Research findings suggest that experience and cognitive strategies contribute to successful performance during perceptual-motor tasks. This article critically reviews selected literature on the effects of information-processing skills, preferred movement time, experience, and task difficulty on performance during coincident timing tasks. Theoretical information and research findings are discussed, and their applications to clinical practice are considered. Clinical recommendations include assessment of coincident timing skills and use of functional activities that provide opportunities to explore and dynamically interact with the environment.

**Key Words:** Cerebral palsy; Pediatrics, development; Perceptual-motor learning; Psychomotor performance.

Physical therapists involved in the rehabilitation of patients with movement dysfunction are becoming more aware of the complexity of movement behaviors and the importance of cognitive aspects of performance during perceptual-motor activities. In my view, assessment of motor skill is inadequate if it does not take into account the nonmotor components of motor behavior. Rather, assessment should encompass the dynamic relationship between the performer’s motor system and the environment within which that system operates. To help produce skilled movement during a wide variety of vocational, daily-living, and sports activities, cognitive strategies are required to direct how the performer will use sensory information, detect and correct errors, and guide motor actions.

Cognitive strategies are based on past experiences and understanding of task requirements. They are related to the resources of the performer’s motor action system, the stage of motor learning, and the environment. The performer needs to learn not only strategies in the form of rules that facilitate successful completion of the activity but also strategies in the form of alternate plans that deal with events requiring instantaneous decisions. Skilled movements require the prediction of events.

Poulton defined three levels of anticipatory behavior that are dependent on prediction. The simplest form, termed *effector anticipation*, requires prediction with respect to the nature and degree of muscular contraction. Effector anticipation is exemplified in tasks involving a rapid aimed movement toward a stationary target, such as hitting a golf ball. Although such tasks are self-paced and the position of the target is known, there is little time for voluntary corrections. Thus, these tasks involve a form of prediction. The second level of behavior, termed *receptor anticipation*, requires prediction of the nature and degree of muscular contraction and the component requirements. Examples include tracking tasks in which the target travels an explicit course, such as stepping onto an escalator or removing an object from a conveyor belt. The third and most complex level of behavior, termed *perceptual anticipation*, requires the performer to synchronize the movement with a target, the position of which must be inferred from previous experience or reasoning. Hitting a ball during a game of racquetball is an example of this type of anticipatory behavior.
Consider movement behaviors within the context of the physical demands as well as the environmental demands placed on the performer. It is critical for us to include evaluation of how the performer copes with varying demands.

The purpose of this article is to present information on the essential role of cognitive strategies during coincident timing tasks. Coincident timing, also referred to as coincidence anticipation (CA), is a form of perceptual-motor skill requiring synchronization of a movement with the arrival of a stimulus at a designated target. Receptor or perceptual anticipation is critical during such tasks. Common clinical activities requiring CA include catching a ball, using an augmented communication device such as a word scanner, and controlling an electric wheelchair. The effects of variables related to subject characteristics and experimental task demands that are documented to affect performance during coincident timing tasks will be critically reviewed.

**Review of Literature**

Coincidence anticipation has been studied in an effort to better define the sequence of skill development and the effects of specific perceptual and motor task demands on performance. The performer's accuracy during a CA task appears to depend, to a large extent, on cognitive strategy. For greater accuracy, initiation of the motor response, termed starting time, must be planned in accordance with the subject's movement time, that is, how long it will take the subject to perform the motor response. Starting time is differentiated from reaction time, in which the performer initiates the movement as soon as possible after onset of the stimulus. Rather, initiation of the movement is postponed so that completion of the movement will be coincident with an environmental event. Identification of the cause of poor performance in a coincident timing task is difficult because of the interdependent relationship among cognitive, perceptual, and motor skills. Figure 1 identifies the general requirements for successful performance.

Test conditions in which the motor component of the task is minimal or the speed of the stimulus is varied generally reflect the performer's perceptual ability to judge the time of the event. For example, during an activity that requires the subject to press a button coincident with the arrival of a stimulus at a target, the critical feature is determination of when the perceptual event will occur. As the stimulus speed is increased, the subject needs to initiate the response earlier after the onset of the trial. Test conditions in which the motor response is of varying duration or complexity generally reflect a performer's ability to match movement time (ie, time from beginning to completion of the motor response) with the test condition. As the performer's movement time is increased as a function of movement length or complexity, the ability of the performer to predict movement time decreases. This skill may be defined as perceptual-motor match. For example, if a subject is required to move an arm crank 180 degrees, the motor response could either be started earlier than when the movement length was shorter, as in the button-press condition, or the speed of the movement could be increased. Matching the movement time with the starting time becomes the critical feature (Tab. 1).

