

# Exploratory Testing With Playing Cards

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A testing exercise created by Payson Hall and James Bach.

## Setup

- 1) Split class into no more than five teams (per instructor) with no more than four students each.<sup>1</sup>
- 2) Provide each team with a complete pack of playing cards<sup>2</sup> that contain two jokers.
- 3) Assure that each team has at least 5 square feet of table space to work with, preferably 10.
- 4) Speak the following instructions:

"This is an exercise in exploratory testing. Instead of software, you are going to test ME. Each team represents an art dealership. Your goal is to win an exclusive contract to sell art to me. In order to do that, you must find out what kind of art I like. You are to discover this by submitting art to me (playing cards) and seeing what I accept and what I reject, until you understand the pattern.

"You must submit art to me in four card sets called a 'showing'. When you show me cards, I may like them, in which case I take the cards I like. If I don't like a card, you keep it. The cards I take are considered 'purchased'.

"You may submit any number of showings. You must complete the task within 45 minutes.

"When you think you understand the pattern you may submit a 'final showing', this must contain five cards. If I take EVERY CARD, your team wins. If I reject any cards, your team loses."

"I will not answer any questions other than to clarify these rules. If you're wondering whether a particular action or strategy is legal, just try it and see what happens."

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<sup>1</sup> Teams with more than four students tend to break apart, leaving introverted students out. More than five teams will overload the instructor, who plays the role of "system under test" in this exercise. Teaching assistants can be used to handle additional teams.

<sup>2</sup> The cards must be ordinary "Bicycle" style. Not novelty cards with any special imagery on the faces.

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## Running the Exercise

- 1) The secret principle you use is “asymmetry”. You reject any card that is indistinguishable when it is right-side up or upside down. In other words, the cards divide into two equivalence classes:  
*Reject:* all diamonds except the 7, and all face cards, 2’s, 4’s, and 10’s.  
*Accept:* 7 of diamonds, and all non-diamond A’s, 3’s, 5’s, 6’s, 7’s, 8’s and 9’s.
- 2) When card sets are submitted, take appropriate cards and place them face down on your desk, away from that team. Keep the cards from each team in separate piles. *If a team asks to review the cards that you took, allow them to do that for their own pile only.*
- 3) If a team presents a showing that is incomplete, or includes extra cards, say “I need to see four cards in a showing, where are the four you want me to see?”
- 4) If a team shows five cards, ask “is this your final showing?”
- 5) If a team presents cards face down, and the backs are symmetrical, reject them all. If the backs are asymmetrical, say “this looks like the same art, four times. I’ll take one of them.” Then pick one and take it.
- 6) Don’t answer questions about “what would you do if…” Just say “if you have a showing for me, let me see it.”
- 7) Consider ending the exercise if people are really stuck or if two teams have won. You might also decide to give hints about process.

## Debrief

Look for behaviors that relate to principles of rapid exploratory software testing. Some examples of these principles are:

- **Coverage modeling.** To be successful, the testers need to notice and consider many dimensions of the situation. Not only do they need to consider them, but it helps greatly if they can find ways to visualize them. For instance, some teams lay out all the cards by suit and number, and that way they have a good chance of recognizing the pattern as it emerges.
- **Smart recordkeeping.** Some testers keep elaborate records of their tests, but that can clutter up the process, too, interrupting the flow of thinking. One unobtrusive record-keeping strategy is to lay out the cards in some pattern, then flip a card over when it is rejected, let it be face up if it hasn’t yet been showed. A blank space in the pattern indicates a card that was taken.
- **Rich hypotheses.** There are many possibilities for the principle being used, such as:
  - the number of the card (e.g. evens, odds, primes)
  - the suit of the card
  - how the cards are ordered within the showing

- how the cards are offered (e.g. by hand, on table, order in which they are put down on the table)
  - relationship of card set to poker hands
  - astrological or numerological principles
  - specific detail of imagery on card
  - physical mark on card
  - several simultaneous rules
  - random acceptance
  - instructor's personal feelings
  - different rule for each table
  - rotating set of rules
  - principle having nothing to do with cards
  - principle having to do with Nth time a card is presented
  - principle related to hidden agent advising instructor
- **Conjecture and refutation.** Good testers don't just conceive of hypotheses and run tests to corroborate them. They also run tests designed to refute those hypotheses. For instance, if a team comes to believe that all diamonds will be rejected, see if they present *all* the diamond cards in the course of the exercise. If they believe that the order of the cards doesn't matter, see if they try tests with many different orderings.
  - **Dividing the work.** Teams can subdivide and simultaneously pursue different strategies. For instance, one tester could do nothing but re-show old rejected cards while other on the team puzzle over which new cards to show. Testers may also adopt different roles.
  - **Team decision-making.** Did the team make conscious choices about test strategy? Did it stay together or split up? A chaotic process may squander resources (cards) too quickly.
  - **Learning from one test informs design of the next.** Good testers use what they know to make the best tests they can, and they learn as much as they can from each test.
  - **Awareness of costs of testing (both direct costs and opportunity costs).** In this exercise, the cost of a test has something to do with the amount of time and energy it takes to produce, but it also has to do with the number of cards lost as a result of a showing. Some testers catch on to the notion of rapidly re-showing rejected cards, changing their positions (or not) with each showing. These are safe and cheap tests. Also, some testers notice that they can submit one new card with three rejected cards (slugs), which effectively gets around the rule that four cards must be shown at a time.
  - **Idea sharing and evolution.** In what way did ideas, theories and processes evolve as testers discussed them?
  - **Time sensitivity.** Since this is a competitive exercise, which simulates to some extent the sense of urgency in a typical project, one strategy testers may use is to maintain a current best guess of five cards that could be presented as a final showing.
  - **Seeking/using external resources.** Testers may ask for additional card decks (say no), or eavesdrop on other teams (that's fine).

- **Challenging constraints (as a learning strategy).** Testers may try to submit other objects as “cards”, or submit fewer than three cards, or more than 4. They may submit cards face down. This is a good thing. It’s no different, in principle, than any other error handling test.
- **The thought process is what matters.** It’s not reasonable to expect each tester, all the time, to discover the pattern behind this exercise. If testers don’t “win”, that’s not necessarily a problem. The question is what was their thought process? Was it reasonable under the circumstances? How might they improve it?

## Variations

- Alternative patterns:
  - Start by taking no cards. For each succeeding case, take one, two, three, four, and all cards, respectively. Repeat the cycle.
  - Take a card if it is adjacent to a card of a different color
  - Take any set of cards that form an ascending series within the showing.
  - Take a card if the number of suit symbols on it is prime.