



1D - SIMPLE AS 1-2-3



“I come from a long line of number lovers,” Darnell said. “**Seriously**. But this long line of numbers is making me **dotty**. And **dash-it-all**, there are **zero breaks**! I see some sequences simple as 1-2-3... But what’s with these extra individual numbers thrown in?”

(Note: All 78 numbers below are meant to be in a one-dimensional straight line, but the page length does not allow it.)

27 28 29 19 16 14 12 15 0 7 9 11 8 5 2 7 6 5 0 6 10 14 12 0 13 16
19 21 0 20 0 18 14 10 9 26 23 20 15 0 8 6 4 0 3 6 9 0 14 9 19 12
0 9 0 10 11 12 14 5 0 21 25 29 30 29 28 20 16 12 0 1 3 5 0 1 7 5

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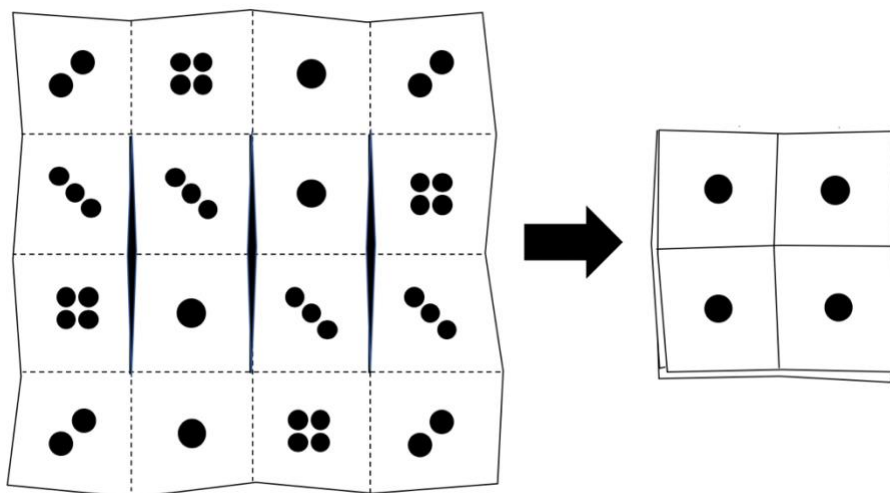
2D - KNOW WHEN TO FOLD 'EM

1/2



Later that week, Darnell joined his friend Deb at her beloved Folded Frappe, which met on the fifth Friday of each month. Participants would gather at local coffee shops, throw back a frappe or latte and maybe a scone and try their hand at some challenging origami constructions. Deb was eager to show Darnell her new puzzle.

“It’s a 4 x 4 grid with horizontal and vertical folds and three vertical slits,” Deb explained. “The puzzle is **based on sixteen** squares: four have one dot, four have two dots, four have three, and four have four. The object is to fold it up into a 2 x 2 grid with all the same dots showing: all ones, then all twos, then all threes and then all fours.”

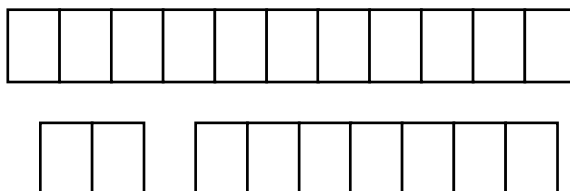


“Like this,” said Darnel holding up the four ones. “That was easy!”

