



# Psyched Up, Psyched Out

Some athletes swear by it. Others laugh at it.

## Can science determine if sports psychology works?

by Michael Shermer

**A**lthough I was trained as an experimental psychologist, I didn't become interested in how psychology could enhance athletic performance until 1981. That's when I began preparing to compete in the first annual 3,000-mile, nonstop transcontinental bicycle race, the Race Across America. I thought I had better try any technique I could find to prepare my mind for the pain and pressures of what *Outside* magazine calls "the world's toughest race."

In addition to riding 500 miles a week and subjecting my body to such "treatments" as chiropractic, Rolwing, mud baths, megavitamins, iridology and electrical stimulation, I listened to motivational tapes. I meditated. I chanted. I attended seminars by Jack Schwarz, an Oregon-based healing guru who taught us "voluntary controls of internal states." I contacted Gina Kuras, a hypnotherapist who taught me self-hypnosis to control pain, overcome motivational lows, maintain psychological highs and stay focused. I got so good at going deep into a hypnotic trance that when ABC's *Wide World of Sports* came to my home to film a session, Gina could not immediately bring me back, causing her to fear that I had somehow harmed myself.

Did all this New Age fiddle-faddle work? I really can't say it did, as a scientist or a cyclist. Still, I'm glad I had these crutches during my 10 days of leg-burning, lung-searing riding.

As Mark Victor Hansen, an apostle of the motivation movement and co-author of the Chicken Soup for the Soul book series, would chant, "This stuff works when you work it."

On one level Hansen is right.

As with fad diets, it matters less which one you are on and more that you are doing something—anything—about your eating habits. Diets are really a form of behavioral, not caloric, modification. The point is to be vigilant

and focused, thinking about the problem and trying different solutions.

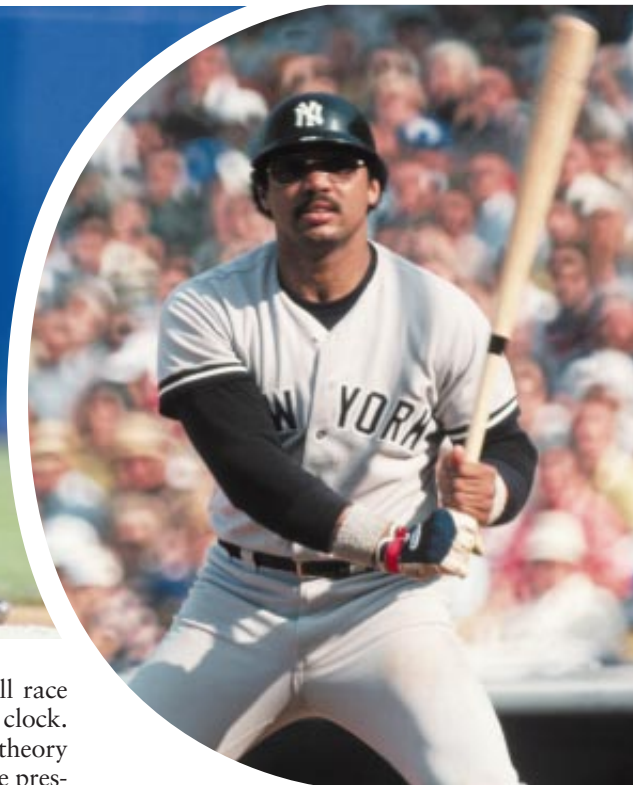
But the deeper and more important question is: Can we say scientifically that sports psychology techniques work? Obtaining an answer is complicated, because so many of these self-help methods are based on anecdotal evidence. As my social science colleague, Frank Sulloway, likes to point out: "Anecdotes do not make a science. Ten anecdotes are no better than one, and 100 anecdotes are no better than 10."

Without controlled comparison groups, there is no way to know if an effect that was observed was the result of chance or the technique. Did you win the race because of the meditation or because you had a deep sleep, a good meal, new equipment or made progress in your training? Even if a dozen athletes who applied a certain procedure before an event performed better, without a control group there is no way to know what really led to the improvement. And when we say that an athlete performed "better"—better than what? Better than ever? Better than yesterday? Better than average? Conducting a scientific evaluation of the effectiveness of psychological aids on athletic performance is a messy business.

