

The answer is not the answer – model thinking for everyday life

- In the rush to embrace AI, we risk abandoning our responsibility to think critically.
- Professor Richard Larson at the Massachusetts Institute of Technology, USA, specialises in maths modelling and operational systems.
- He proposes ‘model thinking’ – viewing the world through a conceptual lens and developing critical thinking skills.
- He applies such components of operational research in everyday life in his book, *Model Thinking for Everyday Life*.
- It is refreshing and, in one significant respect, counter-revolutionary.

As we rush headlong into embracing AI and find new and exciting ways to make it work, we risk abandoning our capacity and responsibility to think critically. The ultimate outcomes will be profound. However, we’ve been on this path for some time. For decades, we have increasingly handed the processing of information to computers. According to Dr Richard Larson at the Massachusetts Institute of Technology (MIT), USA, the result is that when faced with a new problem, we often lack the ability to frame and formulate it using basic principles. His solution is what he ingeniously calls ‘model thinking’, and in the throes of a much-vaulted AI revolution, it is refreshing and, in one significant respect, counter-revolutionary.

Larson is a professor at MIT’s Institute for Data, Systems, and Society and a leading specialist in operations research applied to service industries. He draws on an engineering and maths modelling background to examine the operational systems we interact with daily. He is also a passionate proponent of STEM education and, in addition to over 175 scientific articles, is the author, co-author or editor of six books. In his latest publication, *Model Thinking for Everyday Life*, he challenges the seeming willing abrogation of critical thinking, especially when it comes

to important decisions in our daily lives. What he suggests as a vital tool in thinking going forward at first sounds like a throwback to a bygone era.

Pencil, paper, and process

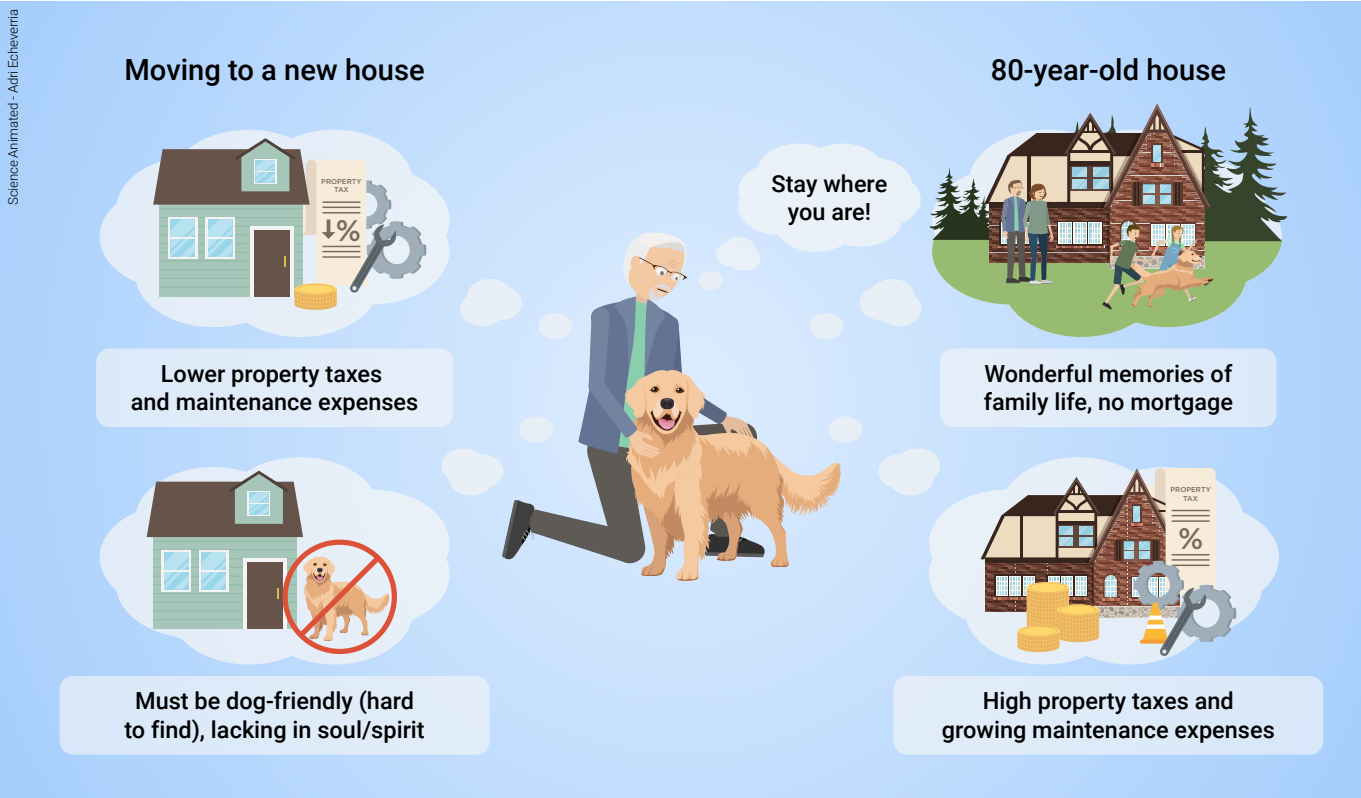
Larson’s term ‘model thinking’ is smart wordplay. It has two equally important but

