Playing tennis

Aim: To show an example of conservation of angular momentum.

Subjects: 1Q40 (Conservation of Angular Momentum)

Diagram:

Equipment:
- Revolving platform.
- Tennis racket (or baseball bat)

Presentation: The demonstrator stands upon the revolving platform and swings the tennis racket (baseball bat). While the swing lasts, the swivel chair moves in the opposite direction. Swinging back brings the swivel chair back to the initial position. (Swinging fanatically is not conductive to the maintenance of professorial dignity, but necessary for a good demonstration.)

Explanation: During the experiment, no external forces are applied. In the beginning the total amount of angular momentum is zero and conservation of angular momentum tells us that this remains so. So as the tennis racket is given angular momentum in one direction, something else must acquire equal angular momentum in the opposite direction (you and the platform).

Remarks:
- This experiment also explains what happens when a dog wags his tail. (Or is it: the tail wags the dog; conservation of angular momentum cannot tell the difference.)
- Also Newtons's third law can be observed in this experiment.

Sources:
- Mansfield, M and O'Sullivan, C., Understanding physics, pag. 103-104
- Leybold Didactic GmbH, Gerätekarte, pag. 33166/-69, 33166
- Sutton, Richard Manliffe, Demonstration experiments in Physics, pag. 73