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## Letters

### Anatomy of a shuffle

Your report on Aric DiPiero's science fair project on shuffling cards ("In the name of the game," SN: 6/6/92, p.380) states that "a four-step riffle, riffle, riffle, overhand fully randomizes a deck." However, after this four-step shuffle, only  $2^{208}$  different orderings of the deck are possible. (Each riffle or overhand shuffle rearranges the deck in one of  $2^{52}$  different ways.) While  $2^{208}$  is a large number, it represents only one in every 200,000 of the 52 factorial arrangements. In practical terms, this means that if you leaf through the cards one at a time, the precise order of the last several will very likely be predictable in advance.

Of course, there are many criteria for when a deck is shuffled enough, and it is unclear from the article whether a well-defined test was used. In any event, the claim that "further shuffling will generally be ineffective and may even . . . negate some of the effects of the

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Cover: This true-color image of a pair of lung-shaped galaxies called the Antennae illustrates the beauty and power of color photography in astronomy. Faint red and blue patches indicate recent starbirth. The richer colors in the galaxy on the right indicate that it contained much more gas — the raw material for stars — than its partner when they began merging about a million years ago. (Photo: David Malin, © Anglo-Australian Telescope Board)

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**Science Service**, a nonprofit corporation founded in 1921, gratefully accepts tax-deductible contributions and bequests to assist its efforts to increase the public understanding of science, with special emphasis on young people. More recently, it has included in its mission increasing scientific literacy among members of underrepresented groups. Through its Youth Program it administers the International Science and Engineering Fair, the Science Talent Search for the Westinghouse Science Scholarships, and publishes and distributes the *Directory of Student Science Training Programs for Precollege Students*.

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previous four passes" is completely wrong. When information may be restored by mixing, no reasonable measure regards it as absent.

Finally, while it is mentioned that an upper bound of seven shuffles was known to randomize a deck, the article fails to mention that the same work of Diaconis *et al.* shows that seven (possibly six) riffle shuffles is a lower bound as well. Thus, while DiPiero may have determined three riffles and an overhand to be enough for a good euchre game, this combination is not "a more efficient way to shuffle cards" than seven riffle shuffles.

Robin Pemantle  
Madison, Wis.

### Murphy again?

Crockett Ellis Jr. (Letters, SN: 6/27/92, p.419) tells us that Murphy's Law as we know it today was originated by Major John Paul Stapp and is misattributed to Captain Edward Murphy, who

actually said something quite different, lacking the elegant simplicity required of a "Law." All of this demonstrates once again the universal validity of Murphy's Law.

Henry D. May  
Dallas, Texas

As a magician, I have long been familiar with a passage in the book *Our Magic* (1911, Nevil Maskelyne and David Devant, E. P. Dutton). In the chapter entitled "Presentation," we read: "It is an experience common to all men to find that, on any special occasion, such as the production of a magical effect for the first time in public, everything that *can* go wrong *will* go wrong. Whether we must attribute this to the malignity of matter or to the total depravity of inanimate things, whether the exciting cause is hurry, worry or what not, the fact remains."

Maskelyne's pronouncement predates Major Stapp's by about 38 years.

Wallace R. Rust  
Greece, N.Y.

