Different Ways to Look at the World

Kevin Yuanshun Yao
kevinyaowork@gmail.com

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> If you "understand" something in only one way, then you scarcely understand it at all — because when something goes wrong, you'll have no place to go. But if you represent something in several ways, then when one method fails, you can switch to another. That way, you can turn things around in your mind to see them from different points of view — until you find one that works for you!
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> — Marvin Minsky, *The Emotion Machine*

Most people look at the world in only one way, which is usually either what's taught in their upbringing or the big idea implanted in their minds later in life. Why? Many, many psychological tendencies favor a single worldview, e.g. (1) A single, consistent, unified view reduces the mental workload. (2) The conflict between a new view and existing views would bring pain. (3) Incentive often outweighs everything — if your living depends on believing the world *should* be X, it's nearly impossible to get you to believe anything non-X, etc.

What's the problem of looking at the world only in a single way? It could be wrong. It could be wrong. It could be wrong. The system is too *fragile* — if your view is wrong, you'll think wrong and act wrong. There's nothing you can do since you have no alternative. It would be a dead end!

It doesn't work because the world is too complex — *no single view can handle the complexity of the real world*. We *wish* to have a single, perfect, foolproof view that is able to understand and handle everything in this world because we're lazy, impatient. But the real world doesn't work in that way — it's too complex to be viewed and dealt with in only one way.

The major cause of this single-worldview error is the tension between our mental capacity and the complexity in this world. Bounded by our cognitive limit, we're tempted to simplify the world whenever we can.

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Simplifying the world itself, however, isn't wrong. To understand the

world, we have to simplify because the world is full of noise, obscuring what's truly important. And it won't become less noisy anytime soon.[1] Nor can we get rid of the fundamental limit that nature puts on our cognitive capacity. Thus, simplifying the world in the *right* way is a very, very useful *tool* — it helps us understand and manage what we know about the world.

[1] In fact, it'll become more and more complex and noisy because knowledge grows; our ancestors' worldviews were much simpler.

Let's call a simplified way to look at the world *mental model*. A mental model *hides details* — it suppresses irrelevant information, telling you what's *not* to think about so that you can *focus* on what's truly important. A typical mental model is a big, important idea in a *solid* field that *tries* to describe the world in a certain way and answer questions about it.[2] A mental model describes the world from a certain perspective and gives you some *piecemeal* understandings about the ultimate question: How does the world work?

[2] Some examples: compounding in math, Occam's razor in physics, abstraction in computer science, probability in statistics, evolution in biology, opportunity cost in economics, margin of safety in investment, incentive in psychology, conditioned reflex in physiology, repeated patterns in history, ideas in philosophy, etc.

However, a mental model simplifies the world in *its own way* — each model omits some parts of the real world that it believes ok to ignore and amplifies what it believes to be the essence, like a salesman exaggerating the benefits and hiding the defects of his product. Therefore, *every mental model has its merits and limitations*.

If you have only one mental model, you'll be tempted to distort the world to fit into your beloved model because it's easy, pain-avoiding, often incentivized — like the saying "To a man with a hammer, everything looks like a nail." It's *dangerous*: the complexity of the real world your model ignores, the blind spots it creates, the false certainty it asserts, the direction it leads you to could kill you.

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The solution is simple but not easy: getting multiple mental models. The more mental models you have, the less tempting it would be to overrely on and get misled by any single one of them. Meanwhile, the more perspectives of the world together they can cover, the closer to reality you can get, and the less likely you would be wrong. The system is much *safer*.

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Which mental model should you get into your head? It, of course, depends on your specific circumstances. We all face different problems in life that require different mental models to solve. The "logical" way is to learn mental models directly related to your problems. That's a

reasonable thing to do at first.

But perhaps being too goal-driven, in this case, is, paradoxically, counterproductive. You can't predict with certainty what problems you'll face in the future — you can't plan your life ahead precisely. Therefore, you don't know which mental models to get at this moment would be "optimal" for your entire life.

One heuristic is to follow curiosity: learning whatever mental models that seem interesting to you even if you don't know how you can use it later. It sounds less efficient but is more fulfilled in the long term — even if you'll have no chance to use it, it's still fun to learn and look at the world in a way that you find interesting. The learning itself is the reward. In other words, it's safer to err on the side of exploration because life is long, uncertain.

Obviously, you have to learn continuously in the multi-mental-model approach since neither understanding a single idea nor reading a single book can give you the magic power to handle everything in this world. You need to learn from a wide range of sources: from ancient to modern times, from different geographical locations, from different fields, etc.

But it's less scary than it seems because mental models connect with each other. The more models you already have in your head, the easier it is for you to *recognize the similarity* between a new model and the existing ones. Once you've formed a *latticework of mental models* in your head, your understanding is much more *robust*. Knowledge compounds.

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When you have a set of mental models in your head, they form a hierarchy. Some models are "high-level" while others are "low-level." The dichotomy between low- and high-level mental models can be described in various ways: specific details vs. the big picture, micro-X vs. macro-X, particular vs. general, narrow vs. broad, etc.[3]

[3] This dichotomy itself is a simplified way to organize mental models, which also omits the complexity of the real world.

It's a common mistake to try to solve problems concerned by high-level mental models with low-level ones. For example, it's absurd to understand how human society works by understanding how a cell in human body works, just as it's ridiculous to know what a computer program does by knowing what a transistor in that computer does.[4] The reverse is also true: understanding high-level mechanisms tells you little about low-level mechanisms.

[4] This is often because low-level model people oversell their ideas.