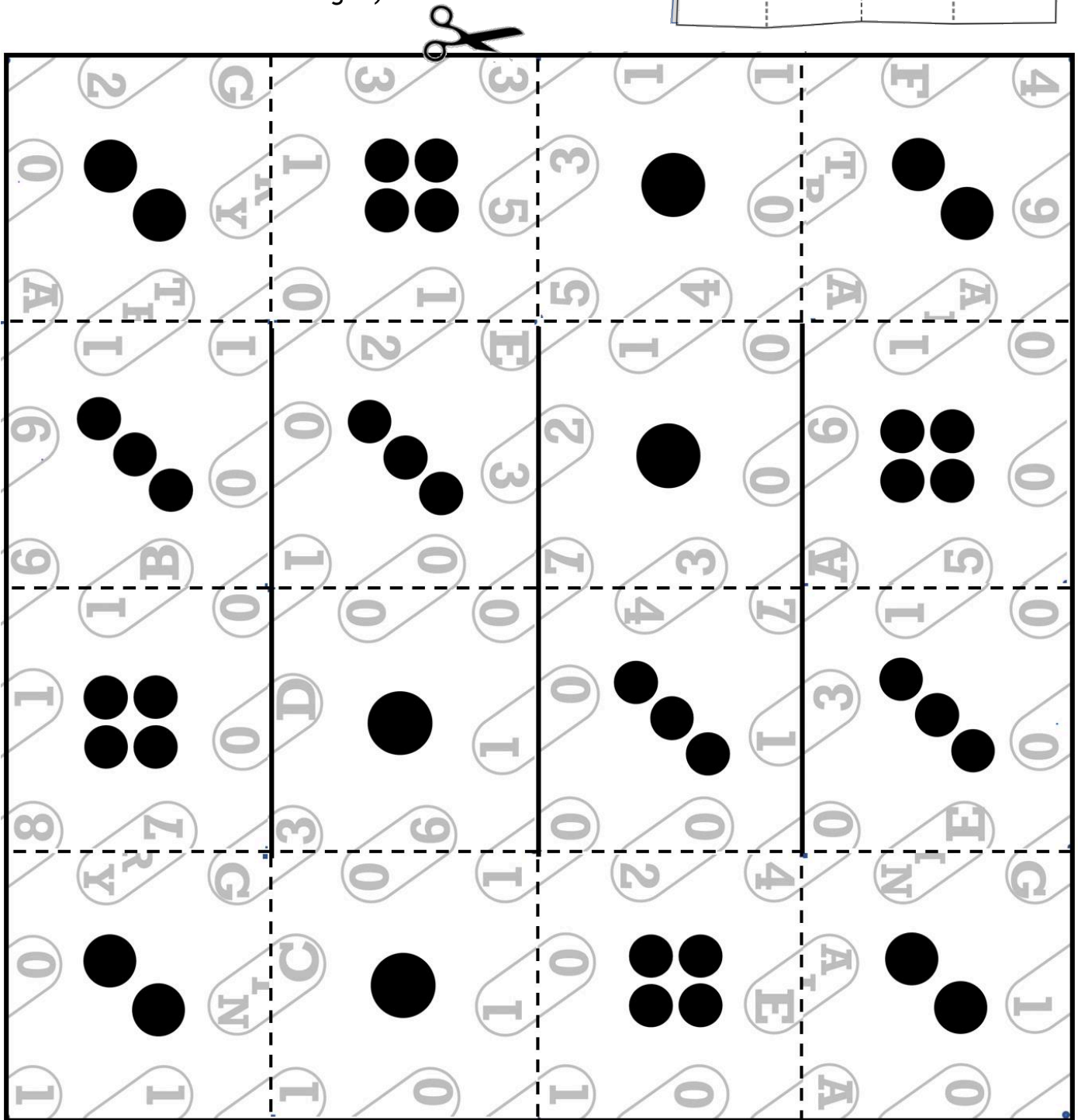
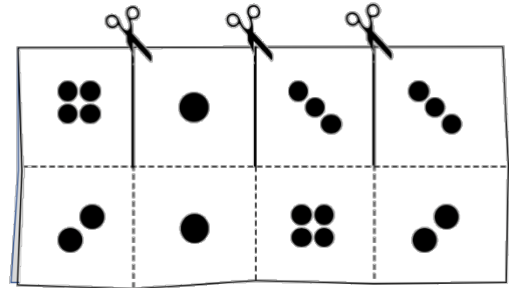
“Yeah,” Deb agreed, “but they just get progressively harder and harder. You’ll feel so confounded, you’ll think someone has put some sort of **hex** on you!”

It took Darnell longer than he thought it would to figure them all out. “To get the fours, I had to think outside the box... or maybe I should say – on top of the box. Now I see that each 2x2 solution has a little extra plus in it with these paired numbers and letters, five pairs in each.”

“Hmm,” Deb pondered, “12, 0E, 06... where have I seen those before?”



First cut out the large border square, then carefully fold back and forth along each of the six dotted lines. Then, cut along the three slits. (These cuts are most easily made by folding the square in half perpendicular to these slits and then making three short cuts – just one square length – across the seam as shown at right.)





3D - THREE'S A CHARM

1/2



After the Folded Frappe, Deb wanted to show Darnell something at the new container store that had just opened up three blocks away. When they got there, they ran into Diana.

“I need some advice,” Deb said. “You both know that I’ve been selling my hand-crafted poker chips on that gambler’s website: See-and-**raise-dot**-com. But I want to package them in cool boxes. And then I just came across these.” Deb held up a crazy looking 18-square array with what looked like little portraits of Clint Eastwood printed repeatedly in many of the squares – and what might have been the back of his head printed in others.

“Oo, that **face! Clint** Eastwood... Dirty Harry...” Diana lowered her voice. “You’re thinking: did he fire six shots or only five...”

“I think it’s perfect,” Deb cut off Diana’s Dirty Harry impersonation. “You’re supposed to cut this up into three pieces to get three boxes out of each sheet, but it doesn’t show you which lines to cut along and which ones to fold along. And before you fold them up, the pieces are all supposed to be the exact same shape. I’m **just not seeing it.**”

“I don’t know” said Diana. “Everyone knows you don’t want to wear sunglasses at a poker game! Opponents will see what you’ve got. You might as well just be using **transparent** cards!”

