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Special Topics: Schema Theory Papers

Motor Schema Theory After 27 Years: Reflections and Implications for a New Theory (pp. 366–375)

Richard A. Schmidt

The schema theory for discrete motor skill learning (Schmidt, 1975), originally published in 1975, has generated considerable interest and received strong challenges over its lifetime. In this paper, I focus on the findings generated since 1975 that bear on the theory and highlight those that produce difficulties for it and will be motivators for differing theoretical viewpoints in the future. At the same time, I examine other lines of evidence that seem to bolster the original lines of thinking. Finally, I provide some suggestions for a much needed new generation of motor learning theory, pointing out particular features from the schema theory that could be included and suggesting gaps and omissions that will need additional data and theorizing in future attempts.

Schema Theory: Critical Review and Implications for the Role of Cognition in a New Theory of Motor Learning (pp. 376–382)

David E. Sherwood and Timothy D. Lee

This paper is based on a symposium celebrating the 26th anniversary of the publication of "A Schema Theory of Discrete Motor Skill Learning" (Schmidt, 1975) held at the annual conference of the North American Society for the Psychology of Sport and Physical Activity in June 2001. We provide a brief historical context for schema theory and a review of the development of the mechanistic approach to motor learning in general. We explore recent findings in mental practice, observational learning, augmented feedback presentation, and the variability of practice that are inconsistent with schema theory and provide a rationale for the importance of cognitive activity in motor learning.

Schema Theory (1975): Retrospectives and Prospectives (pp. 383–388)

Karl M. Newell

A brief commentary is provided on the theoretical assumptions, scholarly impact and continuing influence of the schema theory of motor learning (Schmidt, 1975). The traditional contrasts of schema theory to the coordinative structure or dynamical systems framework are reemphasized, and limitations of the variability of practice experiments noted. A central problem for theories of motor learning is change over time, the basis on which learning is typically defined. Most theories including schema have, however, undervalued the importance of the time-dependent nature of change in deference to the almost exclusive study of the amount of some averaged change in behavioral outcome. The persistent and transitory change(s) in movement and outcome that are observed in action are reflections of multiple time scales of change in a dynamical system.

Epidemiology

Accumulating 10,000 Steps: Does This Meet Current Physical Activity Guidelines? (pp. 389–394)

Guy C. Le Masurier, Cara L. Sidman, and Charles B. Corbin

The purpose of this study was to determine whether taking 10,000 steps in a day is equivalent to meeting the current minimum physical activity guidelines of accumulating at least 30 min of moderate physical activity (MPA). Fifty-nine women ages 20–65 years wore a pedometer and accelerometer concurrently on their right hip for 1 day. There were no differences in the age, body mass index, or the amount of time the pedometers and accelerometers were worn between the 10K+ and the < 10K groups. The 10K+ group accumulated significantly more steps and minutes of MPA than the < 10K group ($M = 13,084$ steps, $SD = 2,603$ vs. $M = 7,518$ steps, $SD = 1,956$; and $M = 62.1$ min, $SD = 27.7$ vs. $M = 38.8$ min, $SD = 18.9$; $p < .05$). A 2×2 chi-square analysis demonstrated no difference between the proportions of 10K and < 10K participants who met the step goal, when all minutes of MPA accumulated throughout the day were considered ($c^2 = 1.8$, $df = 1$, $p = .175$). When only continuous bouts of MPA lasting > 5 min and > 10 min were considered, a significantly greater proportion of 10K participants met the current physical activity guidelines than the < 10K participants ($c^2 = 11.5$, $df = 1$, $p = .001$, and $c^2 = 5.9$, $df = 1$, $p = .015$, respectively). Our findings suggest that individuals who accumulate 10,000 steps/day are more likely to meet the current physical activity guidelines by engaging in the length of bouts promoted by the Centers for Disease Control and Prevention and the American College of Sports Medicine (Pate et al., 1995) and the US Surgeon General (U.S. Department of Health and Human Services, 1996). However, the data also reveal that accumulating 10,000

steps/day does not guarantee meeting the guidelines in the bout lengths documented to confer the health benefits of physical activity.

Motor Control and Learning

Timing of Triggering in Relation to the Cardiac Cycle in Nonelite Rifle Shooters (pp. 395–400)
Niilo Konttinen, Toni Mets, Heikki Lyytinen, and Mika Paananen

This study investigated the timing of the trigger pull in relation to the cardiac cycle during air rifle shooting. Electrocardiogram) was recorded from 20 male nonelite rifle shooters in two separate testing sessions. The testing was conducted at an indoor shooting range using an optoelectronic shooting system. Each participant fired a shot in the standing position at a distance of 10 m from the target. The results showed that compared to random triggering, the shooters fired more often during the phase of 10–50% of the R wave-to-R wave (R-R) interval and less often during the phase of 50–90%. With regard to performance accuracy, the participants exhibited average or above average performance, when the shot occurred in the beginning (0–50%) and in the end (70–99%) of the R-R interval. The less optimal range for the triggering was located within the 50–70% phase of the R-R interval. The length of R-R interval (i.e., heart rate) did not affect the relation of shot placement within the cardiac cycle to the accuracy of shooting performance. The present results extend previous findings by showing that in air rifle shooting the optimum firing time within the cardiac cycle may be located in the systolic phase. It is argued that the systole-diastole dichotomy is not a sufficiently accurate way to investigate the effects of shot placement in the cardiac cycle. Further research is needed to examine the extent to which the relationship between the timing of triggering within the cardiac cycle and shooting performance depends a shooter's skill level.