In general, the higher-level a mental model is, the less certain it is in its correctness due to the more real-world complexity it ignores.[5] In addition, high-level models tend to be more vague, subjective. On the other hand, low-level mental models are usually more certain, precise, objective; but the problems they concern are narrower. This is an inescapable tradeoff. Therefore, you need to *calibrate* the trustworthiness of a mental model by how hard the problem it *tries* to solve is.

[5] But high-level model people might not say so because they need to sell. As an honest economist lamented: "The only function of economic forecasting is to make astrology look respectable." (often misattributed to Galbraith)

A useful practice is to switch between low- and high-level mental models. High-level models tell you how things, as a whole, work; low-level models tell you how a specific part works. Practically speaking, high-level models tell you *what* to do because making overall decisions requires ignoring unimportant details; low-level models tell you *how* to do something because implementing what's been decided requires dealing with specific details. Competent people need to understand both, and switch between them whenever needed iteratively since the big picture affects details and details affect the big picture.[6]

[6] Perhaps the people who are best at it are computer scientists. They arguably have the most experience handling real-world complexity — today's software is perhaps the most complex thing humans ever invent. The key idea is abstraction: building hierarchical mental models to hide details. Computer scientists need to be good at switching between low-level abstraction (e.g. How to write this particular line of code?) and high-level abstraction (e.g. How does the whole system work?), as Don Knuth said: "One of the main characteristics of a computer science mentality is the ability to jump very quickly between levels of abstraction, between a low level and a high level, almost unconsciously." (*Things a Computer Scientist Rarely Talks About*)

Jumping between levels is especially useful when trying to solve a hard problem — if you get lost in too much details, take a higher-level view; if you aren't specific enough, focus on lower-level details.

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What if one mental model disagrees with another? Logically speaking, they can't both be right, so you don't know what to do. This is another reason why holding a single view is appealing: driven by our *animal spirits*, we have the urge to act; to do so, we need to suppress all other views except for one so that we would "know" what to do. We tend to remove doubts as quickly as possible to favor action over inaction.

But even in the neat world of logic, logicians can't get rid of paradoxes; it isn't surprising that the messy real world is full of paradoxes. Why? Because complexity leads to uncertainty — nothing in the real world is absolutely certain. When you only have what *could* be right, not what's *certainly* right, contradiction is inevitable, frequent.

Thus, it's impossible to have a consistent view of the world that is right all the time, under any circumstance. We dislike inconsistency because our brain dislikes exception, which adds complexity. But *it's better to be inconsistently right than consistently wrong*. Holding a single view absolutely due to fear of inconsistency and uncertainty is far, far more dangerous than holding multiple views with doubts.

Since uncertainty means constant change in circumstances, you need a large number of mental models to deal with different circumstances. Each model is good at handling some circumstances but terrible at others, so you need to choose adaptively when to use which mental model that best handles the current circumstances. On the contrary, forcing an artificial consistency on all circumstances looks "logical," but it's easy, intellectually lazy, wrong.

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The multi-mental-model approach is most necessary when facing a complex problem because it needs many perspectives. Each model offers you its own view and suggestions, and it's up to you to decide what to do. When multiple models agree on a positive direction, you might be more confident. When they agree on a negative direction, you might want to avoid it. When they disagree, you should have more doubts and consider suspending judgments and actions.

The multi-mental-model approach is especially useful if you get stuck. When you can't make progress on solving a problem, you can (1) look at it with different models; each model gives you a fresh view and lets you *ask different questions*, which is often the beginning of finding out the solution and (2) try what different models suggest — *if one mental model doesn't work, switch to another*. That way, you're way more *resourceful*.

Resourcefulness, i.e. being able to try different ways to solve a problem, is why we're smarter than other animals. If our ancestors, in the distant past, only had one way to deal with nature, they would die. An unimaginable number of them spent their lives adapting, dying, trying different ways to solve the problem of survival, contributing to the resourcefulness of our brain through evolution. Thanks to them, we all have the capacity to hold multiple views of the world in our heads.

Therefore, we're naturally multi-mental-model creatures. In our daily life, we all, more or less, often unconsciously, switch between different ideas, different ways to think, different viewpoints, different styles, different cultures, different values, different personalities, etc., to deal with the specific circumstances we face. On the other hand, holding a single view is against our nature, often caused by artificial reasons. It's a retrogression from the human progress and a disrespect for all those creatures who died for us.

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Today, the multi-mental-model approach can be discouraged because human knowledge has grown to the point where we have to specialize to handle it with our intelligence. Polymaths are rare now. But when more people become "hammer-men looking for nails," overvaluing their own ideas and ignoring other ideas, if you have multiple mental models, you have a unique advantage.[7]

The multi-mental-model system is right because the real world is complex, operating in a way that this is the only reasonable approach to understanding and dealing with it. The system can't explain the world in a neat, consistent story[8] — it doesn't try to fit the complex, messy, uncertain world into an oversimplified, (falsely) clear, assertive picture that appeals to the human mind, which dislikes complexity, confusion, uncertainty, inaction. The system works because it looks at what the world *is*, not what it *should be*, and accepts the reality.

We have to live with complexity, uncertainty, doubt because the real world works in that way — like it or not.

[7] Pure speculation: the trend might slow down or even reverse if we'll be able to automate more and more highly specialized, low-level tasks, e.g. using AI.

[8] We love storytelling, i.e. reducing the complex world into a seemingly neat sequence of events in time. It works well in every human area, e.g. religion, politics, business, literature, history, education, etc.