



SHOOTING TWO FROM THE LINE

How does the warm-up decrement affect repeated performances?

Pay close attention to skilled carpenters as they hammer nails. They are remarkably efficient in their actions. Two or three strikes are usually all it takes to pound a long nail into a piece of wood. And, unlike me, skilled carpenters never miss hitting the nail on the head. Or, at least, they seldom do. The famous American psychologist E.L. Thorndike once observed that the only miss he ever observed a carpenter make came on the very first strike after a coffee break. Mere coincidence? Perhaps not.

The game of basketball provides another good example of the same phenomenon. The free throw in basketball represents a situation in which a player must perform a specific shot after a varying length of time since the last attempt. When fouled in the act of shooting, a player is awarded two consecutive foul shots. Is the second shot more likely to be successful than the first? In the mid-1980s, a research team investigated the Boston Celtics' shooting performance over the course of two NBA seasons. One of the many interesting findings of that investigation (see also "The Hot Hand" in chapter 4) concerned the success in shooting two free throws. The researchers found that the Celtics' players were successful on 70.6 percent of the first of the two free throw attempts, but they achieved success on 75.2 percent of the second of two consecutive free throw attempts—a level of success that was almost 5 percent higher than that of the first attempt. Why was there such a difference?

Motor skills researchers have studied a phenomenon that might explain the nail hammering and free throw observations and gave it a very simple and explanatory name: warm-up decrement. The idea is simple: When you take a break from performing a task, there is a temporary loss in the readiness to perform at your maximum potential. This doesn't occur, for example, when you are continually pounding nails because you remain focused and prepared for each action (although mental and physical fatigue may come into effect after long periods of work). But, after a break, there is a temporary loss of the abilities needed for performing at peak mental functioning, such as focus of attention, concentration, motor programming, and a combination of other cognitive factors that support performance. In basketball, a game that is in near-constant flow, the free throw is a unique situation in which the rules dictate that the game stand still momentarily. In stepping up to the free throw line, the player may be warmed up in a physiological sense, but perhaps not in the psychological sense of being maximally prepared to take the first of the two shots.

In his excellent review of the research on warm-up decrement, Jack Adams used the term *set* to refer to the psychological factors that support performance. In his view, warm-up decrement occurs because those psychological factors are not optimized when the athlete begins to initiate performance. In other words, there has been a loss of set.

One of the key goals of research on warm-up decrement has been to examine activities that might reinstate the appropriate set after a period of time has elapsed since the last performance attempt. The research suggests that various factors, each related to the specific nature of the performance, partially alleviate the effects of loss of set. For example, practice swings of a tennis racket, a golf club, or a baseball bat may help to reinstate the motor programming or other cognitive and motor processes that will be involved in performance. Research also suggests that mental imagery and relaxation techniques may be useful in reducing the influences of warm-up decrement.

Watch an NBA player take a free throw shot. Before each shot, the player may do one or more of the following: dribble the ball, take a deep breath, mentally imagine the flight of the ball going through the hoop, or take a practice shot without the ball. The player's preshot routine is highly practiced and repeated almost exactly the same way on each occasion. The exact effect of the preshot routine has been debated for years, but the evidence of it having a positive effect on performance is very strong (see "The Preshot Routine" in chapter 6). The reduction of warm-up decrement very likely accounts for some of this effect.

SELF-DIRECTED LEARNING ACTIVITIES

1. Define the terms *warm-up decrement* and *set* in your own words.
2. Describe three situations in the recent past in which you have personally experienced warm-up decrement.
3. What kinds of activities do you think you could have performed to help you avoid the periods of warm-up decrement you described in question 2?
4. Design a research methodology to specifically examine the occurrence of warm-up decrement in performance, and an experimental treatment that could be undertaken prior to performance to alleviate these detrimental effects.

NOTES

- Namikas (1983) noted that Thorndike's comment might have been one of the first documented observations of warm-up decrement in the literature.

Namikas, G. (1983). Vertical processes and motor performance. In R.A. Magill (Ed.), *Memory and control of action* (pp. 145-165). Amsterdam: Elsevier.

- At the time of the basketball study, there was no three-point line. Therefore, all fouls in the act of shooting were two-shot fouls.

SUGGESTED READINGS

Adams, J.A. (1961). The second facet of forgetting: A review of warm-up decrement. *Psychological Bulletin*, 58, 257-273.

Schmidt, R.A., & Lee, T.D. (2011). Retention and transfer. In *Motor control and learning: A behavioral emphasis* (5th ed., pp. 461-490). Champaign, IL: Human Kinetics.

Schmidt, R.A., & Wrisberg, C.A. (1971). The activity-set hypothesis for warm-up decrement in a movement-speed task. *Journal of Motor Behavior*, 3, 318-325.