useful information, try “history of...” or “growing...” Look for advice on how to grow or manage that type of group activity. If you still find no useful material, try a similar group. For example, the Episcopal Church had done some good research on successfully growing a startup church. I suspect its findings would apply to Jewish or Roman Catholic congregations as well.

If you find too many sites to sift through, narrow your search. For example, looking for “growing a business” produced an impossible jumble. But “entrepreneurship research” turned up several useful sites. Trying a different combination of terms is sometimes necessary. For example, “development of volunteers” turned up a huge list, but “volunteer management” had several items that could be used to define steps in creating a volunteer organization.

Competing Memes in Developmental Research

Answers to the eight basic question words provide eight dimensions of developmental research. We will take each of these one at a time and look at the whole system afterwards.

Who?

Who will be in the project? Psychologists often refer to the people in their studies as “subjects.” That term was originally applied to cadavers. Its use began because psychology’s first model for how to do research was medicine. Anthropologists have a slightly better tradition for referring to the people in their studies. They call them “informants.” In common language that connotes ratting or squealing on one’s group. I prefer to think of everybody involved in research as participants. Participants have different roles. Researchers are the core group because they begin the activity. Other participants are collaborators. Some participants are precursors. And some merely accompany collaborators. As you think about the “who” in the group you chose for a

memosystem, it will be most useful if you think of all the other people connected to it as participants.

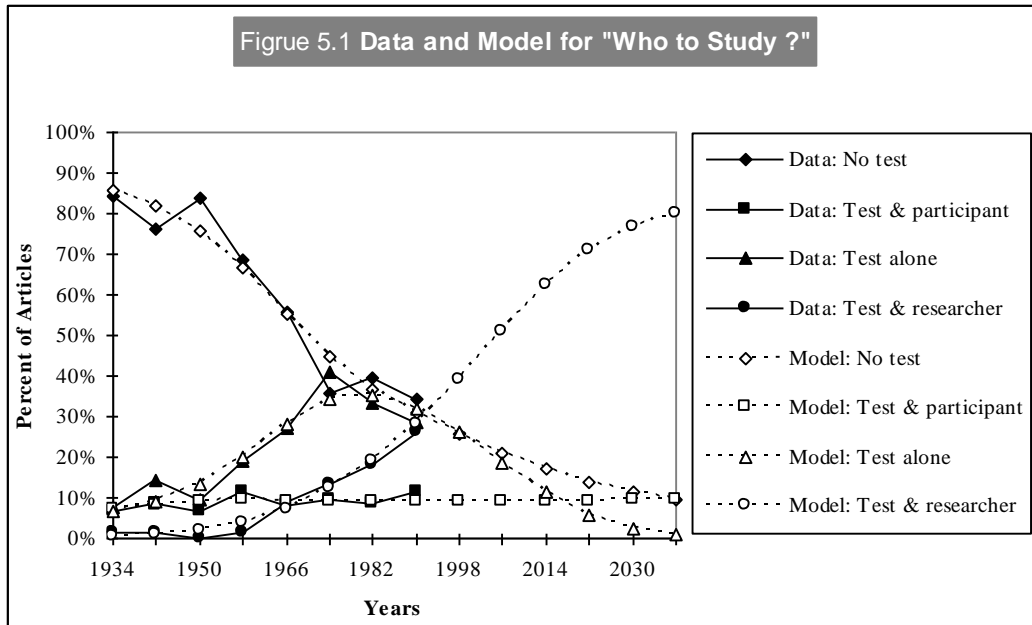
The people being studied, the collaborators, might be studied with the researcher, or a companion like a parent, a sibling, a friend or a teacher. In the early years of developmental research collaborators were never isolated. Either the researcher or another person was there. Then, group tests began to appear. Sometimes, researchers would give group tests without ever interacting with the person being tested. Other times, they would be present themselves. In a small proportion of cases the researcher would measure someone twice. They would give them a test and then study them when they were with a companion.

Keeping track of “who” is the most important issue for understanding any organization. Who is inside the organization and who is outside? Who are the core people and who are the peripheral participants? Who else has a special relationship to the core people or general participants? What do people do together and what do they do alone? In a business, who is the customer, who is the employee, who is management, who is a stockholder, and who are strategic vendors or partners? In a volunteer organization, who is being served by whom and who are the organizers? In a religious organization, who is a member, who is a professional, and who in the community would appreciate involvement but are not involved? In a family, who is a member, who is a potential member, and who has a say over what in the lives of other family members?

In research settings, the researchers are the professionals or core group. The collaborators are the main participants. Those who interact with or accompany the collaborators are peripheral participants. In the group test situation, collaborators are alone. These are the memes for “who” was involved in the research group. So, given these memes, what happened to the “who” in developmental research between 1932 and 1992?

What Did We Discover About “Who”?

Figure 5.1 shows the results of our study. The solid lines show the data and the dashed lines show the model. The first thing to notice is the line with the diamonds. Very few studies used tests in 1932, but the number of studies without tests declined steadily over the next 60 years. In all of these studies, the researcher worked with a collaborator and often also with another participant. Next, notice the lines with the triangles. Studies that only used tests grew until the 1980s and then began declining. Third, the line down at the bottom with the squares represents studies with tests and extra participants. This type of study stayed at the same level for the entire period. Finally, the circles show studies that add researcher-collaborator interaction to test scores. These grew steadily over the entire period. The model predicts that they will continue their growth well into this century.



What Story Do the “Who” Findings Tell?

What does the data mean? In the last chapter you learned about default, pioneering, niche, and dominant memes. The four meme types are illustrated very clearly in the figure. “No test” is the default meme. It declines from a high starting point. “Test alone” is a pioneering meme. It rises fast and then declines when faced with competition. “Test & participant” is a niche meme. It doesn’t grow, but holds its own against competition. Finally, “Test & researcher” is the dominant meme. It grows from nothing to almost everything over the century.

Tests were a disruptive innovation for developmental research in the 1950s, right after World War II. They were useful in the war when overworked military authorities needed a tool for quickly assigning a person to an appropriate role in the war effort. After the war, they provided a few scores that could characterize a collaborator’s activities with a minimum of effort on the part of the researcher. The same way that bad money drives out good, in economics, easy data collection drives out effortful data collection in research. The result is not always better research.

Sheet music was a disruptive innovation. Before sheet music, people had to listen to a song many times until they had it memorized. Since there were no recorders then, this meant that an intimate relationship between one who performed the song and one who learned it. Before sheet music a repertoire of 500 hundred songs was an enormous life accomplishment. Afterwards, it was a good place to start. Sheet music made it easier to begin performing a piece. Centuries later, however, we still demand that our soloists know the music by heart.

In a way similar to sheet music’s effect on performance, testing made it easier to study children. At the same time, it disrupted the intimate relationship that used to persist

between researcher and collaborator. With the advent of testing, what was once distilled from scores of hours of interaction became reduced to a few numbers.

Pressed to elaborate on the scores given by tests, there was little that a researcher could say. So, at first, they modified their research programs to focus on what could be said. This strategy only served so long. As new researchers vied for a voice in the community, they began to expose the weaknesses of relying solely on tests. Their main weapon was to show what else could be accomplished by reintroducing interactive observations. That combined approach is dominant today.

Is the “Who” Story Finished?

The model projects that tests plus interactive observations will take over developmental research. Will this come true? The model does not account for disruptive innovations that are not identified. There may be a disruptive innovation that replaces tests. Careful readers will know that I strongly favor this outcome. No matter my bias, I believe it has begun to happen.