### THE DESIRE TO WIN

**S**ports psychology began in the 1890s, when Indiana University psychologist Norman Triplett, an avid cyclist, performed a series of studies to determine why cyclists ride faster in groups than when they are alone. Triplett discovered that the presence of others, whether competitors or spectators, motivates athletes to greater performance. As sports have become professionalized, the field has paralleled the trends in general psychology, applying behavioral models (how rewards and punishment shape performance), psychophysiological models (the relation between heart rate and brain-wave activity and performance) and cognitive-behavioral models (the connection between self-confidence and anxiety with performance).

The goal, of course, is to understand, predict, and enhance the thinking and behavior of athletes. Studies show that a cyclist will ride faster when another cyclist is riding alongside or even behind than when the



**EMOTIONAL PLAY:** The rash of wild throws this summer by one-time Gold Glover Chuck Knoblauch (*left*) had psychologists guessing about stress related to his ailing father. Some players thrive on competitive stress; although Reggie Jackson (*right*) hit his share of home runs during the regular season, “Mr. October” unleashed strings of them in high-pressure post-season games.

cyclist is alone. And the average cyclist will race faster against a competitor than against the clock. Why? One reason is “social facilitation,” a theory in which individual behavior is shaped by the presence and motivation of a group (think mass rallies and rock concerts). But what is actually going on inside the athlete’s brain and body? Well, competition provides the promise of positive (and the threat of negative) reinforcement, stimulates an increase in physiological activity and arousal, and locks the athlete into a self-generating feedback loop between performance expectations and outcomes. This constant feedback causes competitors to push one another to the limits of their physical capabilities.

#### MR. CLUTCH VS. MR. CHOKE

Yet as in all psychological situations, outside variables alter the theoretical effect. Competition and crowds can increase an athlete’s anxiety, causing him or her to crumble under fans’ expectations. Basketballs that swish in during practice clank off the rim in the game; aces on the practice court turn into double faults at center court. But the same stimulation can accelerate the heart rate and adrenaline of another athlete, accentuating the drive to win. Some athletes are at ease under pressure: Reggie Jackson as “Mr. October,” Jerry West as “Mr. Clutch.” Others falter: Bill Buckner’s infamous through-the-legs error at first base that cost the Boston Red Sox the crucial Game 6 of the 1986 World Series; Scott Norwood’s muffed field goal in the closing seconds of the Buffalo Bills’s best opportunity for a Super Bowl ring thus far.

Sports psychologists offer several explanations for this variance. It comes down to personality: some individuals are just better at risk taking, competitiveness, self-confidence, expectation for success and the ability to regulate stress. And some have an easier time hewing to the basic winning habits of profes-

sional athletes: practice a lot, come prepared with a contingency plan for changes in the competition, stay focused on the event and block out distracting stimuli, follow one’s own plan and not those of the competitor, don’t get flustered by unexpected events, learn from mistakes, and never give up.

The complexity of the task and the nature of the competitive situation also affect each athlete’s ability to rise or fall in the heat of competition. The 100,000 screaming fans lining the final kilometers of a crippling climb up the French Alps in the Tour de France might catapult a cyclist onto the winner’s podium but could cause a golfer to knock his five-foot putt into the sand trap or a gymnast to do a face plant into the mat. Context counts.

So does attitude. Psyching out an opponent is another mental game that can affect an athlete’s performance. It is extremely complicated to test; suffice it to say that it can happen. And place a vote for Muhammad Ali as the greatest practitioner in history. Ali imposed his own psychological edge over rivals better than any athlete in the 20th century, earning him the title of “The Greatest.”

#### HOME-COURT ADVANTAGE

Physiological arousal also tampers with an athlete’s performance; too little or too much are both deleterious. And, again, each athlete varies in how much arousal is ideal for peak performance. Russian sports psychologist Yuri Hanin, for example, describes “zones of optimal functioning,” in which athlete A does best when minimally aroused, athlete B performs best at a medium level of arousal, and athlete C responds to a high level of arousal.

