Mental Models as Applied to the Concept of Fun

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This article is my first attempt at writing a LaTeX document. Although I currently have no practical use for LaTeX software, I thought it would be interesting to familiarize myself with it and potentially self-publish papers before I consider dedicating myself to academia. This article is written in a quasi-academic paper format in the spirit of the topics I'll cover in my first attempt at research writing.

Having Fun at the Mall Charlie Munger Style: An Introduction

Charlie Munger says that "developing the habit of mastering the multiple mental models which underlie reality is the best thing you can do." There is no official definition of what mental models are, but most sources agree that they are a representation, abstraction, and system for understanding reality.[1] For example, the mathematical *Law of Syllogism* says that if p implies q and q implies r, then p implies r. A practical application of this law would be that, if failing to brush my teeth leads to me getting cavities and getting cavities forces me to visit the dentist, I can infer that failing to brush my teeth will land me in the dentist's office. This might be common sense, but mental models like the Law of Syllogism can be applied to more complex scenarios too. Fundamentally, mental models are a method of crystallizing critical thinking. I believe this is the point Munger tries to convey.

To illustrate the application of various mental models, I'll use a hypothetical scenario. Imagine that you have entered a mall with a group of friends. Your primary objective is to have as much "fun" as possible. Fun" is defined by Merriam-Webster as "what provides amusement or enjoyment," but our analyses will occasionally modify this definition. Obviously, in real life, there isn't a need to over-analyze what it means to have fun. It's all for explanatory purposes.

Using Economics To Consider Options

Let's analyze the mall scenario through an economic mental model: consumer choice theory. *Consumer choice theory* operates under three key assumptions: 1) Consumers will maximize utility, or value 2) Consumers always want to consume more 3) By the *law of diminishing marginal utility*, consumers gain less utility from each additional consumption of a product the more that they consume it. Let's also assume that you are a rational consumer, meaning you want to maximize utility. Unfortunately, you arrived at the mall with a limited supply of money and must select your expenses carefully.

Suppose that you are given a choice between cookies and brownies. Let U_c equal the utility of cookies bought and U_b equal the utility of brownies bought, with utility being measured in theoretical units called *utils*. The following table compares U_c and U_b for each dollar amount of cookie and brownie bought:

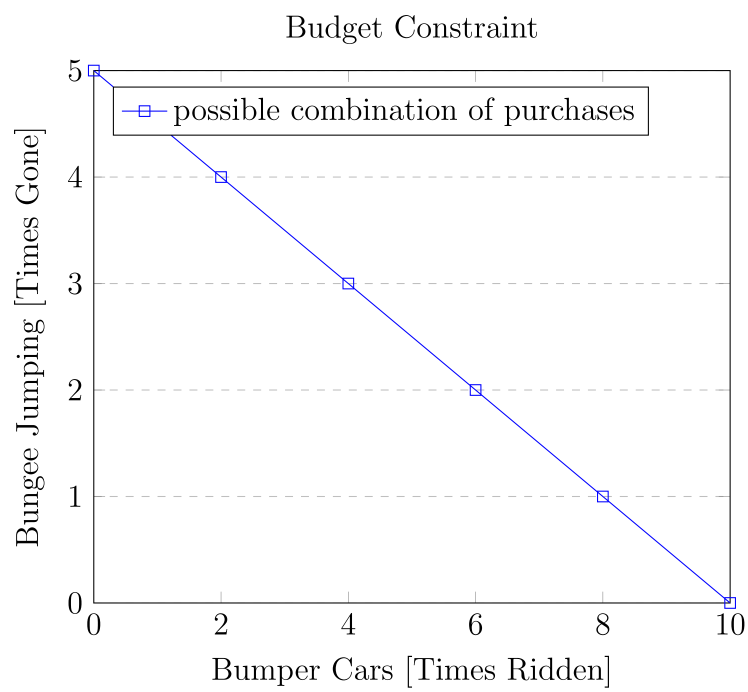
Cost	U_c	U_b
$1	2	2
$2	3	3
$3	3	4
$4	4	5
$5	4	6
$6	5	7

$1 worth of each good yields 2 utils. However, $2 worth of each good only yields one additional util. Think of it intuitively as each food feeling less tasty the more you eat it. In fact, in large quantities, some goods yield negative utility. That is, once you've engorged $50 worth of cookies, you might experience negative utility. Intuitively, it could be that you made yourself sick with junk food. There really can be too much of a good thing.