In the decade since 1992, when we began our study, a revolution has emerged in business data analysis. This revolution is bound to filter down to the developmental research community. The revolution is coded in terms like “data mining,” “xml,” “the semantic web,” “computerized text analysis,” and “computerized image analysis.” All the efforts implied by these terms allow computers to code natural data like text and images. As these efforts improve, researchers will begin to replace tests with computer interactions.

Researchers already use computers to uncover important patterns in written text. Soon they will use them to discover key incidents in streaming video. Adding the computer as a “social” partner in developmental research will disrupt testing because it will provide far deeper information with no extra resource consumption. Collaborators will also be spared the stressful, time-wasting, demeaning activity of testing.

Computers will not become partners in research as fast as tests did. But they trivialize human activity less than tests. Therefore, their use will have more competitive strength than testing had. Yet it seems likely that a similar progression will ensue. Early articles involving computerized analysis of collaborator activities will rely too much on the computer. Gradually a balance between learning through intimate collaboration and learning through computer analysis will be restored.

What Can the “Who” in the Research Community Tell You?

The progression of “who” in developmental research began with learning by contact with collaborators. Those first collaborators sometimes had other participants accompany them. Next, researchers acquired a tool that made life dramatically easier for them. Gradually they discovered the limits of this tool and combined their new and old approaches.

If you are a founder of a new community your core group will likely share similarities with our researchers. At first, the group learns everything they can about their collaborators. They meet their customers, employees, volunteers, members, audience, or

visitors personally. And they try to get to know them. They use all the question words in several contexts. Who do they care about? What are they looking for? And so on during hours of contact. This is “startup” intimacy.

As the community grows, the resources that allow startup intimacy become more and more difficult to find. Surveys, participation records, and employee assistance begin to replace face-to-face interaction. The community suffers from the loss of intimacy causing the core group either to change itself or be replaced. The changed core group achieves a new balance between intimate and remote types of interaction.

The developmental research community has several thousand members. Even extended families have a small fraction of this. Are families too small to be subject to the same dynamics as developmental research? In families, the parents are the core and the children the collaborators. Like the researchers’ tests, in the 1950s, television began to separate the core group from the collaborators. In the last few generations, TV has been the innovation that has disrupted family intimacy. During TV’s half-century of dominance, the use of sex and violence to hold viewers has progressed to levels that are problematic for family welfare. Thoughtful parents have become more involved in their children’s viewing habits.

For families, like developmental researchers, there is a disruptive innovation on the horizon. Again the innovation is the computer. Requiring only a small additional amount of parental resources, it has potential for far greater interaction. Hours of computer use have begun to limit the growth in TV time. But will computer use serve families better? The answer is not as clear as the answer for research. This is especially true, since the family collaborators (the children) appear more adept at computer use than the core members (the parents). The founders of each family seem likely to relinquish control of its destiny to remote individuals who control its computer capabilities. In any case, the similarity between developmental research and families reveals that the findings from our target community may generalize far beyond that community.

We can now answer the question that began our discussion of the value of understanding community development. Standardized tests are like television sets for four reasons. First, both were used by a core group to substitute for their interactions with other community participants. Second, both produced a loss of intimacy in the communities where they were used. Third, the core groups that used them both responded to the negative effects of loss of intimacy by combining personal interaction with the substitutes for interaction. Finally, both are being replaced by computers.

At this point, you should revisit the memosystem you created for this chapter. Consider the scenario that (1) begins with intimate contact, (2) finds a remote but easy to use substitute, (3) responds to flaws in the substitute by partially restoring intimacy, and (4) finds a new, more technologically advanced substitute for intimacy. If that scenario sounds familiar, check your memosystem. Can you improve on your answers for “who?”

Whose?

Whose studies relate to the research problem? There are almost never problems that no one else has learned anything about. Sometimes, a problem has been looked at often by people in the community. At other times, the only way you can get input from others is to think of similar projects done in other communities.

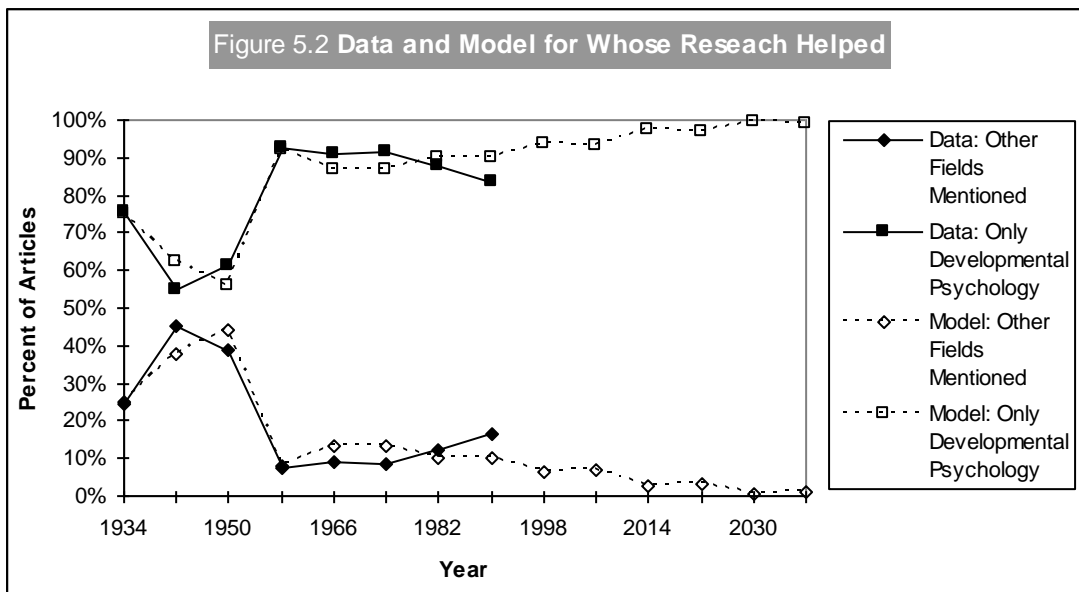
The research community is similar to other communities. Early developmental researchers looked to medicine, biology, philosophy, and pedagogy for guidance. In an advanced community, there is less looking outside. But the search for new insights keeps the examination of related disciplines alive. The question of “whose” work related to a study was examined by looking at the backgrounds of each of the articles.

What Did We Discover About “Whose”?

Figure 5.2 shows our findings about “whose” research helped to prepare for each study. First, look at the lines with the diamonds. These represent articles that mentioned other fields besides developmental psychology. Notice the mark between 1934 and 1950 which represents the World War II period. In that period the practice of mentioning fields outside of psychology became more common than at any other time. Also, the change was very abrupt and dramatic. First, there was a huge increase in mentioning other fields and then, only a decade later, there was an even greater drop. Disciplinary research is the dominant mode. It grows reasonably fast and is competitively very strong. Interdisciplinary work is a pioneering practice. It grows at lightning speed, but its lack of competitive strength means that it dies almost as quickly.

What Story Do the “Whose” Findings Tell?

World War II was a cataclysmic national emergency. A massive number of men



and women had to be assigned to appropriate positions in a seemingly impossibly short period of time. There were no resources for getting to know people. A testing movement that was in its infancy in the 1930s became a national hero in the 1940s. As developmental research boomed along with the babies of the 1950s, testing was merged into the field. In less than a decade, there was a critical mass of prior research that employed an enormous variety of tests. It became no longer necessary to find references outside of the field to justify its use. Today, in the study of psychological development, we see an overwhelming dominance of disciplinary research.