![Figure 1. Diagrammatic representation of general requirements for successful performance during a coincident timing task.](image)

**Table 1. Critical Features During Coincident Timing Tasks**

<table>
<thead>
<tr>
<th>Task Demand</th>
<th>Skill Measured</th>
<th>Critical Feature</th>
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<tbody>
<tr>
<td>Stimulus speed varied or</td>
<td>Perceptual skill</td>
<td>Determination of time of perceptual event</td>
</tr>
<tr>
<td>minimal motor component</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor response varied</td>
<td>Perceptual-motor match skill</td>
<td>Matching of movement time with starting time</td>
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Physical Therapy / Volume 71, Number 3 / March 1991 237 / 69
Accurate eye tracking is thought to be required for accuracy during a coincident timing task. Little information, however, is available regarding the importance of visual processing, as indicated by eye tracking, and its relationship to CA performance accuracy. Haywood divided 60 subjects, ranging in age from 5 to 28 years, into three age groups. They were required to visually track, press a button, or move their arm in response to arrival of a dot at a target displayed on a video monitor. Three stimulus speed conditions were used. Eye tracking error was found to vary as a function of stimulus speed. Smaller error was associated with a slower stimulus speed. Coincidence anticipation performance was least accurate at the slowest stimulus speed, and visual processing measured by eye tracking was not correlated with CA accuracy.

In addition, a larger error in accuracy was not consistently associated with increased movement distance.

Two methodological problems make interpretation of Haywood’s findings problematic. The faster stimulus speeds were so short with respect to viewing time that the subject may have had to initiate the motor response immediately upon recognition of the stimulus. Therefore, at the faster speeds, the task may have actually tested response time, that is, how fast the subject could complete the motor response after onset of the stimulus, rather than CA accuracy. This explanation may account for the poorer performance seen at the slowest stimulus speed, which would have been a score for CA skill. The second problem in this study is related to varying stimulus speeds. Coincidence anticipation accuracy should be measured as distance error, that is, the difference in the distance between where the stimulus is stopped by the subject and the target. In Haywood’s study, CA accuracy was measured as temporal error, that is, the time difference between completion of the motor response by the subject and completion of the task event. A faster stimulus speed takes less time to travel the same distance than does a slower stimulus speed. The size of the error, therefore, is dependent on the speed of the stimulus. When the stimulus speed is varied, temporal error biases results and precludes large errors when the stimulus is moving faster.

Information-processing experts believe that, with maturation, there is an increase in the capacity to process information and to process it more rapidly and with greater efficiency. Children are thought to have more decision-making requirements during a task than adults, because adults rule out actions as a result of experience.

Shea et al. suggest that adults perform better than children during a CA task because of the rate at which they can monitor and process perceptual information. As stimulus velocity increases, the time available for information-processing activity decreases. Therefore, Shea and colleagues hypothesized that, if a stimulus velocity is sufficiently slow, performance across age groups will be similar. To test this hypothesis, subjects aged 5, 9, and 18 years were requested to move their arms horizontally so that they displaced a barrier coincident with the illumination of the last light on a runway of lamps that lit sequentially. Each experimental trial was started by the subject initiating an arm movement. Dependent on the stimulus speed, subjects were required to adjust their arm movements during the trial. Six stimulus speeds were used. Accuracy was measured as temporal error.

The 9- and 18-year-old subjects in the study by Shea et al. demonstrated decreased CA accuracy as the stimulus speed increased. The 5-year-old subjects, however, demonstrated a U-shaped performance curve, with poorer performance at both high and low stimulus velocities (Fig. 2). In addition, photocell recordings of subjects’ arm movements toward the barrier past five equally distanced segments revealed that the 18-year-olds were able to make adjustments to each of the stimulus velocities by the time they passed the third segment (ie, about 250 milliseconds). The 9-year-old subjects were reported to be able to make adjustments by the fourth segment (ie, 310 milliseconds) at the four slower stimulus speeds.
and the 5-year-old subjects were reported to start to make adjustments by the fifth segment (ie, 460 milliseconds) at the slowest stimulus velocity only. In addition, many of the younger children commented that they were frustrated by their inability to speed up or slow down during the trial. The youngest subjects may have lacked the time to translate knowledge of the stimulus velocity into the necessary motor output because of their longer visual processing times and their inability to discriminate stimulus information. The major hypothesis that sufficiently slow stimulus velocities would equalize performance across age groups, however, was not supported.