Funny how economics can have practical applications in everyday life, even for those who have the common sense not to consume too much junk food.

If we look at the table more closely, starting at $3 worth of goods, brownies yield higher utility. Therefore, we get more "bang for our buck" by purchasing brownies instead of cookies. We can connect this notion of maximizing value to the idea of opportunity cost. *Opportunity cost* is the idea that, by choosing one option, another opportunity is lost. For example, by choosing to dedicate some time to write my blog articles, I lose time that could be used to play video games. This means that the opportunity cost of writing blog articles is the amount of time I can play video games. In economics, people evaluate which costs are worthwhile. For example, despite the opportunity cost of writing blog articles, the value I gain from writing outweighs the potential benefit I could gain by committing this time to other activities.

To see how this applies to our mall scenario, let's imagine that you have $100 to allocate between bungee jumping and bumper cars and you want to spend all of it to maximize utility. Going bungee jumping costs $20 and riding bumper cars costs $10. The opportunity cost of going bungee jumping is two times I could have ridden bumper cars because I would then have $20 less to spend on bumper cars. See where this is going? We can derive a graph representing the possible allocations between these activities, with the curve being called the *budget constraint*:



The points lying on the curve indicate possible combinations of purchases that can be made with the budget constraint, such as going bungee jumping 3 times and riding bumper cars 4 times. Note that the graph is **not** continuous because fractional purchases of either service cannot be made. Points that could lie in the area underneath the curve contain combinations that can be made at a lower cost but are unoptimal as they do not make full use of the budget constraint. This is known as *productive efficiency*. The area above the curve contains combinations that are impossible to achieve with the given budget constraint. From here, it is up to you to decide how to allocate your budget, such as by finding the total utility of each combination. When the most favorable combination is selected, it is known as *allocative efficiency*.

It's easy to pick a utility-maximizing or allocatively efficient option in these hypothetical scenarios because they are *economic models*. In the real world, there are complications, including additional options to consider and the fact that utility can't be measured by some arbitrary number. This is okay because it is impossible to comprehend economics without reducing it to models that focus on select factors. Economists have a phrase for this, called *ceteris paribus*, literally translating to "all else equal" in Latin, much like the system of control variables in experimental science.

Both of the mental models that we've covered assume that you are making all of the decisions for your group of friends and that they experience the same utility payoffs that you do. But, imagine that your decision yields a unique utility payoff for each of your friends and that the magnitude of each payoff is unbeknownst to you. Now, your actions have ramifications for your friends and there is no combination of utility payoffs that is certain to occur. You are playing a complex behavioral situation that underlies the economic domain of *game theory*, the study of the interactions between rational agents, or people, in this case.

Let's say that you must choose which movie to watch with your friends, between the two greatest movies of all time: *Morbius* and *Minions: The Rise of Gru*. You prefer *Morbius* and are unsure of which movie your friends prefer. Assume that you can't ask your friends what they prefer because you lack common sense. There are four cases:

1. If you choose to watch Morbius and your friends prefer Morbius, you will gain 2 utils and your friends will gain 2 utils.

2. If you choose to watch Morbius and your friends prefer *Minions: Rise of Gru*, you will gain 2 utils and your friends will gain 1 util.

3. If you choose to watch *Minions: Rise of Gru* and your friends prefer Morbius, you will gain 1 util and your friends will gain 1 util.

