Hugging The Systems Together:

An analysis of Daniel Kahneman's
"Thinking Fast and Slow"

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(The image on the cover page, illustrated by David Plunkert, was taken from Kahneman's book review in the New York Times.)

Preface

It seems somewhat odd to write an essay on this book. After all, one of Kahneman's main appeals is that we need think more statistically. When applied to evaluating this book, the sentiment seems daunting. Without adequate access to outside information (which, to interact on Kahneman's level, would require consecutive PhDs in Statistics, Economics, and Psychology), we must respond somewhat upon our intuitions of his arguments. Our base reactions must prevail, in other words, despite his refined and statistical conclusions.

This is not to say that we rely *only* upon our quick, (as Kahneman calls) System 1, judgments. However, as I will argue in this paper, even if we formulated our arguments using the purest System 2 methods, it would still simply be not enough. Our System 2 and System 1 "minds" do not act independently. They are woven together far deeper than what is previously thought.

Even given an infinite amount of external data and time to reflect upon that data, each decision we make is inevitably made with a System 1 intuition. System 2 is not a separate way of thinking at all. Instead, it is a manner of using System 1 judgments more effectively by binding them together with the passage of time. Though System 2 is a more accurate process, it cannot escape many of System 1's problems. This is the point I will attempt to make in my paper. It is instead in our best interests to improve our System 1 to the best of our ability, than to attempt to focus upon our System 2.

Introduction

This essay relies on the vernacular of Daniel Kahneman's book, *Thinking Fast and Slow.* In presenting a short summary of this book, I aim to make my essay accessible to those who did not read the book. As well, I aim to clarify the way that I interpret Kahneman's argument. In the case that my reader does not share these interpretations, the following will hopefully clear any differences in analysis.

Thinking Fast and Slow investigates the ways that people make decisions. In doing so, it concludes that there is a better and a worse way to make decisions, and that we rely on the latter of the two. *Thinking* uses statistics and philosophical studies to define the following two decision making options:

Thinking Fast (System 1)

These decisions are intuitive and instantaneous. They are our hunch, our gut, our instinct. They require neither time nor effort. They rely on our past experience (be it cognitive connections, stories, or otherwise). Kahneman suggests, however, that these experiences may be irrelevant. Even worse, they may be damaging.

Examples include:
1) *Complete the phrase "bread and…."*.
2) *Understand simple sentences.*
3) *Detect that one object is more distant than the other.*

Thinking Slow (System 2)

These decisions are slow, methodical, calculated. They require time to process. They may be interrupted. They are more accurate than System 1, Kahneman posits, because they are less likely to be influenced by external factors.

Examples include:
1) *Focus attention on the clowns in the circus.*
2) *Maintain a faster walking speed than is normal for you.*
3) *Tell someone your phone number.*

Boiled Down

My argument consists of the following points:

1) Kahneman's *rational* aspect (of System 2) belongs more in System 1.
2) System 2 relies on System 1 well beyond what Kahneman gives it credit for.

Overall, I seek to develop the point that success relies on improving one's System 1. This stands in opposition to Kahneman, who suggests that the System 1 is overvalued and the System 2 is undervalued. I conclude with a reference to Malcolm Gladwell's *10,000 hour rule* to provide external examples of my point.

The Rational Aspect

Kahneman creates a sharp classification in his definition of System 2. Rather than just draw a boundary among the slower part of one's mind, Kahneman states that each System 2 has an *algorithmic* aspect and a *rational* aspect. The *algorithmic* aspect is the slow-thinking part of one's cognitive faculties. It chews on difficult problems. It yearns for solutions. It is the logical embodiment of a slow-thinking mind.

I would like to note that the chess example given previously very much follows the *algorithmic* aspect paradigm. It is a slow analysis of possible solutions. One might interrupt the concentration of a chess player easily. (My favorite way to do so is to sneak a gong by the player's ear and have at it.)