Is the “Whose” Story Finished?

As computerized analysis of human activity improves, it will play a progressively greater role in developmental research. Many fields will contribute to this progress. Amazon.com is the paradigm of data mining. If a person buys X, they become more likely to buy Y. The company and their analysts help the customers out a bit by telling them so. Much work on computerized text analysis is being done by the Educational Testing Service. Transportation and robotics researchers seem to be on the forefront of computerized image analysis. Clearly, before such techniques become commonplace in developmental research, there will be long period of interdisciplinary progress.

What Can the “Whose” in the Research Community Tell You?

Whether you are starting a business, a family, or a community action group, you need to learn what has been done before. Talk with, read about, write letters to, e-mail, join larger organizations with, and just plain communicate with those who have gone before. If there are no other organizations like yours around, find similar ones and talk with their leaders.

Know that your core group is going to get overburdened as soon as your organization begins to show substantial growth. Find out from others what they have done to ease the burden on the founders. Be skeptical of the first answers you get, especially if the method has only been in use for a short period of time. Plan ahead for the time when the new method and plain old face-to-face contact are recombined.

Check you memosystem. Do you have memes related to whose? Did you mention inside and outside groups that can help your group grow?

What?

What will the project study? Researchers like to count things. In the “who” and “whose” sections, we had to interject a little about “what” they counted, because tests substituted for people in the study. Before tests there were two approaches to the problem of “what” to count. One involved letting people do what comes naturally and then coding or classifying their behavior. In the absence of memosystems this was a very difficult task.

One way of simplifying the study of the mind was to drastically limit what could be done in the situation. A problem could be solved in 3 ways. A key could be pressed after a stimulus was presented. A choice of yes or no could be allowed. Researchers often looked at many children and counted the percentage that responded one way or the other. Another strategy was to measure the time that it took to make a response.

It did not take long to move from studies with coded or limited responses to presenting a series of problems each having limited response alternatives. If researchers created problems with several wrong alternatives and one right one, they could ignore the differences between the problems and add up the number of right answers. The multiple choice test was the result.

What Did We Learn About “What”?

Figure 5.3 shows the results for “what” to count. The turbulence caused by the pioneering influx of testing following World War II is evident. Both coded and limited behaviors were pioneering practices. Multiple choice tests proved to be only a niche activity. No matter how sophisticated a test became, an unpleasant possibility always loomed over the interpretation. This possibility was that summing the scores obscured crucial data details. In our discussion of “who” we saw that tests did not substitute well for natural persons. In “what” we find that limited responses and multiple choice tests did not substitute for natural activity.

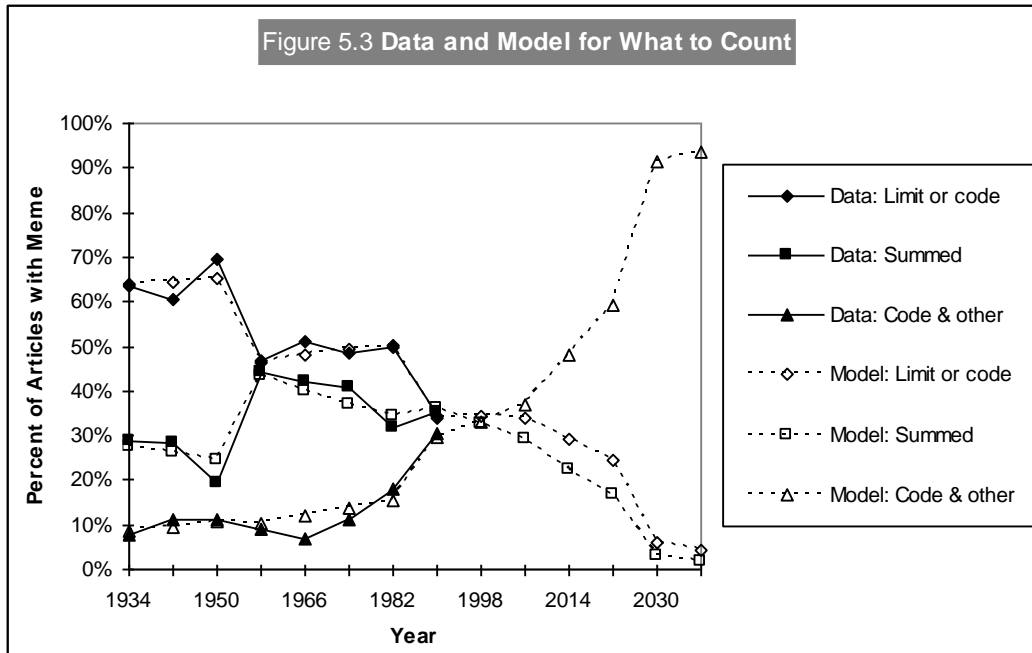
What Story Do the “What” Findings Tell?

The vagueness of multiple choice tests encouraged researchers to combine coded activity with other measures. This was the only strategy which had any competitive strength.

Is the “What” Story Finished?

But the combined strategy grew so rapidly that it will cause problems in a few decades, unless a disruptive innovation curbs its growth. We expect computer coded activities to be that innovation.

What Can the “What” in the Research Community Tell You?



How do you know that you are making progress? The most obvious answer for most organizations is to count members, income, or both. Both of these measures quickly increase in complexity. How sustainable is the membership growth? How much income is left after expenses (how much profit did you make)?

Accounting developed a more elaborate system of quantifiers for measuring people's activities even than psychological testing. It is indispensable for running a business or organization. But, like testing, it provides an incomplete and somewhat cloudy picture. A dollar is a dollar, you might think. But in a few months a dollar invested in two different ways can become two enormously different quantities. Furthermore, the two different investments can have enormously different effects on the loyalty of the participants in the organization. Accounting, like testing, is a substitute for intimate knowledge.

Your memosystem is not only a tool for understanding your organization. It provides a way of coding the free behavior of your organization. It can help you interpret the obscurity in your financial data. How frequent are each of the memes? How is the frequency changing? What impact will the changes have on other measures of your organization, like income, membership growth, and profit? Your memosystem can breathe life into your numbers.

When?

In the St. Norbert College Laboratory Nursery School, Dick Olszewski (one of the founding students) made a set of inclined planes to reproduce an experiment that Piaget had done with young children. There were four two-by-fours. In rough measurements one was 6 feet, two 4 feet, and one $2\frac{2}{3}$ feet long. There was a small wall to support each plane at either a high level (roughly 12 inches high) or a low level (8 inches). A metal trough, wide enough to hold a marble ran the length of each board. The heights and lengths were carefully calculated so that a marble rolling down the high long trough would tie with one rolling down a the medium low trough and a marble rolling down the medium high trough would tie with one rolling down the short low trough. There were covers hinged to each board. When the covers were closed, you could only see the marbles start and begin.

With the covers off, none of the kids in the nursery school had any difficulty telling where the marble went fastest. But with the covers closed, the younger kids would all say that they tied. We could alternate the marble races, first with open covers, then with closed covers. No matter how many times they saw the marbles tie, as soon as the covers were closed and the marbles began and ended at the same time, the kids would say they both went the same speed.

The covered planes result seems funny to most adults – one of those candidates for “kids say the darnedest things.” But our calendar system causes us to do the same thing with development. Calendars encourage us to turn time into places. These places in time become distinct points, such as months, decades, birthdays, or anniversaries. We remember what happened at the points, but not how we moved between them. The result is all sorts of nonsense that curiously, even developmental researchers have not overcome.