“I disagree,” said Darnell. “These **boxes are clearly** the best choice.”

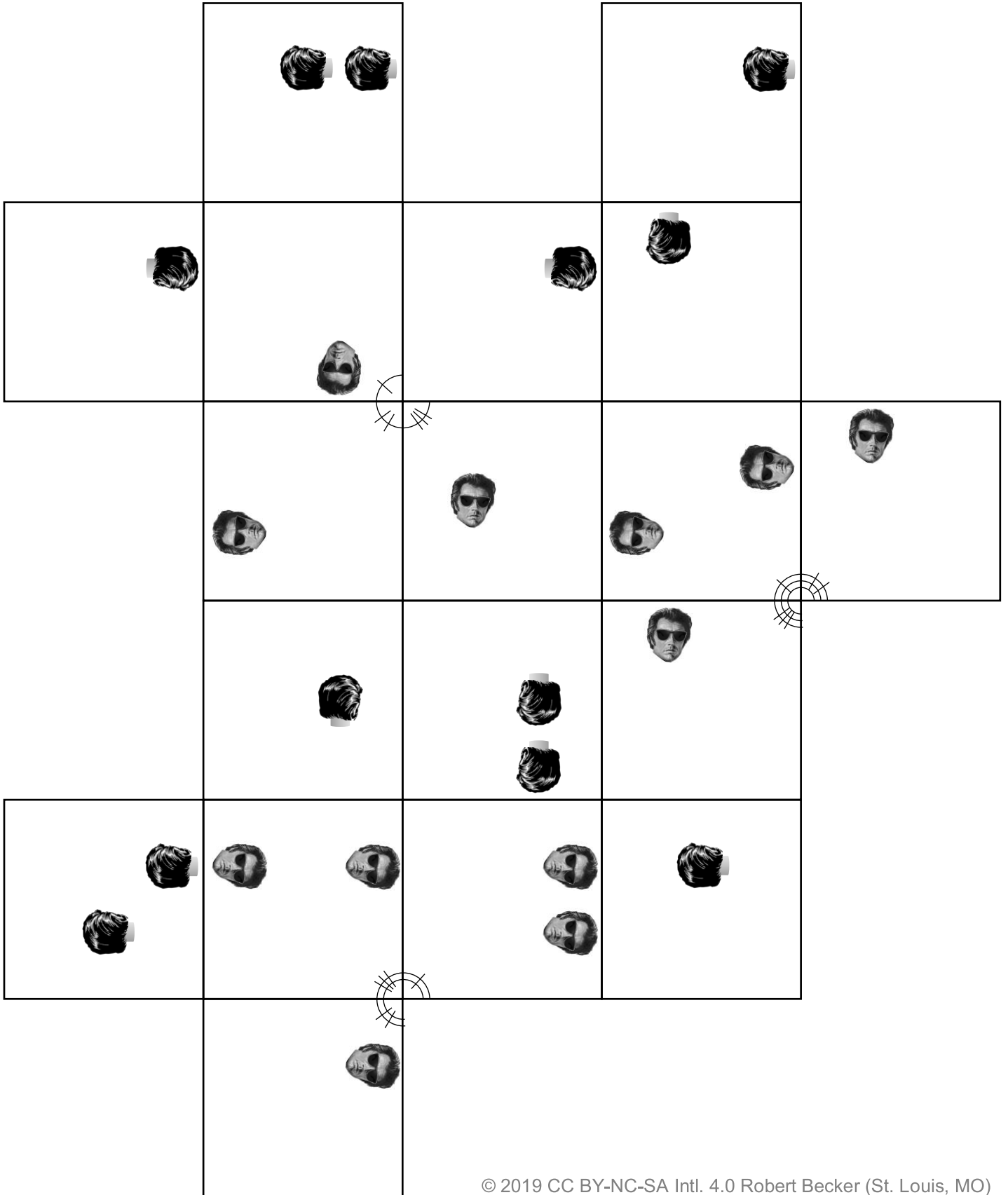
“These are the ones,” Deb decided. “The real question is: how did I just stumble upon them when I wasn’t even looking?”



3D - THREE'S A CHARM

2/2

Cut along the outer perimeter only, and then figure out how to cut the shape into three congruent pieces – all the exact same shape. Then fold these into three separate cubes.





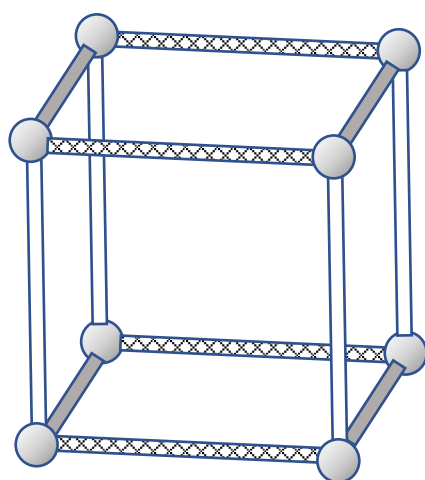
"What is that!?" asked Deb pointing at a drawing of a cube inside a cube up for sale at Dave & Diana's garage sale.