There is also a *rational aspect* classified under the umbrella of System 2. This aspect somewhat resembles a railroad switch. After being fed a problem, the *rational aspect* determines the best course of action for it. Either the problem could be handled by intuition (System 1). It might be instead better dealt with by careful analysis (System 2). Kahneman refers to failures in the *rational* aspect as "lazy thinking". Situations guilty of "lazy thinking" occur when problems were determined as appropriate for System 1, however the System 1 offers a wrong response.

To start, it seems a mistake to place the *rational* aspect under the umbrella of System 2. After all, the *rational* aspect seems involved in all calculations -- both intuitive and analytical. Were one to be given a simple math calculation….

$$2 + 2 = x. \text{ Find } x.$$

… it is obvious that this is a System 1 calculation. One need not check his math, write down the problem, or remember the law of addition. All of this is done instantaneously. When a person blurts out "Four!" to respond, there seems to be no slow thinking involved. However, according to our definition, the calculation must still pass by the *rational* aspect to be found suitable for System 1.

The presence of the *rational* aspect in the slow thinking System 2 has even further implications. Every problem must be evaluated by the *rational* aspect in order to be deemed "System 1"-worthy or "System 2"-worthy. This means that every problem given to a person must pass by System 2, in order to be judged by the *rational* aspect. Further, there is no such thing as a problem that only sees System 1.

Classifying the *rational* aspect inside of System 1 is thus problematic for two reasons. First, it nullifies the need for a System 1 at all, considering it cannot stand alone. Second, if being passed through any part of System 2 indicates that a question will be slowly thought, then that means that every question asked must be be slowly thought.

Take, for another example, the following situation. An exam is given to a large crowd of college students. The professor tells her students to flip over the exam, and the students begin to read the questions. Within a few seconds, the professor might glance across the eager test-takers. She might already be able to predict the test scores by looking at their reactions to the questions. Some students might be audibly sighing (indicating a difficult exam); others might be tapping their feet (also indicating a difficult exam); still others might be sitting up in their chairs (indicating an easier exam).

It is safe to say that each student who displays such body movement has run a question or two through her brain and then made a judgement on how difficult that question is. Each time a question's difficulty is determined, that question must have simultaneously passed through the

rational aspect as well as through System 1. It is not unreasonable, therefore, to conclude that this *rational* aspect is incredibly quick.

As well, the professor noted all of these reactions immediately, without too much focus. In gauging her students' body language, she as well sent stimuli to her *rational* aspect. Further, *her rational* aspect must have been incredibly quick as well. Combining the two of these situations, it seems fair to say that such a *rational* aspect is better placed elsewhere.

This *rational* aspect could be located in two separate locations. Either it may go in System 1, or not within either System 1 or System 2. In the interest of simplicity, I suggest that this aspect be sorted into System 1. After all, it consists of a quick computation to be made. *Does this question warrant an intuitive answer or an analytical one?*

Redefining System 2

I came, I saw, I shook a paw; am I a dog, or am I not?

Read through the previous paragraph, noting all of its commas. This sort of exercise offered by Kahneman as a paradigm of a System 2 problem. After all, one cannot just glance at the paragraph and know the answer. (Well, short of being Dustin Hoffman's character in *Rain Man*.) Counting is a slow calculation that relies on a steady amount of brain activity over time.

This problem is undoubtedly a System 2 problem. As Kahneman notes, "The highly diverse operations of System 2 have one feature in common: they require attention and are disrupted when attention is drawn away." This question fits well within that definition. Completing this task would be difficult to do along with another such difficult task, such as driving. The task requires focus. It can be interrupted. A loud noise while counting commas, for example, would make one start over from zero. Or it would at least make the subject pause to figure out where he was before. In this vein, I would define System 2 more concisely as, "A process which can be interrupted."

No System 2 problem is just a System 2 problem. Each requires some intuition, some instantaneous recalling, and some personal bias. Jumping back to the comma problem, when a subject begins to solve the problem, they must begin at the first letter. Instinctively, the subject

will know whether that letter is a punctuation mark or not. If the letter is a punctuation mark, the subject will know instinctively whether that punctuation mark is a comma. These decisions, such as…

Is ‘b’ a comma?
or….
Is ‘:’ a comma?