If you need to understand how your organization or community is changing, when should you examine it? Developmental researchers either looked at (1) one age group alone, (2) two or more age groups, or (3) in rare cases a whole series of ages.

What Did We Discover About “When”?

Figure 5.4 shows the results for “When to measure development.” Time series and single age groups were both pioneering with the latter starting at a much higher level. The difficulty of time series kept the numbers to low to grow. The multiple age groups answer to “when” was a niche pattern that is projected not to survive. The bottom line is a temporary, dissatisfying ascendance of the most misleading method.

Is the “When” Story Finished?

The question of “when” is projected to collapse altogether around mid-century, unless a disruptive competitor strategy emerges. Of course, without “when” there is no developmental study at all.

What Story Do the “When” Findings Tell?

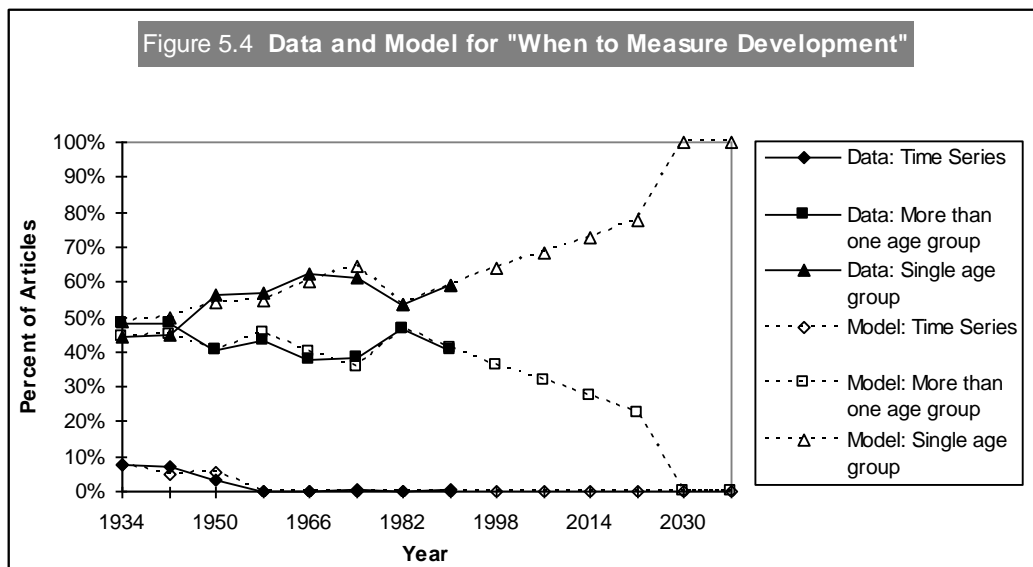
Developmental researchers are taking the easy way. But just like the preschoolers, who don’t look under the cover, they miss the main event. It might be difficult to lift the cover off the paths that show the speed of development. But without doing so, your organization will lose its way.

What Can the “When” in the Research Community Tell You?

The lesson for you is to find a few metrics that chart your path toward your goals and keep track of the progress. We only have eight time points in our historical study of developmental research. But eight is enough to reveal the underlying pattern of change.

Where?

Can you imagine separating the story of a person from where you know that



person? We think of even the internet as a place. Are there communities or organizations that have no important places at all? In research reports, there are three kinds of places mentioned. First, some reports specify that they were done at school, in people's homes, or in some other place. Second, other reports were done both in one of those places and in the author's university laboratory. But third, there were a substantial number of studies that did not specify where the study was done at all.

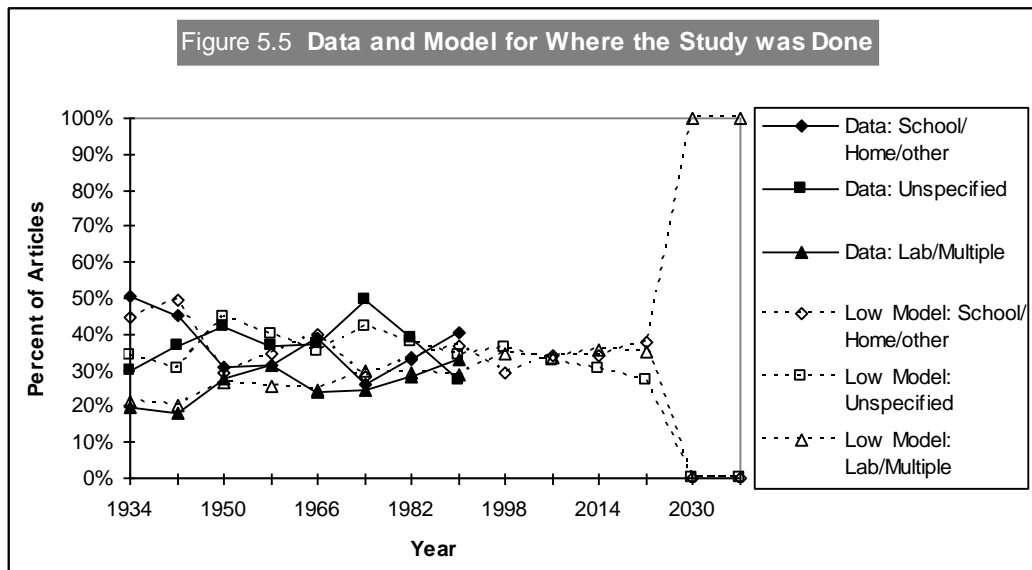
What Did We Discover About "Where"?

Figure 5.5 shows the results for "Where the study was conducted." The abrupt changes reveal that we have three, competitive, fast growing practices. Without the model, however, it would have been difficult to unravel the life cycles of the individual practices. The best fitting model revealed the life cycles. School-based locations were pioneering. Unspecified locations were a niche practice. And laboratories combined with other locations were the dominant practice.

What Story Do the "Where" Findings Tell?

The strength of unspecified locations is the surprise of this group of practices. Kurt Danziger argues that in its quest for status as a science psychology often obscured the uniqueness of its situations. This is a version of the proverbial ostrich effect. Ostrich: if you put your head in the sand, there will be no enemy. Researcher: if you fail to mention the situation where you found your results, they will hold up everywhere. In the last few years several corporate financial officers have used a similar strategy. CFO: If you hide your debt from stockholders, it will go away. Eventually, this approach bankrupts the enterprise, whether it is ostriches, psychological science, or corporations.

Fortunately, unspecified locations will go away. A better approach to establishing generality is to observe what happens in the controlled environment of a laboratory and then see if the phenomena also appear in natural settings.



Is the “Where” Story Finished?

The main prediction for “where” is that unspecified locations will disappear and studies in school or home will be supplemented by some laboratory situation. This is encouraging. Do you suppose accountants will stop trying to hide corporate debt from stockholders?

A deeper corporate analogy is buried in the data. Almost everybody has noticed the globalization of major corporations. They not only sell worldwide but they also farm out much production to countries with lower labor costs. What most people miss is that one activity remains local. Activities that involve innovation or opportunities for productivity growth tend to stay localized, often in the founding nation of a corporation. The original location provides not only a community of experts, but also an infrastructure for innovation.

An example of an infrastructure for innovation is the United States support for software development. There is wide educational support for the teaching of programming skills. There is extensive academic research on programming. Major professional societies are located in the U.S. And the US provides detailed legal protection for intellectual property like software. It is no wonder that the U.S. is one of the leading countries for software development.

