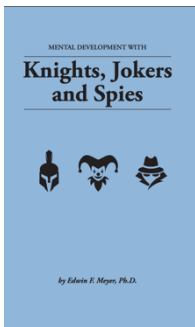# Mental Development with Knights, Jokers, and Spies

By Ed Meyer

In a report from the World Economic Forum titled, *Future of jobs 2023: These are the most in-demand skills now - and beyond*, the top two in-demand job skills are analytical thinking and critical thinking.

These two skills can't be developed by reading, by listening to others, or by watching videos. The only way to develop the ability to think critically and analytically is to think critically and analytically for a long time about new, challenging problems. It is just like developing any skill, you must practice.

The book, "Mental Development with Knights, Jokers, and Spies" is specifically designed to provide an opportunity to develop critical thinking skills.

There are 120 "Opportunities to Develop" in the book. A sample opportunity is shown at the top of the column to the right.

In these challenges, there are always three people, Mr. Blue, Mr. Red, and Mr. Green. One is a Knight, one is a Joker, and one is a Spy. The Knight can never lie, the Joker can never tell the truth and the Spy can say anything. The challenge is to uncover their identities based on what they say.

To encourage the reader not to guess, there is a place to sign and date the solution after entering it on the three blanks provided.

There should be NO hurry to complete the book or even finish a single problem. We can certainly imagine a grandparent presenting the book to a grandchild as a birthday present and then going through the solutions together perhaps years later.

The answers are included, but to discourage the reader from peeking at the answers, there are dashed lines provided around the answer section to seal it with duct-tape and then sign it for a tamperproof seal.

Mental Development with Knights, Jokers and Spies

This book provides the opportunity to struggle with challenging problems with zero risk. Struggling with one of the challenges should be considered an opportunity to develop rather than an unpleasant duty.

If the reader is stuck, he/she should feel welcome to skip the problem and come back to it later. A youngster may go a year without tackling any opportunities to develop.

You can't force people to develop their analytical and critical thinking skills. They must embrace the struggle. Without struggle, there is no development.

In this age of the smart phone, many young people are missing out on the experience of struggling with a challenging problem for a long time to reach a new level of understanding. As a result, the analytical and critical parts of their brains will atrophy.

Without the ability to think analytically and critically about ideas that are presented to them, they are vulnerable to adopt non-sensical ideas and be victims of charlatans looking to develop an army of sheep to further their own agenda.

Quote Acrostic of the Month
By Ed Meyer

Instructions: Fill in the words at the bottom from the clues. Then write those letters in the grid at the top to reveal an appropriate quote. Black squares indicate the end of a word, and punctuation has been removed. When you're done, the first letters of the answers to the clues, from top to bottom, will be the author of the quote.

QUOTE

1N	■	2M	3C	4P	5J	■	6K	7O	8M	9C	■	10L	11C	12O	13F	14Q
■	15Q	16E	17O	■	18G	19H	20N	21O	22D	23J	■	24P	25A	26O	27Q	■
28C	29I	30A	31B	32J	33F	■	34G	35K	36H	37J	■	38N	39K	40P	41E	■
42C	43P	44J	45Q	46N	■	47H	48B									■
49E	50I	51D	52C	53M	54H	55A	56L	57F	58O	59J	60G	61Q				
62G	63N	64L	65D	■	66H	67K	68G	69O	70N	■	71I	72H				
73I	74K	75L	76F	■	77N	78A	79J	80Q	81M	■	82Q	83G	84E			
■	85I	86K	■	87N	88E	89P	90M	■	91B	92Q						
93C	94P	95H	96M	97F	98I	99O	100G	101A	■	102Q	103G	104O	105I	106A		
107B	108A	109L	110N	111C	112K	113D	114O	115J	■	116Q	117H	■	118L	119Q		
120C	121M	122G	123J	124C	125F	126L										