AL BELO Allsport/Knoblauch; NEAL PRESTON Corbis (Jackson)

Arousal of an entire team may explain, or debunk, the so-called home-court advantage. We all “know” that competitors have an advantage when playing at home. Teams strive all season to finish with the best record in order to get it. Research shows that on average and in the long run, football and baseball teams do slightly better at their own stadiums than at their competitors’, and basketball and hockey teams do significantly better at home than away (the smaller arenas presumably enhance social facilitation). But the advantage may hold only for regular-season games. The influence seems to wane during preseason and postseason play. For example, a study of World Series contests from 1924 to 1982 showed that in series that went five games or more, the home team won 60 percent of the first two games but only 40 percent of the remaining games. Interestingly, in the 26 series that went to a nail-biting seventh game, the home team came away empty-handed 62 percent of the time.

Since 1983, however, the trend has shifted somewhat. In analyzing the data, I found that between 1983 and 1999 the home team won only 54 percent of the first two games but went on to win 80 percent of the deciding seventh games. Perhaps teams, like individual players, vary in their zones of optimal functioning. It is also possible that in some instances overzealous fans become fanatics (whence the term comes) in the final stretch, driving their teams into such an intense state of unrealistic expectations that it stymies performance. Or helps it.

What the ambiguous outcome of this scientific analysis tells us is that human variation confounds the predictive validity of most sports psychology models. As all evolutionary biologists know—and experimental psychologists tend to forget—variation within a species is the norm, not the exception. And in few species is variation more pronounced in so many variables than in humans. Throw into this mix the complications of social and cultural sports factors, and the models break down.

### THE LIE OF BEING “IN THE GROOVE”

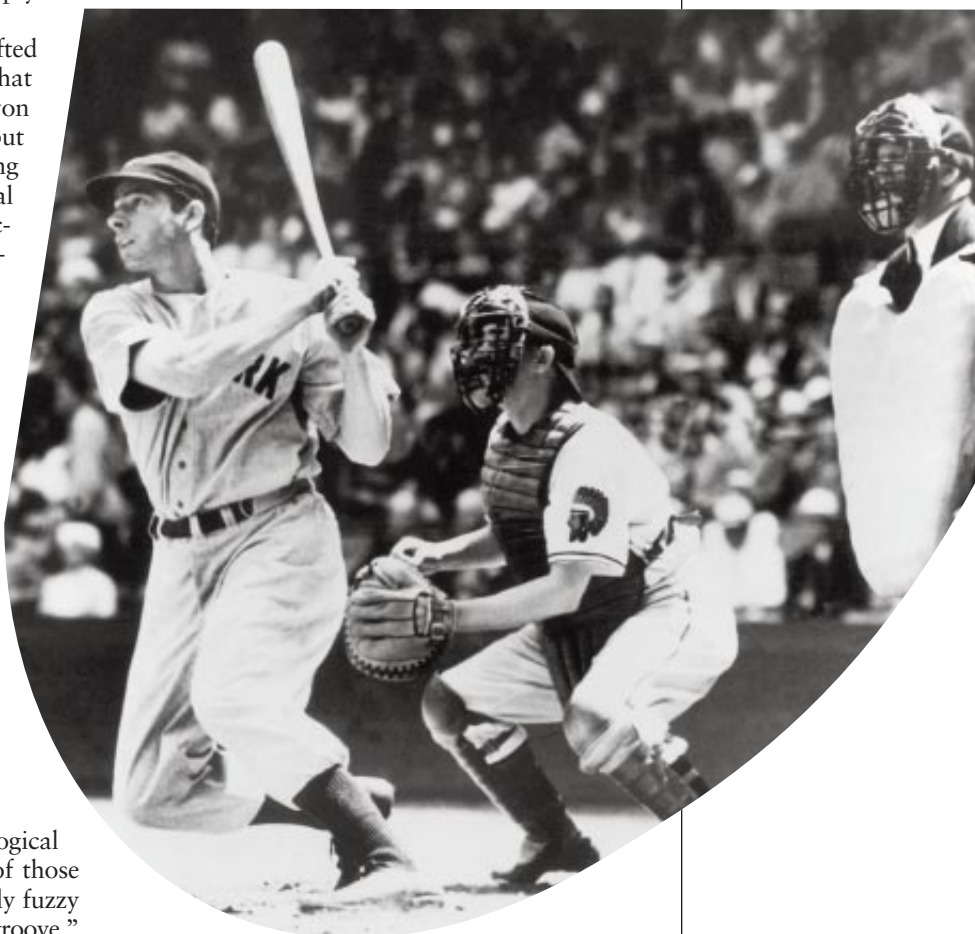
Science has also shed light on the psychological notion of peak performance. It is one of those fuzzy concepts athletes talk about in equally fuzzy expressions, such as being “in sync,” “in the groove,” “in the zone,” “letting go” and “playing in a trance.” Psychologists describe it with such adjectives as “relaxed,” “focused,” “energized,” “absorbed” and “controlled.” But these are just ways to describe some poorly understood connection between mental states and physical performance. Something—we don’t know what—is going on inside the brain and body that allows the athlete, every once in a while, to put it all together. The golf ball drops into the cup instead of skirting the edge. The hit baseball always falls where they ain’t. The basketballs swish