… are System 1 problems. They are simple and instinctive. They cannot be interrupted. I suggest that the comma problem is not unique. Many, if not all, System 2 problems actually contain large groupings of System 1 problems. Let us look once more at the comma problem. That same problem may be worded (equivalently) as, “Read through each letter of the previous paragraph, noting if it is a comma.” Working through it might resemble…

We start with zero commas.
Is “I” a comma? No.
Is “c” a comma? No.
Is “a” a comma? No.
Is “m” a comma? No.
Is “e” a comma? No.
Is “,” a comma? Yes.
Now we have one comma.
Is “I” a comma? No.
etc. etc.

None of the smaller questions are System 2 problems. They require little attention, and, alone, could not be disrupted easily. The transition from these smaller problems to the greater problem at large is simple. First, we combine these smaller System 1 problems. Next, we must remember where we are in the paragraph. Third, we must remember how many commas have already occurred.

The comma problem is not an outlier in the way that System 2 problems work. In fact, anything that requires attention probably has an element of quick micro-decisions. Let us investigate other problems offered by Kahneman in his definition of System 2.

Telling someone your phone number. Recalling your phone number is an immediate task. It hardly requires focus. If one uses their telephone number often, which would be most of the population, remembering it is a System 1 problem. It is, instead, in the act of telling this number (recalling where one is in the process, and recalling the next number from there) that could be interrupted. In a very similar vein to the comma problem, this is a series of System 1 problems tied together.

Focusing attention on the clowns in the circus. When one focuses on clowns in the circus, he relies on System 1 to form impressions. Understanding what the clowns are trying to portray, for example, is quick and immediate. Figuring out who on stage is a clown and is not a clown is a System 1 decision.

Further, there is a simple System 1 step of each System 2 problem. Certain details about the final decision in any System 2 problem are System 1 decisions. There is one type of System 2 problem not investigated yet that I find particularly important. This is the problem of any *creative decision*. These decisions involve using past experience and knowledge (the less experience, the more "System 2-esque" the solution will be) to produce a viable solution to a situation.

Chess, and the intuition behind it

A good example of a *creative decision* is a new (inexperienced) chess player making a move. Through investigation into each step in making a move, I will conclude that this problem is much more reliant on System 1 than is given credit for. The chess player 1) comes up with new moves. The player 2) evaluates each option, ending in a value judgment on it. She 3) determines whether more analysis is needed. She finally 4) narrows down her options through value judgments, ending with just a single move left.

I will now present each option in detail, breaking it down until the System 1 aspects become more clear.

Step one, exposition

The player must come up with viable options. These solutions might be automatic, registered from previous situations she encountered on the chessboard. They may instead be instinctive, gathered by looking at certain moves and deciding whether they are worthy of analysis through some gut feeling. Both of these options are System 1 decisions. One may argue that a player may also decide a move worthy of interpretation through analysis (a System 2 decision), but as I argue in the next paragraph, any analysis relies at length on System 1 decisions.

Step two, analysis

The player must take each option and make a value judgment on it. This process seems like it is purely System 2. It requires time. It requires attention. It may also be easily interrupted. However, even this process requires a series of System 1 decisions. For example, once the player picks an option to evaluate, she must come up with a list of valid game continuations. These are each created in the same manner as Step One, either through experience or instinct.

Deciding whether a game continuation might be valid also relies upon System 1. After all, once a player has come up with several possible game continuations, she must then use prior metrics for determining whether that continuation is better or worse. If she makes a judgment based on what gives her the most pieces, then the simplicity of the mathematics inside of that judgment surely make it a System 1 judgment. If it's based on what gives her the best position, then recognizing that pattern is also a System 1 judgment.

Step three, time

After each move, the player must make another judgment. Is she ready to move (go on to step 4), or should she analyze another position (go back to step 2)? This decision relies on a gut feeling. There are certainly external factors. These include the time left on her clock, the amount of moves left to analyze, and the quality of moves she has already experienced. However, as I will explain next, each value judgment is inherently a System 1 decision.

Step four, the value judgment

Despite any amount of appropriate evidence that a player has gained of the position, the analysis of any position will end in the same scenario. The player will have a list of possible options and a

value judgment for each. The process of choosing from this list the best decision is surely a System 1 problem. It is quick. It renders an immediate solution.

