

## The ART of Magic

OSCAR THUMPBINDLE  
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On anyone's list of the world's greatest mathemagicians the name Arthur Benjamin would most certainly appear. He has recently been showing a truly astounding mathematical card trick at various meetings around the country. I first saw Art present it at a Gathering for Gardner and later saw him give it again at a Mathematical Association of America regional meeting. *The Mathematical Gazette*, Vol. 95, No. 531, Nov. 2010 contains "To your hearts' content" by Hang Chen and Curtis Cooper which describes the trick. They said "Arthur Benjamin showed the amazing mathematical card trick during the 2007 annual meeting of the AMS/MAA in New Orleans."

I here give a word version of the trick. It is simpler than Art's. For his full version, consult the *Mathematical Gazette* article.

First, a cross word puzzle.

1	A	H	A	B
2	L	A	R	I
3	T	A	L	C
4	E	R	O	S
	a	b	c	d

### ACROSS

- 1 Melville's Captain
- 2 Monetary unit of Georgia or the Maldives
- 3 Magnesium silicate
- 4 Greek love-god

### DOWN

- a Der \_\_\_\_ (Konrad Adenauer)
- b A raw sea-mist
- c Woody Guthrie's son
- d Popular pens



As crossword puzzles go, this is not so hot but it has an additional, rather magical property. Cut the 16 letters out and put them back in order in the 4x4 grid. We define an ARTful fold as a fold of a full row onto an adjacent row or a full column onto an adjacent column. For instance row 1 could fold over to row 2 by placing AHAB face down on LARI. Then the new (double) row 2 could fold over onto row 3's TALC.

I ask a spectator to choose a square, say he chooses 3b. I then start folding to reach that square letting the spectator have choices on whether I fold a column or a row. I do this over and over until all letter cards are on position 3b. Some letters will now be face up and some face down and I separate the two. There will be exactly 8 in each pile and I

point out to the spectator that exactly one of the piles transposes into an 8-letter word. I give this word in the Answers and Solutions column in the back.

If the spectator is not sufficiently impressed with this highly unexpected development I offer the following puzzle, again with letter-cards so that we can fold easily.

1	I	R	R	A
2	D	A	I	D
3	O	T	T	O
4	S	E	E	S
	a	b	c	d

#### ACROSS

- 1 Babylonian god of war or pestilence
- 2 “I shot’m \_\_\_\_\_!” (OED)
- 3 Comic Sergeant’s dog
- 4 Observes

#### DOWN

- a Bachelors’ last words
- b Grade
- c Bar mitzvah for one
- d Stirs

I had previously written on a card the word ASTEROID and on another card the words RADIO SET. These have been placed face down on the table.

I now ask the spectator to choose a target square in the IRRA grid. With his help I perform the ARTful folds until his target square is reached. The cards are separated into the face up and face down groups. The Spectator is to choose one of the piles. He also is to choose one of the two face-down cards. He should be amazed that his pile of 8 cards can be transposed into the word(s) on his freely chosen card.

This trick is self-working – I will give a hint as to why in the Answers and Solutions. It is always possible to give the folds in any order with the following proviso. If, for instance, row 2 is folded onto row 3 and you want to fold row 1 to row 3 you must first fold 1 to 2 and then use another fold to 3.

As puzzles for the reader I offer the following (possible solutions appear in the back).

- (1) Place the letters of MOUSETRAP into a 3x3 grid with legitimate crossword words so that ARTful folding separates into MOUSE and TRAP.
- (2) Do the same for the word FACETIOUS so that ARTful folding separates the vowels and consonants.