The scale of developmental research is much smaller than software development. But the research community shows a similar pattern. Supportive research, like giving a test, can be done anywhere. But innovative research needs the infrastructure of a laboratory. The laboratory provides a common setting for all participants in a research project. It also provides proximity to colleagues who can discuss the research and students who can assist in data collection and analysis. Universities have institutional research boards that oversee the safety of participants. Ultimately, the university’s

reputation is part of the infrastructure. It attracts assistants, participants, and supporters of the research.

What Can the “Where” in the Research Community Tell You?

Organizations begin with a home, but reach out for new members or customers and for supplies or services. The most innovative activities begin with the core founding group and build on their results. Organizations that fail to build on the cultural innovations of the core group weaken their own prospects. This core group has a location. And the location consists of more than the core group. It also consists of an infrastructure which provides resources that may be essential to the further growth of the organization. When planning a first location or a move, begin with a list of people who could have some impact. Everybody who knows the location of an organization is a potential resource.

Which?

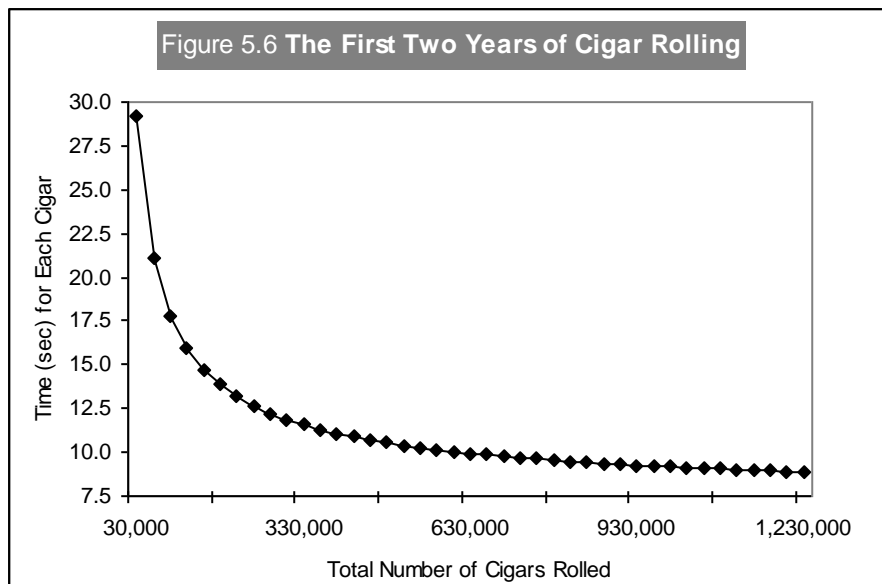
Several years ago, I was hired by a factory that fabricated plastic ware for the food service industry. The company had grown from 17 to 120 employees gradually over the preceding decade. The growth required a change from hands-on management to a less time-intensive approach. My task was to develop strategic procedures and measures that would help improve the use of management time.

Noting considerable shuffling of factory workers among tasks, I recalled the cigar rolling study that was mentioned in the last chapter. The principle findings from this study can all be represented in a single graph (see Figure 5.6). I made a copy of the figure and put it up on a wall where it could be frequently observed by management.

In the figure, each dot represents 30,000 cigars. It took our expert cigar roller 35 days to reach that first milestone. By the end of two years, she was rolling 30,000 cigars in a little less than three weeks. By ten years, she could do it in two weeks. Another way to look at it is that by her first day she had achieved 24% efficiency. The first month resulted in improvement only to 32% efficiency. It took four months of dedicated practice to get to the 50% level of efficiency. After the first year, she achieved only 62% efficiency. After the second, it was 75%. By eight years, the 90% level had been reached. By the end of 10 years, she was four times as productive as a worker who was just starting and three times as productive as one who had been on the job for a month. There is an ultimate limit to performance speed, but even after 50 years and 38 million cigars, our worker would still be 3% below this limit.

One practical lesson of the figure is that turnover can be very expensive. Another is that several months of practice can make a dramatic improvement in performance. The expert cigar roller illustrated one of the most established laws in psychology. It is called the “power law of performance.” The law reveals that repetition produces improvement in the speed or accuracy of performance. Also, the biggest improvements appear early in learning.

This contribution of practice to performance is very often overlooked. Musicians who play pieces very rapidly are thought of as having “talent.” Listeners should think of them as having practiced the piece more than most other musicians. Some people can read road maps upside down faster than an average person can turn it upside right. They are thought of as having “good spatial skills” rather than as having read a lot of road maps. Without special feedback, people who read speeches or prayers that they have practiced many times, read them much too fast for their hearers to understand. An experienced driver can see several times as many threats to safety per minute as an



inexperienced driver.

Even experts in psychological research often overlook the importance of the power law of practice. For example, one of the most intractable problems in North American health is obesity. It has been known for half a century that there is a “stop eating” center in the brain. The stop-eating center is activated by blood chemistry. There is a delay between ingestion and absorption. So researchers have linked up eating speed with obesity. But I have been unable to find any discussion of the possibility that older adults improved skill at eating allows them eat faster. Consequently, weight control experts miss a key reason why older people may eat more than younger people before their “stop eating” center kicks in.

One of the most glaring examples of experts overlooking practice effects is illustrated in the choice of “which” task to measure. This important choice in developmental research concerns how often to measure each task. The most common answer is to observe each task in only a single session. Obviously, this approach makes it impossible to observe the influence of practice effects. When practice is overlooked, it becomes possible to hypothesize all sorts of mysterious processes to account for performance.

The second answer of developmental research to which task to measure is called the “micro-longitudinal” approach. In this approach, the same task is measured several times, but only in a short period of time. You can see from the graph that if researchers are dealing with people who have little experience with a task, they can find dramatic difference. But the most important activities of people are often those that they do the most. For such common activities, there may be very little difference from one session to the next.

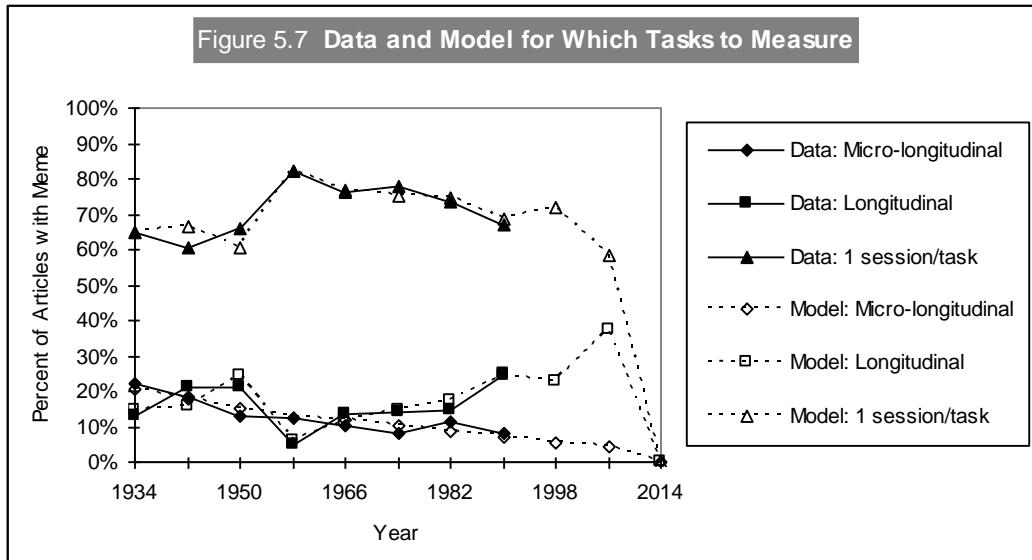
A third type of study is the “longitudinal” approach. This is the one that Crossman used for his study of cigar rolling. He returned each year to measure performance on a task that he knew would be practiced during the year.

