Paper Puppets Game

Why Use This Game

- To explain what a process is: a series of steps that turns a set of “inputs” into an “output.”
- To show how to measure the different parts of a process.
- To introduce some of the tools used in analyzing data about a process.

Key Concepts

- All work takes place in processes (a process is a series of steps that produces an output).
- The quality of a process can be measured at many points in the process.
- Simple tools can help you analyze data.

Materials

For this game, you will need:

- Colored paper, at least 25 sheets
- White paper, a few sheets
- Blue or black marker
- Red marker
- Scissors
- Ruler
- A flip chart and felt-tipped marker for displaying graphs and charts
- 6 time sheets
- 1 quality control form

Preparation

Familiarize yourself with the session’s structure and content:

- Read through the game instructions and key teaching points in their entirety.
- Practice the game itself.
- Practice presenting the key teaching points.

Prepare the room:

- Set up a long table at the front of the room with five chairs along one long side (one for each “workstation”).
- Seats for the rest of the audience should be set up auditorium style or in a semi-circle.
- Place the stacks of colored and white paper at the first workstation, the scissors at the second, the blue marker at the fourth, and the red marker at the fifth. Also place a partially completed unit at each workstation to show each worker exactly what his or her output should look like.
- Add a sixth chair at the short end for the Quality Inspector.
- Prepare a sample puppet to use as a model and demonstration.

Playing the Paper Puppets Game

Learning Objectives

Tell participants that by the end of the session they will:

- Understand what a process is and how the design of the process affects quality.
- Have experience using tools for measuring a process.
- Have experience analyzing data about a process.

Agenda

Provide a brief description of the session’s primary components:

1. Background to the Paper Puppets Game.
2. The game itself.
3. Debrief and discussion on what the game shows, and how its lessons can be applied.
4. Feedback and close.

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Background to the Game

Facilitator's Note

"Processes, not people" is one of the first concepts taught about quality improvement. Most people in health care will be familiar with this idea, and most people believe it. The purpose of this game is to give people a chance to see just how the structure of a process can affect quality, and to give them experience with measuring and analyzing the process's function.

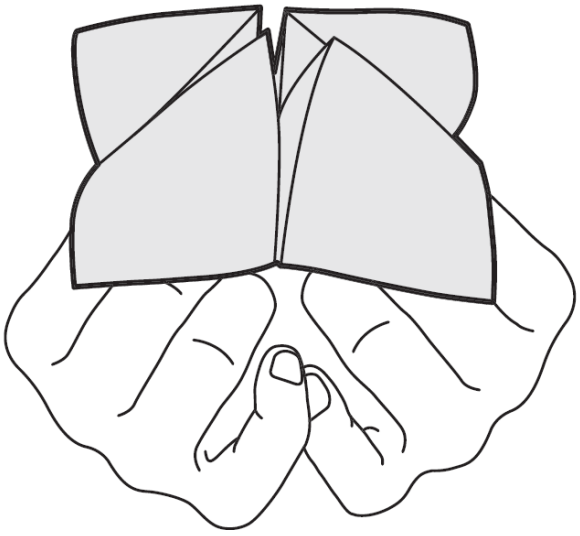
This version of the game focuses on two data analysis tools: pareto diagrams and run charts. Pareto diagrams allow you to analyze causes by category, and run charts show the variation in data over time. By looking at causes by category you can make a data-driven decision about which part of a process to address, and by looking at variation over time you can begin to develop hypotheses about why a process may not be working well.

Key Points to Explain to Your Audience

- Improvement comes from addressing the processes of work.
- One step in a process affects another; each step can't be viewed in isolation.
- Developing and tracking good process measures is critical to being able to improve the process.
- Simple tools can help analyze what these measures show you.

The Game Itself

1) Tell participants that their job is to produce a "complex toy product" and that their pay will be based on the number of products that they complete.
2) Instruct workers in the 5 tasks of the production process:
   - The task 1 worker folds the bottom left corner of a piece of paper to align with the right side to define a square.
   - Task 2 is designed to be the bottleneck. The worker must cut off the excess paper, fold the second diagonal of the square, and then fold each corner in to the center of the square to form a smaller square.
   - The worker at task 3 again folds each corner of square inward toward the center to form a still smaller square.
   - The task 4 worker flips the small square over and draws a pair of eyes, one eye each on 2 neighboring squares with the black marker.
   - Task 5 requires the worker to flip the square over again and draw a tongue with the red marker. The puppet is made by flipping the square, inserting a finger under each of the four squares on this side, and folding each side of the square together.