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"That's a tesseract," explained Dave. "Think four-dimensional cube. It's really tricky to portray a 4-D object on a 2-D surface like a piece of paper, but that drawing will have to do."

"And did you ever notice," chimed in Diana, "how a regular cube has four edges that run left-right (shaded criss-cross on the left-hand diagram below), four edges that run up-down (shaded white) and four edges that run in and out of the paper (shaded gray)?"

"Oh, I see where you're going," exclaimed Darnell as he joined them. "It looks like a tesseract has eight edges that run left-right (criss-cross), eight edges that run up-down (white), eight edges that run back-forth (gray), and then eight more edges that run in a new dimension (black). Let's call that dimension 'in-out.'"

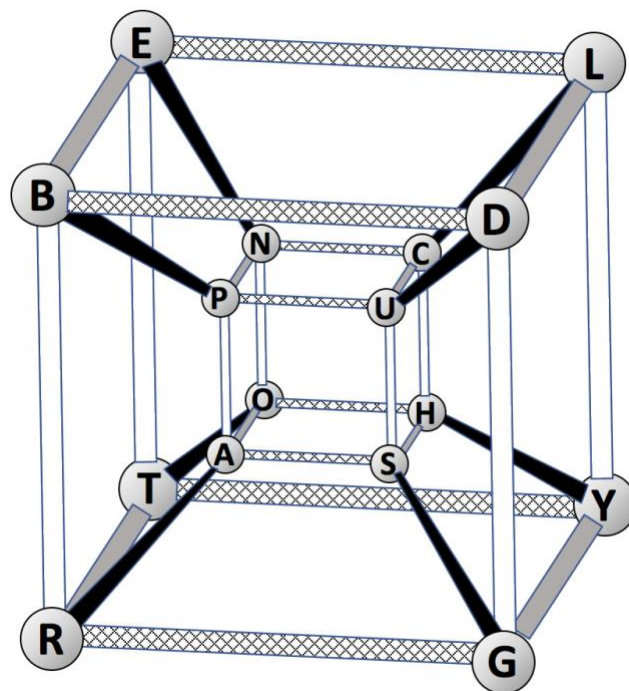


"Does this fourth dimension run perpendicular to the other three, just as they all run perpendicular to each other?" asked Deb.

"Yep," said Dave. "Kind of hard to wrap your mind around, isn't it?"

"Hey, check it out," exclaimed Deb, pointing at the tesseract with the lettered vertices. "Do you see what is special about the word BENCH?"

"I sure do," said Dave, "And BRASH and PUSHY are also special in that same way. Wow!" Dave was starting to get overly excited, like he was trying to sell everyone on this amazing tesseract idea!



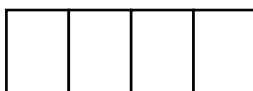
Find four more words in the tesseract like BENCH, BRASH and PUSHY that match the four clues below. Once you've done this, consider how many times each letter gets used. Then you'll understand what all the ballyhoo is about.

Considered a compliment in some countries, seen as rude in others _____

A soirée or political faction _____

Describes a person when the pants don't fit – or a finger when the ring doesn't fit _____

Glistened and gleamed _____



Meta - Uncertainty in the Shadows

1/1

Over pints of beer that night, our four friends gathered to see if they could make sense of all of their dimensional explorations.

"I just find myself questioning everything," Deb bemoaned. "Do we live in 3-D but only see things in 2-D? Is it even possible to really comprehend 4-D?? Everything seems so dubious."

"I hear that," said Diana. "Sometimes I feel that way at work too when we're showing those 3-D movies only they're really 2-D." Diana was a **projectionist** at Cinema One to Infinity, a vintage movie theater across town. "Lately I've been working **noon to midnight** every day."

"Dang," exclaimed Darnell, "it's like going fishing, and you're never quite sure where to toss your lure in." No one could really follow Darnell's logic, but they all nodded to be polite.

"And it's all the extra stuff I end up having to do," Diana continued. "I mean the other day, we're showing some 1943 flick, where Wallace Ford tries to play the role of a detective. What amateur film-maker made that call? And then the film breaks. So, while they're fixing it, I had to keep the audience entertained with '**Whose Shadow is it Anyway?**' **Fifteen straight** games we had to play! I was exhausted."

"Ugh!" Deb moaned. She had seen Diana's hand-shadow impersonations on more than one occasion.

"Hey," Dave interrupted, "I vote for another round of drinks, but I'm just not sure what I should order."