What Did We Discover About “Which”?

Figure 5.7 shows the results for “Which” task to measure. Micro-longitudinal studies were the default approach. By 1932, that default choice of which task to study was already much less common than the single task approach. The single task approach, however, does not have much competitive strength. Longitudinal studies, on the other hand, were very fast growing and competitively strong. As a result, they grew so rapidly that they are expected to exhaust the resources needed for research within two decades of the endpoint of our study. Clearly, a change of method is on the horizon.

What Story Do the “Which” Findings Tell?

Clearly, a bad method can drive out good method, if the bad method requires fewer resources. Ultimately, this outcome can destroy the competitive balance in a group of methods. This leaves the entire activity vulnerable. Then, the only way to salvage the activity is through innovation.



Is the “Which” Story Finished?

It seems unlikely that developmental research will collapse any time soon. Consequently, we can expect innovations. Since a decade has past since we concluded our study, they may already exist.

What form might the solution take? Developmental researchers need to be continually aware of practice effects. Successful solutions will make researchers more aware of how practice affects every task they measure. An obvious solution would be to combine micro-longitudinal with longitudinal studies. An easier solution would be to combine micro-longitudinal methods with the continuum of ages that was advocated in the section on “When.” If you measure the effects of several practice sessions across ages, you can estimate how much practice occurs in everyday life.

What Can the “Which” in the Research Community Tell You?

The choice of which measurement strategy to employ affects many organizations. How often do you measure customer or member satisfaction? How does satisfaction change over time? As customers, members or employees get more experience with your organization or community do they become more or less attracted to it? How does your performance change? As you get more experience with each person related to your organization, does your performance improve? Or do you learn some practices that are counterproductive?

In most cases, your expertise improves with each interaction. For some aspects of expertise, a modest level of performance is sufficient. Experts are known to accept a modest level for many aspects of their expertise. The discussion of eating and speech reading speeds showed that even performance improvement can be detrimental.

A second well known aspect of practice is that the more you practice, the less you need to attend to what you are doing. Like performance speed, this has its positive and

negative consequences. On the positive side, you can do more things at once, because you need to pay less attention to each one. On the negative side, it causes you to be less aware of what you are doing. The solution to the negative aspects of practice on an activity is to periodically make yourself aware of your performance speed and its effects.

Have you noticed that your memosystem gives you a short, organized list of the major choices for an activity? Having a memosystem is a powerful way of periodically checking your awareness of the activity. Using a memosystem is also an activity. Therefore, it is subject to the power law of practice. Each time you use it, you become quicker and more automatically than the last time. Each time you use it, you are reminded of the alternatives you rejected as well as the choices you made. These reminders are an easy way to keep track of your progress toward a goal.

Why?

What is the purpose of an organization or a community? In their best selling exposé of *Cultivating Communities of Practice* Wenger, McDermott and Snyder argue that “Communities thrive because they deliver value to the organization, to the teams on which community members serve, and to the community members themselves.” Considering the “Why” of a community, therefore, should be a primary task of its core group of organizers. The crux of this consideration is determining the value of the activity.

We coded research articles as serving researchers or serving others, such as parents and schools. The teams mentioned in the book by Wenger and others would be the infrastructure for the research. This includes student assistants, colleagues, institutional review boards, teachers of the subject at other colleges, textbook publishers, the developmental journals, and the professional organizations.

Articles could be written to provide value for the infrastructure. We missed the meme of writing for the infrastructure. One reason for missing the infrastructure meme is that it is very difficult to detect in articles. Journals are mentioned in the references section. Helpful colleagues or students are at best listed as co-authors or buried in a footnote. Other aspects of the infrastructure, such as publishers, teachers, and professional organizations are extremely unlikely to be mentioned at all. In the minds of the authors, however, some are acutely aware of the unmentioned infrastructure while others avoid such awareness.

What Did We Discover About “Why”?

Figure 5.8 reveals what we learned about the “Why” of developmental research studies. The first thing to notice is the large discrepancy between the data and the model for 1958. It is possible that this would be resolved if some way could be found to code for the infrastructure meme. Alternatively, the discrepancy might be accounted for by external events. For example, the reorganization of the research community after World War II might explain the unusually high numbers of articles focusing on researchers.

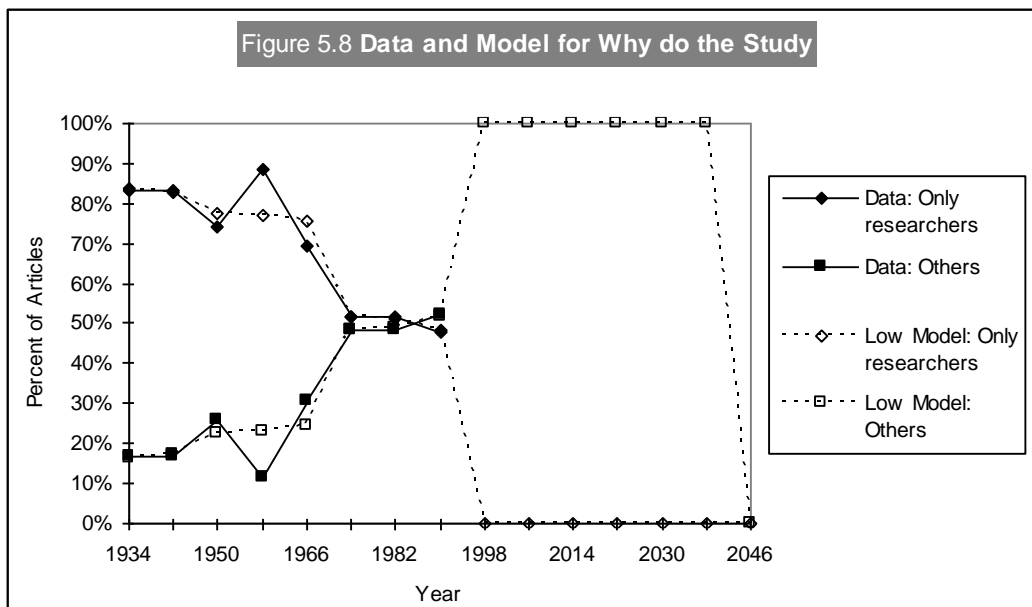
Besides the discrepancy, the graph shows two very fast growing memes. Also, research for others had more competitive strength than research for researchers. Fast growth and discrepant competitiveness predict a collapse of the system several decades from now. This suggests that another meme will emerge. Adding the infrastructure meme into the model would result in a more stable system. Another new meme that would add stability to this system is research for technology’s sake. Programmers and robotics engineers are currently using findings from the psychology of language to improve the way that programs and machines interact with people. Such research is likely to become more common.

What Story Do the “Why” Findings Tell?

Early in the history of the developmental research community, the focus was mainly on what the research would do for other researchers. The core members were focusing on the value created for each other. Later, creating value for people who interact with children was emphasized.

Is the “Why” Story Finished?

The creation of value for the infrastructure seemed almost a taboo topic right through the end of our study. The creation of value for technology was not a topic that



was even on the horizon in 1992. One or both of these values are likely to be more prominently discussed in the developmental articles of the future.

What Can the “Why” in the Research Community Tell You?