related interpretations. Firstly, it refers to exemplary thinking that serves as a *model* we should emulate, and secondly, it involves conceptual *models*, some of which are backed by mathematics. For those with little head for numbers, that may sound like a reason to pause, but this is where Larson’s knack for STEM education comes to the fore. As a way of introduction, he says all we need for model thinking – to view the world through a conceptual lens and develop critical thinking skills – is a pencil and paper, no computers.

For Larson, we’ve become so used to entering data into computers to get answers, such as when Googling, that we eschew the multi-step thinking process. We’ve also lost the preparedness to make mistakes and learn in the process. According to Larson, these steps are critical to more robust ‘discovery learning’ and smarter decisions. By thinking through the steps and employing model thinking, we understand and remember solutions better, applying what we’ve learned to future problems. ‘The answer is not the answer’, says Larson, ‘the process is the answer.’ If that sounds abstract, Larson has found a way to make it real.



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Model thinking can be applied to any real-life scenario, such as the decision whether to move or stay put.

Surprising insights from everyday life

It would be easy for a specialist in maths modelling to write a book that is too difficult for the average reader to understand. Instead, Larson provides surprising insights from everyday life to underscore key concepts. For example, he uses chocolate chip cookies and meatballs to explain what he calls ‘the flaw of averages’ and then shows how economists use it in faulty projections. The concept of ‘orders of magnitude’ is told via what could have been a tragic event in a hospital emergency room, and what seems the simple act of queueing becomes a remarkable examination of mathematics within human behaviour.

Importantly, by linking mathematical models to everyday events and providing case studies that are easy to relate to, Larson helps us connect to his world of operations research. We see how operational systems and the mathematical modelling that supports them help shape the way we negotiate the spaces around us every day.

For Larson, everyday activities such as driving to work (and avoiding potholes in the process) become avenues for learning. Throughout the book, he provides opportunities for the reader to reach for their pencil and paper, jot down their ideas and observations and then apply them to the models and formulas he suggests. The data aren’t floating somewhere in the cloud, but real and right in front of them.

Personal response

What inspired you to write this book?

Elizabeth (Liz) Murray, my wife and soulmate for 43 years and who tragically passed away over a year ago, encouraged me to write it. At the beginning of the COVID lockdown, I thought I’d write a book on something I’m an expert on – queues or waiting lines. My nickname is ‘Dr Queue’, and a Google search on this phrase will result in my name appearing. I had spent decades on queues – their math modelling and also the psychology of waiting in lines. Liz said to me, ‘No, you’ve been there and done that and have nothing new left to say. And you are lacking passion on the topic.’ She was so right! She said, ‘What is your passion about your profession that you would like to share with the world?’ THAT was the right question! My passion was communicating to the broader world ‘model thinking’. Again here, the word ‘model’ as an adjective has two meanings: (1) exemplary, to be emulated and (2) conceptual, sometimes accompanied with mathematics depicting a model. I felt that each of us could learn something new each and every day using model thinking. And such communication had to be engaging, not stuffy academic scholarship, and sometimes even entertaining! And, before I started on this path, I knew that writing such a book would be a lot of fun, not academic drudgery!

In what way is your encouraging the use of pencil and paper a pushback against the march of ‘smart’ technology?

I am of the ‘old school’ who believes that writing something down on paper creates a path in the part of your brain that is likely to understand and remember it, and bring it back days, weeks or even years later. Research recently discussed in *Scientific American* strongly supports this point of view (Charlotte Hu, ‘Why Writing by Hand Is Better for Memory and Learning’, *Scientific American*, 2024.) As an 18-year-old freshman student at MIT, I used to study for each weekly in-class closed-book exam just writing, writing, and more writing, and then – throwing each marked-up paper in the wastepaper basket! My fraternity brothers thought I was nuts! But I told them, ‘That is how I learn and remember!’ Little did I know that decades later, research would substantiate this statement.

If I may be blunt: in my view, so-called ‘smart’ technology, by removing many human thinking steps, can produce dumb people. ‘Shallow learning’ is a phrase that is often appropriate.