The judgment seems like it takes a long time. However, this is instead caused by the player going back to previous steps. ("I need to analyze this position further!" or, "I need to spend more time looking at the board...".) The actual moment that the decision is made is infinitesimally short. It requires little attention. It happens, in the same way that a face is recognized or an instrument is recognized from a classical record.

(*Step five, spontaneity*

Due to any host of reasons, including a time crunch, the player may instead just choose a move at random to make. This step resembles that of a System 1 process so much, that I find it unnecessary to analyze further.)

Thus, I have described each step of this move-making process as requiring System 1 processes. Now, I return to the problem at large. There is a chess game, and the player has to make a move. I will provide a sample stream of consciousness for what might go on inside a chess player's head before making a move. With each concurrent thought, I will note which step the player is following. In doing so, I attempt to show that making a chess move is done following just these steps. Thus, each step in making a chess move relies on a System 1 decision.

> *(Step one) Okay, so the valid options right now seem to be Rook to E5 and Bishop to F4.*
> *(Step two) Rook to E5 seems bad, because it could be taken there by the Knight.*
> *(Step one) But wait, I could move my Bishop to G5 instead!*
> *(Step three) My time's running a little low, I should make a move.*
> *(Step two) My Bishop doesn't seem like it would be very important at G5,*
> *(Step four) so I guess I will go with Rook to E5.*

Analyzing the way that a chess player moves is beneficial for looking at a host of possible decision-making processes, not just those within board game strategy decisions. For example, going after Kahneman's example System Two options[1], "*searching through memory to identify a surprising sound"* includes both the "exposition" (coming up with memories) and "analysis"

[1] The list I consult is located on page 22 of the book.

(comparing those memories with the sound in question) steps used in the chess example. Were the subject not to find a perfect match, she might even use a "value judgment" to decide which sound is the best fit!

Filling out a tax form requires the "exposition" of one's own knowledge to complete. Bracing for the starter gun in a race requires the "analysis" of each loud noise to see if it matches a starter gun. Looking for a woman with white hair requires an "expository" glance around, as well as an "analysis" of each woman to see if she matches the desired description.

The Ten-Thousand Hour Rule, or proof that people who succeed have good System Ones [2]

Ten years. That's how long it took seventy-three out of seventy-six famous classical composers to write their greatest work. Malcolm Gladwell, in his novel *Outliers*, suggests that this sort of time given to fostering excellence in one's self is not unusual. Rather, it is the norm. Most people who are excellent at anything, Gladwell writes, have devoted at least ten-thousand hours to it.

Gladwell references many other venues of skill. Be it other forms of music, sports, etc.
It comes then as no surprise that Grandmasters, when they look at chess positions, exhibit far less mental activity than novice players. Think back to *Step Three* of a chess game analysis, described before. The Grandmasters reference combinations of moves that they have experienced before. This is an inherently System 1 process. Despite doing fewer calculations (which would require System 2), the Grandmasters still come up with the best scenarios. It is thus evident that those who are excellent at their crafts have well-developed System 1 thinking.

Implications and Conclusions

Kahneman suggests that we must think more according to our System 2. When given a problem, we must decide more often that it is worthy of slow analysis. Or, perhaps, we must be wary of our quick intuitions, and the justifications that go along with them. However, turning to System 2 as a solution to the problems of our System 1 is problematic.

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[2] This section references "Complexity and the Ten-Thousand Hour Rule," an article written in the New Yorker by Malcolm Gladwell. The article was published on August 21, 2013.

Because the two systems are so intertwined, we are unable to escape the larger problems of our System 1. Continuing with the chess analogy, no matter how long we might contemplate the our positions, the variations of moves we choose are completely dependent upon the limitations of our System 1.

It seems that Kahneman advocates for a less frequent use of System 1. He vouches instead for using System 2 whenever possible. I, however, posit that using System 2 still ends up with similar consequences to System 1. If better consequences are desired, then a person must instead train her System 1 to yield better consequences.