4. If you choose to watch *Minions: Rise of Gru* and your friends prefer *Minions: Rise of Gru*, you will gain 1 util and your friends will gain 2 utils.

These cases and their respective utility payoffs can be represented by a *payoff matrix*:

		You	
		$Morbius$	$Minions$
Your Friends	$Morbius$	$(2,2)$	$(1,1)$
	$Minions$	$(2,1)$	$(1,2)$

Each element within the payoff matrix is an ordered pair of the form (U_i, U_f), where U_i represents your individual utility payoff and U_f represents that of your friends. The two columns represent the movies you could pick and the two rows represent the two preferences your friends could have. It is best for everyone if they like *Morbius* and you choose it. But remember that you don't know your friends' preferences. What gamble are you willing to take? If there is a 50% chance of them preferring each movie, it is optimal to choose *Morbius*. Why? If you choose *Minions: The Rise of Gru*, you will only gain 1 util no matter what and your friends have an equal chance of gaining either 1 util or 2 utils. If you choose *Morbius*, on the other hand, you are guaranteed to gain 2 utils, while your friends still have the same odds of each utility payoff. When the odds for your friends are the same either way, the strategy of choosing *Morbius* is preferable to the strategy of choosing *Minions: The Rise of Gru*. Game theory expresses these intricate strategies mathematically and the example I describe is similar to the *Prisoner's Dilemma*, a popular game in game theory.[2]

We've just finished discussing three economic mental models with basic applications to real-world scenarios: consumer choice theory, budget constraint, and game theory. It's already easy to see what Munger meant; these mental models reify lines of reasoning that underlie reality.

Using Algorithms To Crystallize Thought

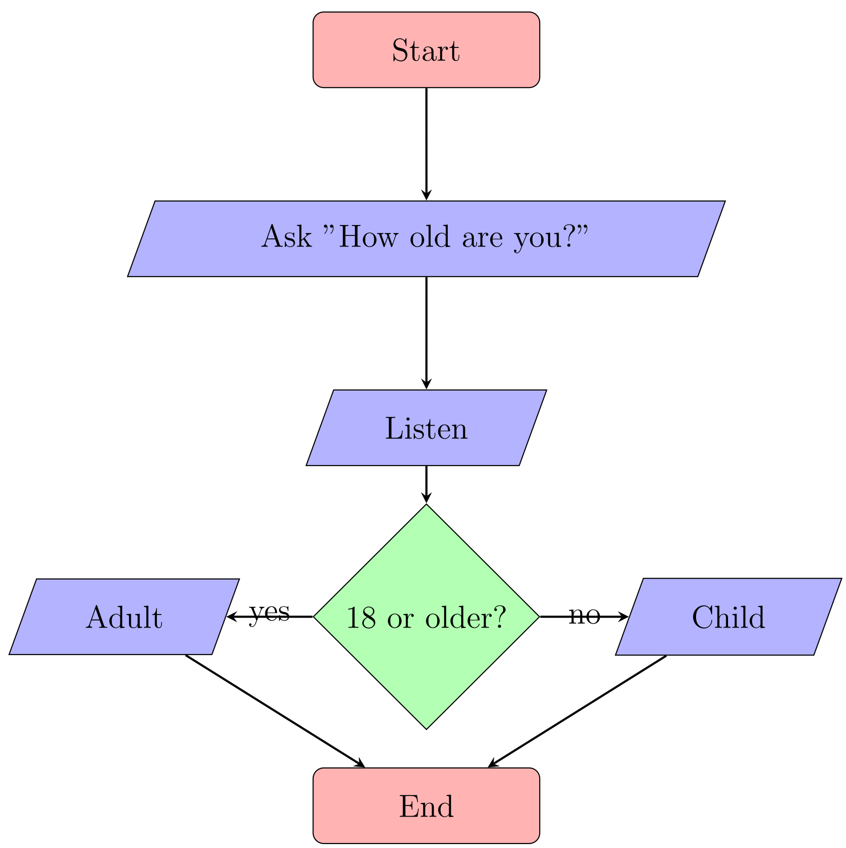
If you thought economics over-complicated our mall scenario by formalizing what was effectively common sense, you'll love computer science's most salient mental model: the *algorithm*. Merriam-Webster broadly defines an algorithm as "a step-by-step procedure for solving a problem or accomplishing some end." Algorithms contain precise, finite instructions, with inputs and outputs. Let's see which of the following processes can be classified as an algorithm:

- Cake Recipe: A Cake Recipe is an algorithm! It contains precise instructions(hopefully), is finite, takes ingredients and labor as inputs, and outputs a cake.
- Grocery Shopping: Grocery shopping is **not** an algorithm. Although you may have a precise grocery list, there are no precise instructions

for how you should shop for groceries. Grocery shopping does require money and labor as an input, but these inputs are not precisely defined. The output groceries can be precisely defined by a grocery list, but the process still fails our test.

- Geological Weathering: Geological weathering has been studied precisely by geologists, with precisely identifiable inputs and outputs, but it is not finite. That is, geological structures will weather indefinitely.

Algorithms are outlined in steps that are commonly represented by a flowchart. The flowchart below delineates an algorithm that determines someone's age and either responds "You are an adult!" or "You are a child!":



Each shape is called a *node* and each node is connected to another node by an arrow. The direction of the arrow indicates the shift from one direction to the next. The algorithm starts with the *start node* and ends with the *end node*. Each parallelogram contains an *input* or an *output* and each rhombus contains a *decision*. Rectangles, which are not included in this flowchart, each contain a *process*, such as storing or modifying information. In our algorithm, the question "How old are you?" is outputted, a person's response to the question is inputted by listening, and a decision is made based on that input. If the person answers yes to the question, you output "You are an adult!". If not, you output "You are a child!".

See the power of algorithms? They can decompose and delineate complex processes for computer applications. A similar line of thinking, which I call *algorithmic thinking* is a method of similarly decomposing and delineating complex processes. Algorithmic thinking can elegantly simplify problems in organizational management, mathematics, and philosophy just to name a few. The further elegance of algorithmic thinking emerges through algorithmic efficiency, which I'll refrain from discussing to avoid stretching this article too far.[3]

Using Psychology To Understand Fun

Fret not Freudians, psychology has perhaps the most relevant mental models to the layman. Hitherto, I've used economic and computer science concepts to explain mental models, although fun is a concept intrinsically tied to psychology–specifically, the psychology of choice. Unlike the previous mental models I explained, which were applied impractically for illustrative purposes, the psychology of choice perfectly encapsulates the dilemma faced in the mall scenario. For instance, social psychologists have found that overwhelming options increase indecision and dissatisfaction in consumers. One study shows that people are 10 times more likely to make a purchase when presented with an assortment of 6 flavors of jam instead of 24 flavors of jam.[4] Ironically, the best solution to the mall scenario was to avoid rationalizing the idea of fun and participate in whatever interests you and your friends. This may seem to trivialize my entire point about mental models, but it's quite the contrary; mental models are a panoply of critical thinking tools with remarkable effect when the right tool is used for the job. I suppose Munger was right.

Further Reading

Unfortunately, I had to cut this article short because it would have spanned about 5000 words if I decided to commit all the ideas I had to paper. However, I've included links to other articles that can detail some of the topics I originally hoped to cover.

1. https://jamesclear.com/mental-models#: :text=with%20a%20definition.-,What%20are%20mental%20models%3F,carry%20around%20in%20your%20mind.

2. https://en.wikipedia.org/wiki/Prisoner%27s_dilemma

3. https://www.geeksforgeeks.org/time-complexity-and-space-complexity/

4. https://www.apa.org/monitor/jun04/toomany