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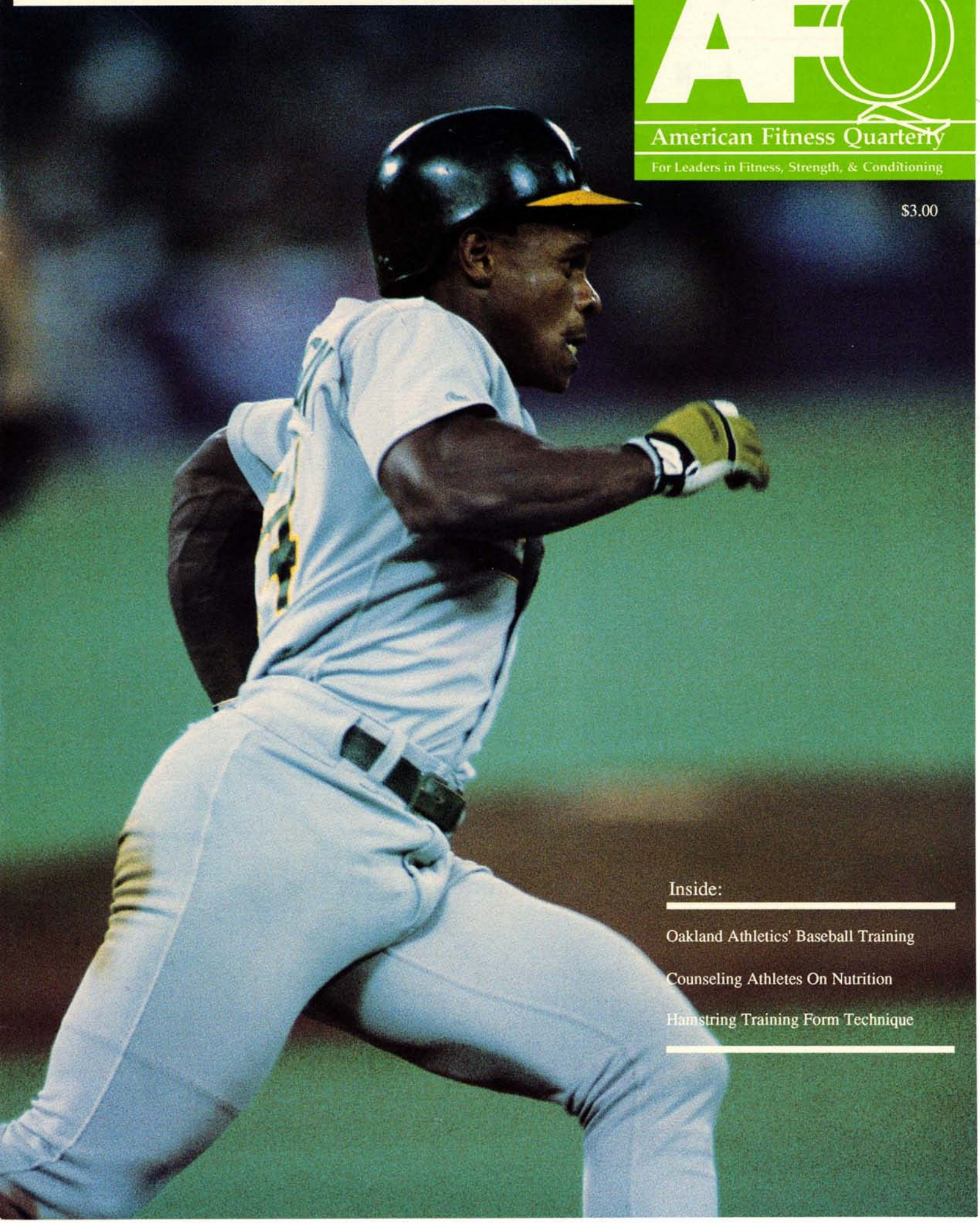

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IMPROVING SPORTS SKILLS

Matt Brzycki

Mr. Brzycki is the Strength Coach at Princeton University.

Some individuals believe that using weighted implements will contribute to the learning of specific motor patterns and sports skills. In fact, some coaches and athletes have taken sports skills and tried to simulate these movements in the weight room using a variety of weighted implements is entirely anecdotal with very little support from the motor learning literature.

The Kinesthetic Aftereffect

Motor learning research refers to a "kinesthetic aftereffect" which is defined by Sage (1977) as a "perceived modification in the shape, size or weight of an object. . . as a result of experience with a previous object." This phenomenon is exemplified by the baseball batter who swings several bats in the on-deck circle so that the bat he eventually uses at the plate will seem lighter. Of course, the bat is not really lighter but it creates a perceptual illusion which makes the batter feel that he can swing faster. In a sense, his neurological pathways are fooled into believing that the bat is lighter.