in one after another. When you’re hot, you’re hot.

But maybe not. Streaks in sports can be tested by statisticians who specialize in probabilities. Intuitively we believe that hot streaks are real, and everyone from casino operators to sports bookies counts on us to act on this belief. But in a fascinating 1985 study of “hot hands” in basketball, Stanford University behavioral scientist Amos Tversky and his colleagues analyzed every shot taken by the Philadelphia 76ers for an entire season. They discovered that the probability of a player hitting a second shot did not increase following an initial successful basket beyond what would be expected by chance and the average shooting percentage of the player.

In fact, what they found is so counterintuitive that it is jarring: the number of streaks (successful baskets in sequence) did not exceed the predictions of a statistical coin-flip model. If you conduct a

**HOT BAT:** Few “streaks” actually defy statistical chance, but scientists say Joe DiMaggio’s 56-game hitting streak “should never have happened at all.”



coin-flip experiment and record heads or tails, you will shortly encounter streaks. On average and in the long run, you will flip five heads or tails in a row once in every 32 sequences of five tosses. Because Tversky was dealing with professional basketball players, however, adjustments in the formula were made to account for ability. If a player’s shooting percentage is 60 percent, for example, chance dictates that he will sink six baskets in a row once in every 20 sequences of six shots attempted. When

average shooting percentage was controlled for, Tversky found that there were no shooting sequences beyond what was indicated by chance. Players might feel “hot” or “in flow” when they have games that fall into the high range of chance, but science shows that nothing happens beyond what probability says should happen.

There is one exception to this principle: occasionally, all the human variables can come together in a unique fashion that leads to a performance so rare that it is not matched for decades, or ever. Bob Beamon’s unbelievable long jump of 29 feet, 2.5 inches, at the 1968 Olympic Games in Mexico City, surpassed the old mark by a remarkable 21.75 inches and was not bettered for more than two decades. Even more remarkable was Joe DiMaggio’s 56-game hitting streak. It was a feat so many standard deviations away from the mean that, in the words of physicist Ed Purcell and paleontologist Stephen Jay Gould, who calculated its probability, it “should not have happened at all.” It ranks as perhaps the greatest achievement in modern sports. Individual greatness can defy science and throws a new wrench into the tightly coiled machinery of psychological theory.

#### DOES VISUALIZATION WORK?

**L**ike most social scientists, sports psychologists are much better at understanding behavior than at predicting or controlling it. It is one thing to model all the variables that cause some athletes to triumph and others to flounder. It is harder to predict which athletes will step up to the winner’s podium and virtually impossible to turn Andy Airball into Michael Jordan. Here we enter the murky world of performance enhancement and sports counseling—the art of sports psychology.

One of the most common and effective techniques is imagery training, or visualization, wherein an athlete envisions himself executing the physical sequences of the sport. We have all seen Olympic downhill skiers minutes before their run standing in place with their eyes closed, their bodies gyrating through the course. Gymnasts and ice skaters are also big on visualization. Even cyclists practice it: Lance Arm-

strong attributed his extraordinary 1999 Tour de France victory in part to the fact that he rode every stage of the race ahead of time, so that during the race itself he could imagine what was coming and execute his preplanned attacks. Countless experiments show that groups that receive physical and imagery training on a novel task do better than groups that receive only physical training.