**Preferred Movement Speed**

Williams criticized the information-processing theory of Shea et al, because either extreme of stimulus speed (ie, fast or slow) resulted in poorer performance in younger children. In a replication of Shea and colleagues' study, Williams found a U-shaped performance curve across the six stimulus speeds. Because Williams argued that poorer performance was due to the fact that there was little variation in arm movement speeds for the younger children in the study, she added stimulus speeds matched to individual preferred movement times. The ability to modify arm movements dependent on the stimulus speed was found to be age-related. Children who performed accurately only when the stimulus was at their preferred movement time, however, also demonstrated more corrections under the fastest stimulus speed than under the slower stimulus speeds. Thus, the hypothesis that younger children's responses were stereotyped was only partially supported.

**Experience**

In an attempt to explain the U-shaped performance curves seen in previous studies, Wade hypothesized that information or cues in the environment directly specify timing details for motor tasks but that this information must be considered in direct relation to aspects of the performer. Because a performer's actions and perceptions are body scaled, the performer must be viewed within his or her own environmental context. Wade suggested that a child's interaction with the environment, as a function of time spent in that environment, leads to a limited set of perceptions about objects moving in that environment. He hypothesized that stimulus speeds outside of the child's everyday experiences would cause problems in performance.

In the first of two studies, Wade investigated the difference in performance between educably mentally retarded and "normal" (ie, nonretarded) children. By rolling an aluminum "doughnut," subjects were required to strike a target moving right to left on a conveyor belt. Three stimulus speed conditions were used. Accuracy was measured as distance error, because Wade recognized the biasing effect of using temporal error when varied stimulus speeds are used. No significant differences were found between the groups. The youngest children, however, irrespective of IQ level, demonstrated poorer proficiency at the slowest speed. A U-shaped performance curve was not consistently seen. Wade proposed that poor performance at the slow stimulus speed may have been related to the younger children's poor attentional skills during the time between stimulus onset and the event. He described a superior strategy that was demonstrated by adults and older children. They paid little attention to the target early in a trial and made judgments as the target neared the coincidence point.

In a follow-up study of nine normal children and seven stimulus speed conditions, Wade identified the elements of a U-shaped performance curve. That is, poorer performance was observed at either extreme of stimulus speed range. Wade proposed that, although he did not find a strong, uniform U-shaped performance curve at the slower velocities, the data supported a view that timing is the result of a compatibility between the performer's motor action system and the environment. This view is also supported by the findings reported by Williams.

Forsstrom and von Hofsten investigated postural coordination, timing, and aiming strategies in two subject groups—children with minimal brain damage (MBD) and children without MBD. The children in both groups were matched for age, sex, and handedness. The task required reaching for a ball attached to a rod under three stimulus speed conditions. Forsstrom and von Hofsten reported that the children with MBD had more misses and exhibited less efficient reaching patterns than the children without MBD. The children with MBD, however, appeared to compensate for their less efficient reaching by aiming further ahead of the target. This cognitive strategy gave the children with MBD a longer approach time to compensate for their coordination deficit. The authors described the children with MBD as well attuned to the perception and action relationship; that is, they took their less efficient reaching pattern into account when initiating the movement.

**Movement Extent**

Schmidt investigated the hypothesis that increases in the extent of movements reduce accuracy during CA tasks. Subjects were 160 male college students. The task required the subjects to intercept a target by horizontally moving a slide with their arms. Variations in movement time were accomplished by lengthening the distance the subject's arm had to travel and by adding a load to the slide. Temporal errors were significantly reduced with shorter movement distances. Size and direction of errors were reported to vary with starting time. With regard to cognitive strategies, low correlations were reported between temporal errors and movement times, in contrast to moderate correlations between temporal errors and starting times and between starting times and movement times.
jcts with the most accurate performance appeared to use a cognitive strategy in which movement time was kept constant and starting time was varied in relation to the movement extent.

