

## Memories trip up gymnastics scores

Two Canadian psychologists offer some advice to ambitious gymnasts: In athletic meets, perform your warm-ups as flawlessly as possible to avoid taking a scoring tumble in actual competition. The reason: Gymnastics judges display unconscious scoring biases in favor of gymnasts who perform warm-ups with no slip-ups, report Diane M. Ste.-Marie and Timothy D. Lee of McMaster University in Hamilton, Ontario.

In sports such as gymnastics and figure skating, judges typically watch not only competitive performances, but also same-day warm-ups and training in the days before an event. Judges should watch only actual competition to improve the objectivity of their scores, the researchers argue in the just-released January *JOURNAL OF EXPERIMENTAL PSYCHOLOGY: LEARNING, MEMORY AND COGNITION*. Political biases still sway judges' decisions at international meets, they add.

Ste.-Marie and Lee recruited 24 female gymnastics judges with one to 19 years' experience. Judges viewed videotapes on which four accomplished female gymnasts performed 48 moves from the four events in the women's competition—vault, uneven bars, balance beam and floor exercise. Half the moves represented perfect performances; each of the rest included an error, such as legs bent or toes unpointed. Judges rated each move as either perfect or flawed.

Participants then rated moves on a second videotape with 16 "same" moves (for example, a specific move performed error-free following its perfect performance on the first videotape), 16 "different" moves (such as a marred move following its flawless performance on the first videotape) and 16 new moves not shown on the initial screening.

Both novice and experienced judges rated same moves most accurately, followed by new moves and then different moves. Two further studies, including one in which experimenters told judges to guard against the biasing effects of the initial viewing, still resulted in overall scores of 76 percent accuracy for same moves, 72 percent accuracy for new moves and 68 percent accuracy for different moves.

Thus, judges' unintentional memories for warm-up moves cut two ways. If a warm-up proceeds perfectly, a duplicated performance in competition gets an optimal score and a flawed performance gets a better score than it deserves, the psychologists assert. However, if a warm-up contains a flub, a flawed competitive performance receives a minimal score and an error-free routine scores undeservedly low.

While the 8-percent contrast in accuracy between judges' ratings for same and different moves appears relatively small, it could easily affect competition standings, the researchers add. For instance, in the 1988 Olympics, the women's gymnastics gold medalist scored 79.675 out of 80 and the 10th-place finisher scored 78.550, a difference of less than 2 percent.

## Believe it or not

People express a "surprising degree" of credence in psychic and supernatural phenomena, according to a random, nationwide telephone poll of 1,236 U.S. adults conducted last June. Although these beliefs often conflict with traditional religious views, they emerge among deeply religious folk almost as often as among the nonreligious, report George H. Gallup Jr. and Frank Newport of the Gallup Organization in Princeton, N.J.

The poll results, published in the winter 1991 *SKEPTICAL INQUIRER*, include the following: One in four people believe in ghosts, one in six cite communications with someone deceased, one in four say they have communicated "telepathically" with another person, one in 10 claim to have seen or been in the presence of a ghost, one in seven say they have seen a UFO, one in four believe in astrology and about half believe in extrasensory perception.

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## Sandy signs of prehistoric shaking

If seismic history repeats itself, the Wabash Valley along the Indiana-Illinois border will someday host a strong earthquake. Geologists last week reported finding evidence that an intense temblor—of estimated magnitude 6.2 to 6.7 on the Richter scale—shook this region sometime before the arrival of European settlers.

Stephen Obermeier of the U.S. Geological Survey in Reston, Va., and colleagues made their discovery by searching the Wabash Valley area for features indicating liquefaction—a process that occurs when strong shaking turns buried sediments into a pressurized liquid. The slurry can escape upward through fractures and erupt at the surface.

To date the liquefaction deposits, the researchers relied on geological and archaeological information from nearby layers of soil. Most of the shaking-produced features formed during a single earthquake sometime between 7,500 and 1,500 years ago, the scientists conclude in the March 1 *SCIENCE*. The distribution of the deposits helped them determine the quake's size.

During the last 200 years, the Wabash Valley region has generated five slightly damaging earthquakes, ranging from magnitude 5 to 5.8. The new evidence demonstrates that a far stronger earthquake rattled the area in the recent prehistoric period. Because the valley continues to experience sporadic seismic activity, including many small shocks each year, Obermeier says: "I have to believe that this area is a good candidate for a future strong earthquake."

## Earthquake fatalities rose in 1990

Last year proved particularly lethal in terms of earthquakes. Seismic catastrophes caused almost as many deaths worldwide in 1990 as during the entire decade of the 1980s, the U.S. Geological Survey reported last month. Most of the fatalities in 1990 resulted from a major earthquake in Iran on June 20. The magnitude 7.7 shock killed an estimated 50,000 people and left 60,000 injured.

## CO<sub>2</sub> and temperature: A *pas de deux*

In a finding that may have ominous implications for greenhouse warming forecasts, scientists report that carbon dioxide levels and equatorial temperatures perform a close dance, moving in tandem to an as-yet-unknown rhythm.

J. Brad Marston from Cornell University in Ithaca, N.Y., and his colleagues at the New York City-based Environmental Defense Fund compared a 30-year record of carbon dioxide concentrations to a record of average monthly temperatures for different regions of the globe. They found a close statistical relationship between the carbon dioxide measurements and equatorial temperatures: The two tended to rise and fall together, with changes in the greenhouse gas lagging several months behind the fluctuations in equatorial sea temperatures, the researchers report in the Feb. 14 *NATURE*. This suggests that the temperature changes cause the short-term variations in carbon dioxide, or that both respond to some other meteorological force, Marston says.

The findings provide empirical evidence for an idea raised long ago: That rising temperatures will cause the land surface or ocean to release stored carbon dioxide—an effect that tends to push temperatures even higher. Scientists call this kind of relationship a positive feedback. The feedback studied by Marston's group works over relatively short periods, each lasting a few years. He says it is important to determine whether the same feedback also operates over several decades. If so, that would raise the possibility that increasing temperatures will cause a massive surge in carbon dioxide levels, driving temperatures to even higher levels than those currently predicted by climate models.

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