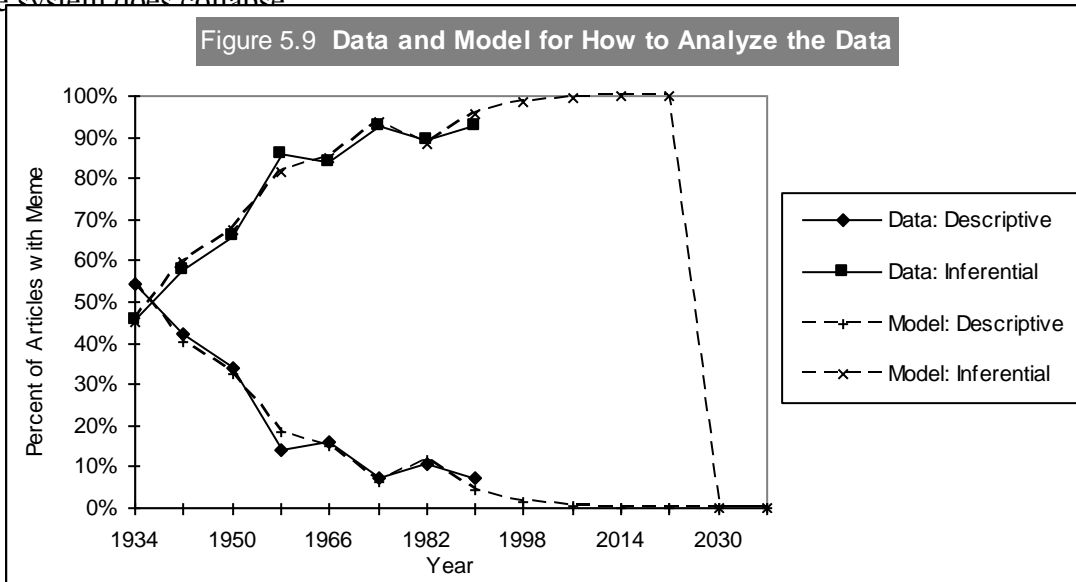
The first focus of most communities is likely to be the creation of value for the core members. The community does not get far if it does not provide value for the wider communities that surrounds it. When you design a memosystem for your favorite activity, an important step is to ask why the activity exists. Next, break this down into how the activity serves (1) yourselves, (2) people affected by the community (the others), and (3) people the community relies on (the infrastructure).

How?

A key “How?” question in the developmental research community of the 20th century was “How are we going to analyze the data?” The answer to this question had much to do with establishing developmental research as a science. Shortly after mid-century editors began to push for inferential statistics. At that time the field was somewhat arcane and the editor’s insistence put pressure on graduate schools to begin requiring statistics courses. Today concepts from statistics are taught in high school.

What Did We Discover About “How”?

Figure 5.9 shows our findings concerning how to analyze the data. Here we have descriptive statistics as a niche practice and inferential statistics as a very fast growing, highly competitive alternative. The oscillation pattern is typical of moderately fast growth. It is moderately fast because it challenges the resources without being fast enough to cause a complete collapse. After the niche competitor of descriptive statistics is extinguished, however, there is no damper on the growth of inferential statistics. Then, the system does collapse.



What Story Do the “How” Findings Tell?

This is another example of the wolf and moose story. Without the competitor, the dominant practice overwhelms the resources and collapses.

Is the “How” Story Finished?

Surely, a new competitor to inferential statistics will emerge. In the two mainstream journals that we coded, mathematical models were exceedingly rare. As computer skills become more widespread, however, it seems likely that computer models will become more common.

What Can the “How” in the Research Community Tell You?

Inferential statistics was imposed on the research community beginning with the editor of one influential journal. Perhaps it would not have grown so fast without this extra push. The graph shows that fast growth is not always a beneficial outcome. When planning for the growth of a community it is better to aim for steady growth than too rapid growth.

Communities in Time

This chapter has laid out our basic findings about what happened to the developmental research community during the 20th century. Eight groups of memes were discussed. Each group showed a different pattern of interaction. There were various mixes of default, niche, pioneering, and dominant practices.

There were several examples where a fast growing, dominant practice drove out its competitors only to cause a collapse in the system. This is the typical story of community power. A core group member gains power and pushes his or her own agenda. This upsets the healthy balance that the various approaches to community problems have achieved. The history of communities reveals few George Washingtons. Leaders with the foresight and character necessary to relinquish power are rare. Our findings reveal that one reason why the U.S. Constitution is the oldest in the world is that it made an institution of both the release of power and of the gradual change of itself. The first lesson of this chapter, therefore, is that if you want to create a long-lasting community, institute steady moderate growth.

For several groups of memes, you learned that an activity could be preserved by the introduction of a new practice. When one practice overwhelms all others and threatens to exhaust the resources of the community, some members may urge a return to an earlier model of practice. The earlier model, however, lost the competition for a reason and most likely the reason has not changed. In such cases innovation is the solution. The second lesson of this chapter, therefore, is that innovation is the solution to being overwhelmed by a single practice.

For several groups of memes, you saw how the research community adopted facile solutions that actually undermined their purpose. Some facile solutions counted

different practices as the same. Those who used that type failed to discover relationships between the practices that interested them. Other facile solutions failed to include enough ages to see the transitions in development. A third type failed to measure often enough to reveal the underlying influence of practice on performance. Finally, some researchers even failed to mention the locations where they made their discoveries.

You can guard against adopting facile solutions by using a memosystem. A memosystem provides several answers to the “who, whose, what, when, where, which, why and how” of your organization. It is a tool for periodic reflection. As you automate the practices of your organization, it allows you to discover how your improvement in performance might actually create problems. The third lesson of this chapter then is that memosystems help you to guard against the unhealthy growth of practices.

In this chapter you learned a number of specifics for creating and improving your memosystem. Table 5.1 condenses these ideas into one place for easy reference. The final lesson of this chapter is that the more you practice using a memosystem the easier they will get. The benefits of practice will include quicker innovation. You will also acquire a broader and deeper understanding of each activity you are involved in. And you will have an effective way to reflect on how your performance is affecting others around you.

Table 5.1. Summary of Competing Community Practices

Group	Default	Pioneer	Niche	Dominant or Explosive growth
Who: Consider core group, participants, peripheral members, outsiders	Core group and participant contact. Close relations	Records & Surveys. Lost intimacy	Participant contact plus records and surveys. Low level connections	Core group contact plus records and surveys. Data supported leadership
Whose: Consider learning from other communities		Learn from similar activities in outside communities		Learn only from similar communities
What: Consider measuring your progress	Detailed measures	Global scores	Details and global scoring	Computer analyzed memosystems
When: Consider how often you reflect on your progress		Consistently	Occasionally	Once
Where: Consider different places for different functions		All functions dispersed	All functions centralized	Activity anyplace but innovation at home where infrastructure exists
Which: Consider your choices of ways to solve problems	Good approaches used briefly		Easy approaches	Combinations of approaches. Memosystem to track automatic growth,
Why: Consider the beneficiaries of your activity.		People inside the community.	People the community relies on.	People the community affects. Future opportunities.
How: Consider the source of community action			Members select diverse approaches	Core group or leader imposes will on community

Apply the Meaning-of-Life Equation to Find Roots, Significance, Harmony, and Balance

What is the Meaning-of-Life Equation?

Memetics is revolutionary. It demands that every social science reexamine its units of analysis. In everyday life, it reveals that you can never influence anybody without attending to the evolving memes expressed in both you and their activities. Of course you can do so by simply acting on the memes that have influenced you without ever knowing that they are memes. People have done so for ages. But so have they tried to manage the rain forests without reflecting on evolution. Such a naïve approach is a recipe for disastrous mistakes. Every century has its powers that apply slash and burn to cultural practices.