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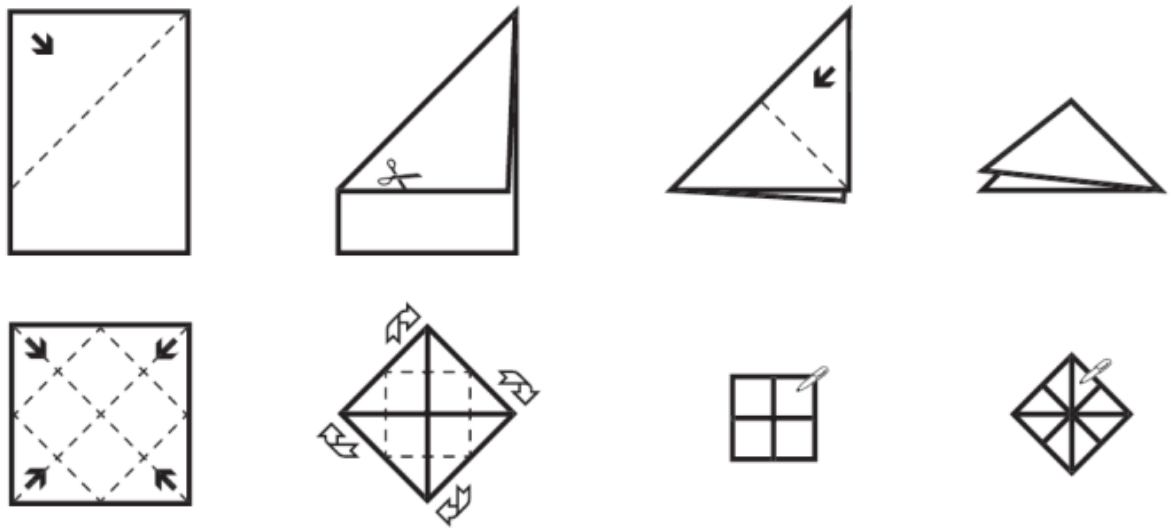
http://nationalqualitycenter.org/download_resource.cfm?fileID=16567

Paper Puppets Game

3) After the tasks have been explained to the workers, give them a few sheets of the white paper to practice their tasks before the actual simulation.
4) Ask for volunteers from the audience to act as timers:
   - Five task timers measure, in seconds, how long it takes each worker to do his or her task (from the time a worker picks up a unit until he or she is finished with that unit).
   - One throughput timer measures the time it takes to complete a single unit. Note: this can be difficult as bottlenecks can make it hard to keep track of an individual unit. Use alternating colors of paper so the timer can keep the different units straight.
5) Ask for one more volunteer to be the quality inspector who reviews and accepts or rejects each finished puppet. Keep the criteria the inspector should use purposefully vague.
6) Let the system of production produce 20 items.



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Debrief and Discussion

1) Review results. Ask the participants, what did they observe? Most common responses are:
   - Task 2 was the longest task.
   - Task 4 (or sometimes 5) was the shortest task.
   - The worker at task 2 was never idle.
   - The workers at tasks 3, 4, and 5 were idle most of the time.
   - The workers at tasks 3, 4, and 5 slowed down after a few units had been produced.
   - The worker at task 1 ran out of space to send units to task 2.
   - The worker at task 2 exhibited signs of frustration: flushing, rushing, making comments about being overworked.
   - Work-in-process (WIP) inventory only built up at task 2.
   - Workers didn't communicate much with each other.
   - The quality inspector didn't communicate back to the other workers. The quality inspector rejected (or didn't reject) many units.

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2) Ask for their conclusions about this process. Most will answer:
   - The bottleneck at step 2 limits the process's capability.
   - The workers didn't communicate because they were not told to; workers often will not do something unless they are told it is OK.
   - Some may give suggestions on how to improve the process: providing square paper to start, for example, or a template for the eyes and tongue or for the folds needed in the paper.

3) Introduce the quantitative analysis.

Ask one group of participants to look at the quality inspector's data and identify categories of defects. Have them draw a bar graph, with the types of defects on the horizontal axis and the number of puppets showing such defects on the vertical axis, with the highest number in the left hand bar and the rest in descending order. This is a rough Pareto diagram, designed to show the relative influence of different causes to an overall result (in this case, poor quality puppets). The diagram helps identify which part of the process should be looked at in order to provide puppets of higher quality.

Additional groups of participants can draw run charts – line graphs – based on the task time sheets and throughput time sheets. The horizontal axis is numbered for each unit, from 1-20. The vertical axis is labeled with "number of seconds" and the time each unit took is recorded, with the points for each unit connected with a line. Ask about the conclusions they can draw from the charts. Why does the throughput time increase? Which task takes the longest and increases the most? How does this relate to their initial response to the process?

4) Consider asking about the processes in their programs:
   - Which work well? Which seem to have bottlenecks?
   - Which do we measure now? Which should we measure? How?
   - If we measure process performance, how will we organize ourselves to act on the results?

Feedback and Close

Ask your audience for feedback on whether this session met its objectives. Take notes of their response on a flip chart, and keep it for your use in the future.

Schedule an informal follow-up session with any audience member who wants clarification or more information on the game or the concepts you discussed.