The Independence of Response Structure and Element Production in Timing Sequences (pp. 401–420)
Charles H. Shea and Jin-Hoon Park

In three experiments, participants were asked to produce a prescribed temporal sequence of key presses. The number of elements in a key press sequence, the movement time of the elements, and uniformity of the timing elements comprising the sequence were manipulated. If the processing of the sequence structure was independent of the processing of elements comprising the sequence, increasing the number of the elements in the sequence should affect the production of the sequence but not the proficiency with which the individual elements are produced. Increasing the movement time of the elements, however, should affect the production of the elements but have little, if any, effect on the integrity of the sequence. The findings indicated that increasing the number of elements negatively affected sequence production when the elements were nonuniform but had little or no effect when elements were uniform. Alternatively, element production was affected by movement time but not number of elements. The results of these experiments appear to confirm the independence of sequence and element production. However, Experiment 3, in which the uniformity of the elements was directly contrasted, found strong evidence for coarticulatory influences in the learning processes, whereby the longer and shorter than average elements in the sequence negatively affected the sequence integrity and the production of the individual elements. When faced with a nonuniform timing pattern, participants appear to elongate or shrink individual elements of a uniform timing pattern to fit the desired sequence requirements. The result is that the longer or shorter than average elements require more practice to produce correctly, tend to regress across retention intervals, and are generally less stable than the elements nearer the average.

Psychology

Influence of Social Goal Orientations and Peers on Unsportsmanlike Play (pp. 421–435)
Cheryl P. Stuntz and Maureen R. Weiss

The present study was designed to examine the influence of personal (i.e., social goal orientations or definitions of success that include interpersonal relationships) and situational (i.e., peer influence) factors on decisions surrounding unsportsmanlike play. Middle school students (ages 11–15 years) completed a measure to assess task, ego, and social goal orientations. Participants also read scenarios about unsportsmanlike actions and responded to questions tapping the intention to perform those actions. A series of hierarchical regression analyses revealed that in certain peer contexts, social goal orientations influenced unsportsmanlike play responses above and beyond the contribution of task and ego goal orientations. Results varied for boys and girls and provide support for including social goal orientations in achievement motivation research in the physical domain.

Arousal, Anxiety, and Performance: A Reexamination of the Inverted-U Hypothesis (pp. 436–444)
Shawn M. Arent and Daniel M. Landers

Moral Issues in Sport: The Child's Perspective (pp. 445–454)
Moira E. Stuart

Sport offers opportunities for children to identify and resolve moral issues. Moral issues in sport have primarily been studied from the researcher's perspective, with the child's perspective relatively ignored. Thus, the purpose of this study was to explore the nature and content of the issues children experienced in sport. Interview participants consisted of 7 boys and 8 girls ranging in age from 10 to 12 years ($M = 11.6$ years, $SD = 1.7$) who had competitive youth sport experience. An inductive content analysis revealed that children identified issues surrounding three overall dimensions concerning fairness of adult's actions, negative game behaviors, and negative team behaviors. Specific examples of issues included unfair actions by coaches, disrespecting opponents, and selfish behavior in practice. The self-identified issues both confirmed and expanded upon the content found in hypothetical moral dilemmas in sport.

Sociology and Cultural Anthropology

Treatment Discrimination Among Assistant Coaches of Women's Teams (pp. 455–466)
George B. Cunningham and Michael Sagas

The purpose of this study was to examine organizational treatment discrimination (i.e., when members of a group receive fewer rewards, opportunities, or resources than they legitimately deserve based on job-related criteria) in the context of women's athletics. Data were collected from 170 assistant coaches of women's teams (i.e., women's basketball, softball, track, volleyball, soccer, and tennis). Results indicate that women's perceived work experiences and outcomes were comparable, and sometimes better, than those of men. We present competing explanations for this finding. First, it is possible that these women were not subjected to treatment discrimination. Alternatively, it is possible that this demonstrates the existence of the "paradox of the contented working woman." Additional analyses indicate that work experiences explained a large portion of the variance in organizational commitment and turnover intentions, thereby demonstrating their importance in the workplace.

Research Notes

Reduced Knowledge of Results Frequency Enhances Error Detection (pp. 467–472)
Lisa Bruechert, Qin Lai, and Charles H. Shea

Situational Indexes of Achievement Motivation, Help-Seeking, and Performance: Influences of the Learning Context and Gender Differences (pp. 473–479)
Christophe Gernigon, Fabienne d'Arripe-Longueville, Véronique Debove, and Aude Puvis

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