Coaches and athletes experience these effects during "overload" training. Overload training is when an individual practices a particular motor skill with weighted objets. Barbells, dumbbells, medicine balls and other weighted implements are used during overload training with the expectation of improving performance.

The research indicates that these so-called kinesthetic aftereffects are not accompanied by a measureable improvement in performance in the skills that have been practiced using weighted objects. Essentially, the kinesthetic aftereffect is nothing more than a sensory illusion.

Transfer of Learning

The transfer of learning refers to the effects of past learning upon the acquisition of a new skill. Many coaches and athletes take the transfer of learning for granted. They assume that movements for the execution of one skill always and automatically transfer to the learning of another skill.

The truth of the matter is that the transfer of learning from one skill to another may be positive, negative or absent altogether. *Positive transfer* occurs when the influence of prior learning *facilitates* the learning of a new skill. *Negative transfer* happens when the learning of a new skill *inhibits* the learning of a second skill. *No transfer* occurs if the learning of one skill has a *negligible* influence on the learning of a second skill.

According to motor learning research, if a skill is to be performed at a given speed, it should be practiced at that speed in order to facilitate the learning of the skill. Practicing a skill at a slower or faster speed than it would be used in the actual performance of the skill will cause a momentary negative transfer.

Consider a quarterback who practices his throwing motion with a weighted football. Will his movement pattern with the weighted object be faster, slower or the same as his usual throwing motion? Obviously, it must be *slower*. Therefore, it follows that the use of weighted implements actually *impairs* the learning of sports skills. Watch someone swing a weighted tennis racquet or shoot a weighted basketball and you will quickly notice that the effort used to direct the unfamiliar weight results in a very different movement pattern that is labored and awkward. In fact, it is a *very* different motion altogether.

Yet, many individuals still insist that the use of weighted objects encourages a positive transfer of motor ability to the athletic arena. As an example, I have known several well-meaning athletes who sincerely believed that there was a direct relationship between performing power cleans and rowing a boat. If there were a correlation between weightlifting skills and other sports skills than highly successful weightlifters would excel at literally every sports-related movement that they attempted. So, if eight members of the Bulgarian

National Weightlifting Team were placed in a boat they should easily win every regatta! Naturally, this would not happen. That is because there is absolutely no positive transfer or "carryover" between weightlifting skills and other athletic skills.

The Principle of Specificity

The Principle of Specificity is well-documented in the motor learning literature. Briefly, it states that your activities must be *specific* to a skill in order for maximal improvement to occur. Specific means "exact" or "identical"... NOT "similar" or "just like". So a barbell squat may be "similar" to a vertical jump and a power clean may be "just like" a rowing motion but barbell squats will only help you get better at doing barbell squats and power cleans will only help you get better at doing power cleans. Furthermore, there is NO exercise done in the weight room -- with barbells or machines -- that will expedite the learning of sports skills. In fact, Sage (1977) suggests that "any attempt to improve performance by utilizing objects that are slightly heavier than normal while practicing gross motor skills that will be later used in sports competition seems to be hardly worth the time spent and the money paid for the weighted objects."

Indeed, attempting to duplicate a sports skill with weights or weighted implements is a gigantic step in the wrong direction. Each time an athlete performs a given sports skill, there is a specific neuromuscular pattern involved that is unique to that movement alone. Introducing anything foreign to the "pattern" (such as weighted footballs, weighted vests, ankle weights, barbells, medicine balls, etc.) will only serve to confuse the original neuromuscular pathways -- actually creating a negative transfer and a resultant decrease in performance.

Power cleans have long been touted as specific to an incredibly wide range of skills from the breast stroke to the golf swing to the shot put. It is utterly ridiculous to believe that this one movement could possibly be identical to such a broad group of differing skills. Like any other motor skill, it takes a lot of time and patience to master it's specific neuromuscular pattern. This valuable time and energy could be used more effectively elsewhere -- such as perfecting wrestling techniques or gymnastic skills.

Improving Sports Skills

There are two requirements necessary in order to increase your efficiency at performing sports skill. First of all, you must literally practice the the motor skill for thousands and thousands of task-specific repetitions. Each repetition must be done with perfect technique so that its specific movement pattern becomes firmly ingrained in your "motor memory". Remember, the skill must be practiced *perfectly* and *exactly* as you would use it in competition.

Secondly, you must strengthen the major muscle groups that are used during the performance of that skill. However, it should not be done in a manner that mimics or apes a particular sports skill so as not to confuse or impair the intended movement pattern. A stronger muscle can produce more force; if you can produce more force, you will require less effort and be able to perform the skill more quickly, more accurately and more efficiently. But again, this is provided that you have practiced enough in a correct manner so that you will be more skillful in applying that force. Remember, practice makes perfect . . . but only if you practice perfect.

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