CLUES

A. Going bad
_106_ _30_ _55_ _78_ _25_ _108_ _101_

B. Slow
_31_ _91_ _107_ _48_

C. Academic appointment
_120_ _52_ _42_ _111_ _3_ _9_ _93_ _11_ _124_ _28_

D. Vortex
_22_ _51_ _113_ _65_

E. Wasted on the young, according to Shaw
_84_ _88_ _49_ _41_ _16_

F. Stinging plant
_57_ _76_ _13_ _97_ _125_ _33_

G. Oppenheimer's Project
_18_ _122_ _60_ _103_ _68_ _62_ _34_ _83_ _100_

H. Meeting of the student body
_19_ _117_ _54_ _36_ _95_ _47_ _66_ _72_

I. Weak, ineffectual person
_50_ _29_ _71_ _85_ _105_ _73_ _98_

J. Astronomical distance
_32_ _59_ _123_ _79_ _5_ _37_ _115_ _44_ _23_

K. Half of a screen door latch
_112_ _86_ _67_ _35_ _74_ _39_ _6_

L. Stupendous
_56_ _10_ _126_ _118_ _109_ _75_ _64_

M. A click on Amazon
_53_ _96_ _8_ _81_ _2_ _90_ _121_

N. Boreas
_70_ _77_ _87_ _20_ _63_ _110_ _1_ _46_ _38_

O. Summed an infinite number of infinitesimals
_99_ _7_ _26_ _104_ _114_ _69_ _12_ _21_ _17_ _58_

P. Standard unit of force
_40_ _43_ _24_ _89_ _94_ _4_

Q. Unattributed author
_61_ _27_ _119_ _14_ _15_ _82_ _45_ _116_ _102_ _80_ _92_

Problem Solving "Exactly One Ace"

By Ed Meyer

The Grand Challenge for January 2024 was…

A well shuffled deck of cards is dealt into four hands with 13 cards each, as in the game of bridge. What is the probability that each of the four hands has one of the four aces?

Of course, an expert mathematician might be able to get the answer quickly by plugging numbers into an equation that has some factorials. However, the goal here is not to get the answer as quickly as possible. The answer is just some number that is not worth knowing. The goal is to develop the ability to make progress on challenging problems by thinking and reasoning.

Let's not experience any stress or any time pressure. It's supposed to be a fun intellectual challenge.

Before we even tackle this problem, let's take are shoes off and stroll through it to look around and see if there are any interesting observations we can make.

What about enumerating the possible Ace distributions? The problem asks for the probability of the 1-1-1-1 distribution. What others are there?

Well, all four aces can be in the same hand. This is the 4-0-0-0 distribution. Let's not differentiate whether the four aces are in the North, East, South, or West hands. The 4-0-0-0 ace distribution simply means that all four aces are in the same hand.

Another possible distribution is 3-1-0-0. That is, one hand has three aces, and another has one ace.

A third possible distribution is 2-1-1-0. Here, one hand has two aces, two others have one ace, and one hand is aceless.

The last possible distribution is 2-2-0-0. In this distribution, there are two hands with two aces and two hands with no aces. The five possible ace distributions among the four hands are 1-1-1-1, 2-1-1-0, 2-2-0-0, 3-1-0-0, and 4-0-0-0. It is a good investment of your time to rank these using your

probabilistic intuition. Compare your ranking with others. Discuss why you ranked them as you did and try to reach aa consensus.

Let's start to try to solve this challenging problem.

On second thought, let's not. It's too hard.

As with most challenging problems, a good way to make some headway is to consider a much simpler version of the same problem.

A useful simplification is to consider a four-card deck that contains two aces and two kings that is "shuffled" and dealt into two two-card hands. In this situation, there are two possible ace distributions, 2-0 and 1-1. A 2-0 ace distribution is when both aces are in the same hand and a 1-1 distribution is when the two aces are in different hands.

Which, if either is more likely, the 2-0 distribution or the 1-1 distribution? If it is not clear, a good idea would be to deal out, say 30 hands while tallying whether the ace distribution is 2-0 or 1-1.

Since it makes no difference, shuffle the mini-deck first and then flip the deck over to deal the cards face up. With this strategy, you might have an AHA! moment as you watch the cards go into the two hands.

Once you are 100% confident that you understand why the probability of a 2-0 ace distribution is one-third and the probability of a 1-1 ace distribution is two-thirds, you can take another step towards the solution by considering a six-card deck that contains three aces and three kings. This mini-deck is shuffled and dealt into three two-card hands. The two possible ace distributions are 1-1-1 and 2-1-0. What is the probability of each?

Explore, discuss, think, calculate, wonder. Do not be in a hurry to get the answer. The answer is not the goal, the goal is to develop reasoning and problem solving skills, not plug numbers into equations.