Nevertheless, failures of imagery-trained athletes are legion. We hear about Lance Armstrong but not about all those other cyclists who mentally rode the Tour ahead of time and finished in the middle of the pack. We don’t hear about the visualizing downhill skiers who crash or the imagining gymnasts who flop. Did riding the course ahead of time give Armstrong a psychological edge or just a better race



#### HOW TO AVOID CHOKING

**E**ven Michael Jordan makes mistakes. No matter how good an athlete is, “choking” is inevitable. The difference is that the pros have trained both mentally and physically to reduce its likelihood and to recover from it. Sports psychologists Robin Vealey of Miami University of Ohio and Daniel Gould of the University of North Carolina at Greensboro offer some tips:

**Focus.** Choking often occurs when your thoughts are on the past or the future. Focus on the present, and be conscious of your emotional and physical reactions to a stressful situation.

**Practice.** Practice in stressful situations in order to get used to physical and mental tension. Mental and muscle memory inter-

act, and you can train them together to create conditioned responses to tense circumstances.

**Relax.** Stress makes your mind hurry and your muscles tense up. Use breathing techniques to relax, and consciously loosen tight muscle groups.

**Talk to yourself.** Self-talk can calm, remotivate and remind you of your best technique. Use a “mantra with meaning”—for example, a tennis player can remind herself to have “quick feet” so she is moving and ready. And don’t obsess over a mistake; instead replace a negative mental image of yourself with a positive one to bring you back into the game.

**Know yourself and your environment.** Perceived pressure from teammates, coaches and yourself can cause you to freeze up. Remember: it’s just a game. Pick the challenges and competitions you think you can handle.

—Naomi Lubick



plan? Visualization may be little more than good, utilitarian planning.

Even the most enthusiastic supporters of imagery training caution that numerous variables can interfere with the technique's benefits. University of North Carolina sports psychologists Daniel Gould and Nicole Damarjian caution that "imagery is like any physical skill. It requires systematic practice to develop and refine. Individual athletes will differ in their ability to image. Imagery is not a magical cure for performance woes."

### FLOODED WITH FLAPDOODLE

What Gould and Damarjian seem to be saying is that this stuff works when you work it. But what does that mean? To determine if a psychological technique "works," we might evaluate it by two standards: whether it works for an individual and whether it works for everyone. For the athlete who wins the gold medal, whatever he or she did "worked." It does not matter what scientists think of the techniques that were used, because there was a positive outcome. That satisfies the first criterion.

But will a given technique used by that winning athlete work for all athletes? Here we face a problem that hangs like an albatross around the neck of clinical psychology. There is very little experimental evidence to suggest that it will. I do not go as far as psychiatrist Thomas Szasz in his claim that mental illnesses are all socially constructed. Nor do I accept all of clinical psychologist Tana Dineen's argument

that the "psychology industry" is "manufacturing victims" in order to feed its growing economic juggernaut. But these two extremists have injected a badly needed dose of skepticism into a field flooded with flapdoodle. Both the practitioners and participants in sports psychology would be well advised to step back and ask themselves whether it is good enough if an individual believes a technique helps and, if not, how science can prove it has value.

So did all the psychological exercises I tried "work" for me in the Race Across America? It is impossible to say, because I was a subject pool of one and there were no controls. When I wanted them to work, it seemed like they did, and maybe that's good enough. Yet I cannot help but wonder if a few more hours in the training saddle every day might have made a bigger difference. Sports can be psychological, but they are first and foremost physical. Although body and mind are integrated, I would caution not to put mind above body.

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### FURTHER INFORMATION

SPORT PSYCHOLOGY: FROM THEORY TO PRACTICE. M. H. Anshel. Allyn & Bacon, 1997.

CASE STUDIES IN SPORT PSYCHOLOGY. B. Rotella et al. Jones and Bartlett, 1998.

**AT HOME:** Basketball and hockey teams win more games inside their home arenas than football and baseball teams do on their own turf.