How can we encourage young people to embrace model thinking?

By example. Show them example after example of model thinking in action – in our

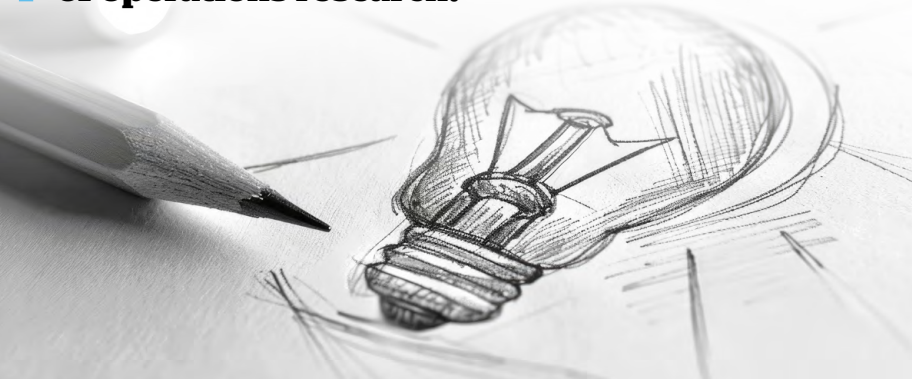
An immersive reconnection

If a pencil and paper may seem a little pedestrian in the fast-paced race to adopt AI, there’s reason behind Larson’s adoption of the low-tech approach. It encourages a more hands-on and immersive reconnection with the process of critical thinking. Instead of plugging in and standing back, we must lean into the process and engage more fully.

It is also, at times, a collaborative process; the book wouldn’t be called *Model Thinking*

for *Everyday Life* if it didn’t reflect the many moments when we need to make smart decisions for those in our family and colleagues at work. Larson might be an MIT professor and specialist in theoretical maths modelling, but he’s also plugged into the mainframe of life’s real challenges and uncertainties. So, next time you’re about to make a decision about everyday life, whether it be what time to leave for work, a career choice, or what queue to join at the supermarket, think models. And don’t forget your pencil and paper.

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everyday lives, and how that can improve our lives. This has nothing to do with ‘scholarship’, just with decisions that we make every day, many being minor and a few being major. An example of minor: You are headed to the supermarket to buy this week’s groceries and you need to figure out how many cans of dog food to purchase for your favourite pet. The model thinking here is a type of inventory management reasoning: how many cans are still in the kitchen, how many cans does my dog eat each week, so how many should I buy to have, say, a two-week inventory? For those who may be interested, there are entire books written on models of inventory control! A major decision might relate to where you and your family will be living next. There are so many issues to consider (eg, cost, public education, property taxes) that only a careful, systematic paper-and-pencil model thinking will help you sort through all the issues, prioritise them, and ultimately make a moving decision.

Paint a scenario in the near future where humans have almost entirely abandoned critical thinking.

This is already happening, with human thinking being replaced with ‘AI’, Artificial Intelligence. I prefer Human Intelligence to Artificial Intelligence. To a point, the AI process is great at reaching out to the

world of data and collecting all that is relevant towards a certain decision. But I would never trust AI to ‘understand’ all the complexities and nuances involved with important decisions regarding humans and their lives. Example: A surgeon is performing open heart surgery and runs into a complication they have not seen before. Their assistant can quickly load all the data into a computer and seek the interpretation from one or more AI algorithms. But, when that information comes back from the algorithms, the surgeon must interpret all the data and figure out the most appropriate actions to take with the patient. The surgeon will ‘know’ many issues related to the patient and the environment that the AI does not know. There is no substitute for a human’s critical thinking analysis of multifaceted complex problems.

What encourages you to encourage others to develop model thinking?

Excellent question! I think each and every one of us can have a more fulfilled and satisfied life if we allow time in our daily hectic routines to pause and reflect. To ‘model think’ and then maybe to decide that our plan for the day is flawed in this way or that. Or, it may not merely be a plan for today, but a much broader plan on how to conduct our life!

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- Dan Livengood (former student)
- Evan Larson (son)
- Mary Elizabeth Murray (wife and soulmate, now deceased)

Bio

Dr Richard Larson is Mitsui Professor at MIT’s Institute for Data, Systems, and Society (IDSS) and co-founder of MIT BLOSSOMS. His research focuses on operations research applied to services industries. Larson is author of books and scientific articles in the fields of urban service systems, queueing, logistics, disaster management, disease dynamics, education, and workforce planning.

Further reading

Larson, RC, (2023) *Model Thinking for Everyday Life – How to Make Smarter Decisions*, Institute for Operations Research & the Management Sciences, ISBN 978-0990615385.

