

## Shuffling Effects

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Most card games require a randomized deck; failure to mix the cards is unfair to players, and makes games less interesting. Mixing is normally done by shuffling and cutting the deck. One way of checking and improving randomness is looking for number runs; if the same number appears twice in sequence, one of the cards can be moved to a different position. Of course, there's no assurance that the new location won't create a new repetition. This is to be expected, since there is an extremely high probability (95%) of at least one sequential repetition of a number occurring in a randomized deck of cards. We therefore shouldn't be too worried about the occasional pairing.

There's an interesting trick you can perform that utilizes shuffling effects, as follows:

### *Preparation*

1. Use a 52-card deck, with no Jokers.
2. Separate the deck into four stacks by suit.
3. Recompile the deck by selecting one card in turn from each of the suit stacks, maintaining the same order of suits.
4. Return the cards to their case.

(It's fine to let the person you're showing the trick to observe this preparation step.)

### *Performance*

1. Fan the cards to show that they are (apparently) randomized, based on there being no clear number sequence.
2. Place the cards face-down, and cut them (arbitrarily splitting the deck into two and placing the top half on the bottom) as many times as desired.

3. Give the cards to the other person, and tell him to deal out a stack of 20–30 face-down cards.
4. Since there are 52 cards in the full deck, it is now approximately split into two equal parts.
5. Request that other person shuffle the two halves together, using a riffle shuffle (where the halves are alternatively interleaved by flipping them together). It's not necessary to perform a perfect shuffle; indeed, a rough shuffle is even better. Only perform one shuffle, though.
6. Retrieve the cards from the other person.
7. Hold the cards behind your back. Pretend that you are searching through the deck, pull out four cards, announce, “diamond, spade, heart, club—a full set,” and reveal the cards. You can continue doing this, revealing full set after full set.

If you have a deck of cards handy I urge you to give this a practice run. After you have done so, consider why it works this way. When doing so, I suggest that you name the four suits A, B, C, D and use a spreadsheet to duplicate the Preparation and Performance steps described above. Watching things in order should reveal how the trick works.

This trick relies on the belief that shuffling a deck randomizes it. A single shuffle alters the order of the cards, but does not break up the order of the suit sets. It takes a second shuffle to really mix things up, which is why the instructions say to only shuffle once.

This trick is also described in Nob Yoshigahara's *Zentenkō-gata shijō saikyō no pazururando* [Ultimate Puzzle Land, Suitable for all Weather] (Benesse, 1995).