Memetics allows you to look at an activity as a whole or break it up into skill components. A key step in separating out the components was to ask the eight basic questions: who, whose, what, when, where, which, why, and how. For whole activities or components context we found five memetic life cycles: default, pioneer, predator-prey, niche, and dominant. Activities and skills compete with each other in ways other than predator-prey, but with similar effects. When both activities require the same resource, one prevails. The competition is not necessarily bad. Pioneer and prey-without-predator growth patterns can be disastrous if not checked. Most of the evils that humans inflict upon themselves are found in pioneer and prey-without-predator memes.

Anger, pleasure, fear, and grief have benefited us greatly in our evolutionary past. Yet unchecked, they produce abuse, addiction, hate, and depression. And nearly all of us have at some time allowed those beneficial processes to go unchecked. To get control of such activities, we need competing activities strong enough to deplete the resources or actually “consume” the unchecked growth.

Variety is more than the spice of life; it is the root of adaptability. An ecosystem without variety can be quickly devitalized. A species without genetic variety risks extinction. A life that is too focused risks disaster. Memetic variety is not only a hallmark of civilization; it is an essential element of survival.

How do you tell if your life is already or is quickly becoming too focused? This question is posed in one form or another throughout every person's life. As such, it is one of the most basic questions of life. Your answers to it determine both how well you survive and how long you survive.

Throughout this book you have seen how one equation captures the essence of this central question of life. The equation was independently identified by two brilliant biometricians three-quarters of century ago.

Even simplest of outlines of the lives of these biometricians reveal adaptability and courage. The first was A. J. Lotka. He was born on the Ukrainian fringe of the Austrian Empire. He immigrated to the United States, taught for a while, and completed his career in the insurance industry as a population expert.

The other biometrician was Vito Volterra. Volterra spent his life in Italy. He rose to the position of Professor and Chair of Mathematical Physics at the University of Rome and Senator of the Kingdom of Italy. He was humiliated and deprived of his positions at the end of his career because of his refusal to sign a loyalty oath to Mussolini.

In the mid 1920s, both mathematicians concluded that the population of interacting species depended on four factors. One was the initial population. The second was their growth rates. The third was the competitive strength of each species. And the last was the resources available.

The Lotka-Volterra equation was the central model of this book. Instead of species, however, we applied the model to cultural practices. Lotka and Volterra's equation shows that fast growth rates are typical of pioneering species. The numbers of these pioneering species can overshoot the available resources. When that happens, a collapse of the entire population can occur. The equation also shows how competing or predatory species can curb the fast growth rate and create stability.

In the preceding two chapters you saw how the value of the Lotka-Volterra equation is even broader than its authors knew. Its applications concern more than the population of species. The equation applies just as well to the learning of skills and the spread of cultural practices. The equation helped us to identify pioneering practices, default practices, niche practices, and dominant practices. We could see both competition among practices and predator-prey relationships between them. And we were able to see how both competition and predation could be essential to the survival of fast-growing practices.

These findings suggest that the Lotka-Volterra equation should be promoted from the obscurity of its scientific name. We could remember it better with a popular, but dignified epithet such as the *Meaning-of-Life Equation*. Such a name would give new meaning to idioms such as "That activity just doesn't fit into the equation for my life!" Whenever you thought of that phrase, the name Meaning-of-Life Equation would remind you how to achieve stability.

Using the Meaning-of-Life Equation to Improve Your Life

Let us insert the Meaning-of-Life Equation into our basic question about life choices. Can you use the Meaning-of-Life Equation to tell if you are becoming too focused? To help you answer the question and also to sum up the understandings that we have achieved so far, I offer four points of reflection. First, think about the roots of the activity. Next, reflect on its significance. Third, consider the harmony that it creates. Finally, note the balance it achieves.

Roots

To reflect on roots, consider the activities of your youth and the activities of those you admired in your youth. Which of the activities you prized back then have you not even thought about in the last year? Which did you never learn enough about to make them part of your life? Do you care that you have let these activities lapse? What activities in your life have taken their place? Is the substitute an improvement? Could both activities coexist, side-by-side?

If you think the lapsed activity would be useful to you, find a person or place that you could go to learn more about the activity. Recovering your roots -- learning about adaptive activities from your past -- can be both pleasurable and a powerful counterbalance to debilitating life trends.

Significance

To reflect on significance, note the meaning of the activities in your life? Do they contribute to your survival? Do they contribute to the survival of those you care about? Do you experience a sense of urgency about carrying them out? Are there activities that you could readily substitute which would better answer the questions about meaning? Often, we are not aware of the opportunities until circumstances force us into awareness. Then, we discover that we have been missing out for years or decades.

It may also happen that the alternatives are much less attractive than your present situation. Memetic analysis can help you decide without actually making a disruptive life change. Look at the variety of options in your current and potential situations. Ask the eight basic questions about each activity and list the beginning, intermediate, and advanced skills that go along with each. The most significant activities allow you to experience greater variety for both yourself and those around you especially when considered over a long period of time.

Harmony

Without humans around, the resources of the entire planet could support only a few million gorillas. We have 99% of the same genetic makeup as gorillas. Yet we number in the billions. We are a thousand times more plentiful than gorillas. This simple fact proves that 99.9% of our resources come from each other.

To reflect on harmony, ask yourself who you cooperate with on a daily basis? Do both you and the other persons benefit significantly from the activities? Do you get more from the cooperative effort than either you or they could get by yourselves? What kind of cooperation is involved? Is it impersonal where almost anyone would do? Or do you benefit most when you have worked with the other person over the longest span of time? If you are not satisfied with your answers to these questions and you have much invested in who you are cooperating with, look for activities that might improve the depth of cooperation. This approach is critical when family partnerships are involved. An alternative for more casual partnerships is to look for people who might be better partners in your most significant activities.

Balance

Finally, to reflect on balance, consider the variety of physical and mental exercise that you get with the most time consuming activities of your life. Which muscles do you not use enough? Which are overused? Which senses are challenged too seldom and which too often? Which emotions and patterns of thought have become automatic? Which ones do you have to remind yourself to use? To balance your life, seek activities that rely on opposing muscles, senses, and thought patterns.

We balance our lives by doing the opposite of our most time consuming activities. When we choose balancing activities, however, we need to be careful. The life cycle of the balancing activity should be easy to coordinate with the activity that it is supposed to balance. Default activities (those requiring little effort to master) are too weak to do much good. Pioneering and predatory activities grow so fast that they create wild fluctuations. Dominant activities take over, making a new set of imbalances. Niche activities generally provide the most effective balance.

Now It's Your Story

These four basic prescriptions for applying the Meaning-of-Life Equation to your life are simple to set down on paper. But they are highly abstract concepts. With your newly acquired expertise in creating memosystems, you have powerful tools for making everyday sense of them. You can outline on paper what activities you need to connect with your roots. You know what activities add significance. You know that harmony is necessary for spreading memes. You know how to improve balance in your life. Armed with such knowledge, it will be easier for you to choose activities to seek, to study, and to master.

Finding support for adding new activities to your life will be difficult even with the vast resources of the World Wide Web. Perhaps, as people grow in their ability to use memetic analysis in their professional and home lives, resources that give people easier access to the great variety of human skills will become more readily available. Your new understanding of memetics should help you not only to find resources more easily, but also to be a better resource to others.