**Movement Complexity**

Bard and colleagues suggested that differences in task complexity may explain some of the conflicting findings among studies on CA performance. To test this hypothesis, the authors investigated two levels of response demand, a simple response requiring a button press and a complex response requiring throwing a ball at a target coincident with the arrival of a light stimulus. The complexity of the motor response significantly affected absolute temporal error in subjects 6 through 11 years of age. This finding supported the authors' hypothesis. In a subsequent study, the method was replicated with subjects across a wider age range. A total of 186 subjects were divided into six age groups, 9 to 11, 11 to 14, 14 to 18, 18 to 30, 30 to 41, and 41 to 52 years of age. The 9- to 11-year-old age group demonstrated significantly greater absolute temporal error than any of the other age groups, and complexity of the task significantly increased all subjects' absolute temporal error. Subjects were also tested under three stimulus velocities, and a significant interaction was found between complexity of motor response and stimulus velocity. Under the complex motor response condition, a U-shaped performance curve was seen, with greater absolute temporal error at the two extremes of velocity.

In conclusion, researchers agree that CA performance improves with increasing age from early childhood to adulthood in nonhandicapped populations. Linear patterns of improvement in performance, however, have not consistently been reported. Researchers also have not investigated whether these changes are due to maturation or experience. It has been suggested that improved performance is related to better information-processing skills, experience, and cognitive strategies. In addition, performance during coincident timing tasks has been shown to be affected by task demands. Findings among studies, at times, have been conflicting. In several studies, young children have exhibited the greatest difficulty with the slowest stimulus speed, whereas other studies have reported poorer performance at the fastest stimulus speed. Moreover, U-shaped performance curves, with poorer performance at either extreme of stimulus speed, have also been reported in a number of studies. Additionally, motor response demands appear to influence performance. For the most part, increases in extent or complexity of movements have been associated with poorer performance. The effects of these variables may reflect the ability of the performer to time a movement and to match sensory and motor aspects of the task.

**Recent Research on Children with Cerebral Palsy**

Often, children with cerebral palsy, in addition to their primary motor problem, have perceptual and perceptual-motor deficits. These deficits do not appear to be correlated to the severity of the motor impairment. It has been hypothesized that perceptual-motor dysfunction is, in part, the result of a lack of perceptual-motor experiences that aid in the development of cognitive strategies. Perceptual-motor match skill may have difficulty performing CA tasks, beyond that attributable to mere slowness or constrained movements, because of inefficient cognitive strategies. In addition, deficits related to perceptual skills (eg, detection of movement, knowledge of velocity) and to motor skills (eg, speed) need to be discerned from perceptual-motor match skills.

To examine these issues, Goodgold-Edwards and Gianutsos studied 20 children with SCP and 20 nonhandicapped children. The children were matched for age and sex and then categorized as either young (ie, 7-9 years of age) or old (ie, 10-12 years of age). Subjects with SCP were required to have a diagnosis of spastic diplegia with moderate involvement, to have sufficient range of motion and sitting balance to perform the experimental tasks, and to be within normal limits in intelligence.

The task in Goodgold-Edwards and Gianutsos's study was in the form of a computer game. Under six test conditions, subjects were required to stop a downward-moving cage when it was exactly over a stationary cartoon character shaped as an elephant on a stand (Fig. 3). Visual perception was identified and partially isolated by varying the stimulus speed (2.5-, 5-, and 10-second viewing times). The specific stimulus speeds were chosen to allow comparison with previous studies and to ensure that the task actually measured CA performance rather than response time. (See the problem noted previously with respect to the study conducted by Haywood.) Perceptual-motor match skill was identified and partially isolated by varying the extent of the motor response (ie, button press, arm crank). As recommended by Wade, distance, rather than temporal error, was used to avoid bias attributable to the stimulus speed. Both absolute error, a measure of total accuracy, and constant error, a measure of direction bias, were calculated. In addition, under the crank conditions, movement time was recorded in milliseconds so that the motor component of the task could be partially isolated and examined. Starting time, that is, when movement of the crank was initiated, was also recorded to help elucidate cognitive strategy.