Thank your audience and congratulate them on their hard work and success.

Source, History and Resources for More Information

This game is adapted from a version developed by Janelle Heineke of Boston University. Heineke uses the game as a first class for her students in her Operations Management course.

See: Heineke, Janelle, "*Enhancing Learning Using Classroom Games and Exercises,*" Quality Management Journal, 1997,4:4, 32-42.

Time Sheet

If you are a **Task Timer**, indicate the task number and record the time from start of work on unit to end of work on unit.

If you are a **Throughput Timer**, record the time from start of work on a unit at Task 1 to the completion of work on that unit at the end of Task 5.

Task #: _____

UNIT	TIME IN SECONDS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
Average	

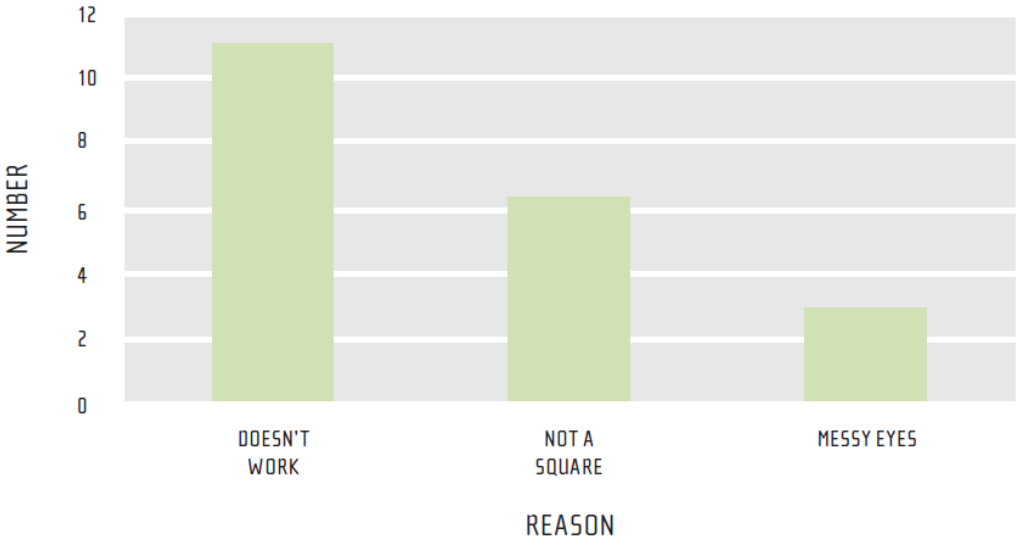
Quality Control Form

UNIT	ACCEPT OR REJECT?	COMMENTS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Acceptance Rate		

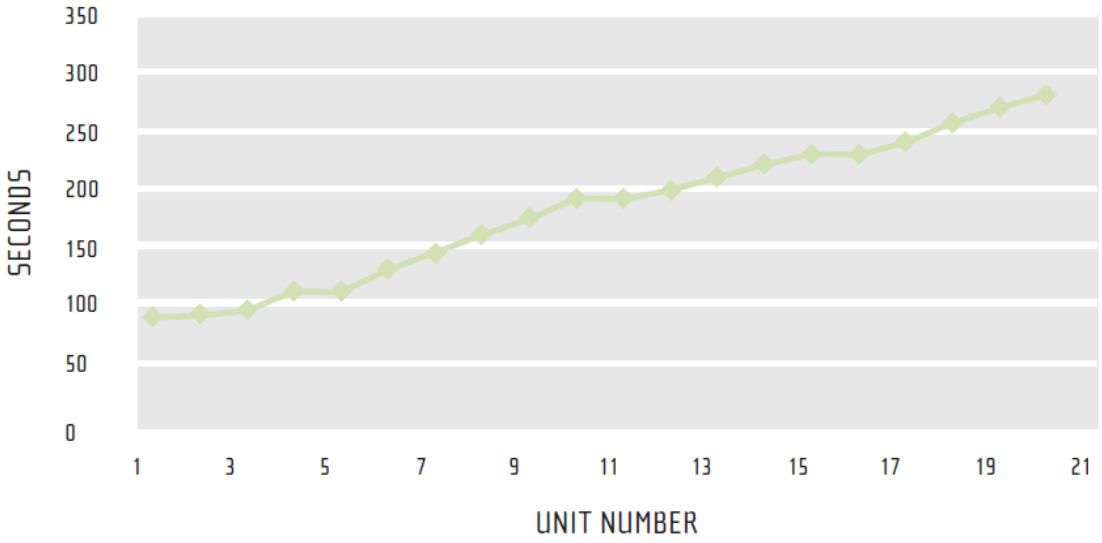
Sample Pareto Diagram & Run Chart

Sample Pareto Diagram and Sample Run Chart

Pareto Diagram: Reasons for Rejects



Run Chart: Throughput Time



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