Although all of the subjects in Goodgold-Edwards and Gianutsos's study were significantly less accurate in the arm-crank condition than in the button-press condition, there was greater deterioration in performance for the SCP group than for the nonhandicapped group. There was also greater deterioration for the SCP group than for the nonhandicapped group as the stimulus speed in-
increased. Additionally, the combination of increased extent of movement and increased stimulus speed further exaggerated performance differences between the groups. Functionally, these findings do not mean that the SCP group was merely less accurate under the six conditions than the nonhandicapped group, but rather that increases in task demands caused greater difficulty for the SCP group than for the nonhandicapped group.

The correlation between movement time and accuracy in Goodgold-Edwards and Gianutsos's study was not significant for either the SCP group or the nonhandicapped group. The motor deficit of the children with SCP, therefore, was not sufficient to explain the differences between the two groups. Second, the correlation between movement time and starting time was much stronger for the nonhandicapped children than for the children with SCP. Although a causative relationship may not be assumed, these findings support the assumption that the nonhandicapped children were better able to match their movement times with initiation of the motor responses. In contrast to Forssstrom and von Hofsten's findings that children with MBD were attuned to the perceptual-action relationship, the children with SCP in this study appeared to have a problem matching their movement with the environmental demands. These findings suggest that the two groups used different cognitive strategies and that the children with SCP may have ineffective timing strategies that contribute to difficulty in perceptual-motor tasks.

Younger children within the SCP and nonhandicapped groups in the study by Goodgold-Edwards and Gianutsos exhibited slightly faster, although not significantly different, mean movement time scores than did the older children. Although a faster movement time may allow the child more time to view the stimulus, because he or she can start the movement later, additional viewing time does not necessarily result in more accurate performance. The mean scores of the older children within groups were more accurate under the six CA conditions than were those of the younger children. This finding suggests that the older children within groups were better able than the younger children to anticipate or predict the event, and the finding provides evidence for the importance of experience in the development of CA skill. Experience, rather than maturation, appears to be the critical factor because younger nonhandicapped children exhibited consistently more accurate mean scores than did older children with SCP.

Wade believes that a child's limited interaction with the environment, as a function of age, is a major factor leading to a limited set of perceptual skills regarding objects and movements. The findings by Goodgold-Edwards and Gianutsos support the observation that perceptual skill limitations may be exaggerated in a child with SCP, who secondary to motor disability has suffered a paucity of sensorimotor experiences. Thus, a child with SCP may demonstrate a problem in perceptual-motor match.

Clinical Implications

It is not uncommon to observe a child with SCP appear to ambulate independently and competently in the “protected” physical therapy setting, free of barriers and obstacles. On leaving this environment, however, the child may suddenly “freeze” and appear to be unfamiliar with everyday architectural features or occurrences, such as where to stand when opening the door or how to time a movement to avoid colliding with a moving obstacle. Kiss proposed that the child with SCP who cannot make appropriate responses to the environment may lack the sensorimotor experiences with which to organize complex adaptive motor behaviors.

Exposure, experience, and practice are associated with improvements in performance, but what are the optimal conditions? Caretakers, both family and professional, often organize a
We should also reexamine the use of "error-free" therapy, that is, therapy in which quality of movement is emphasized and only actions that can be performed "normally" are permitted. Although the importance of quality of movement is not being disputed, practice under conditions of trial and error have been found to be superior with regard to transfer of skill.22 Once a strategy is learned, it can be used in a wide range of related contextual situations.22,23

Singer22 listed a number of cognitive strategies that the nonhandicapped performer accomplishes early in motor learning. These strategies may be extremely beneficial for the child with SCP and can be incorporated into therapeutic programs. Two of these strategies are commonly used by therapists: (1) helping the child understand the task goal and perceive the nature of the activity and (2) helping the child maintain an ideal state of arousal and motivation. The clinician, however, may want to expand the repertoire of strategies by (1) helping the child recall related behaviors and similarities between characteristics of the task at hand and those of previous experience; (2) identifying the most relevant cues and selecting attention to a minimum of appropriate cues; (3) rehearsing mentally prior to, during, and after the trial; (4) facilitating ongoing self-evaluation of performance and adjustment of performance, which requires attribution of the performance outcome to the appropriate reason; and (5) facilitating adaptation to stress. Examples of how a therapist can facilitate perceptual-motor learning are provided in Table 2.

Psychomotor taxonomies have been designed in an attempt to classify movement behaviors that have similar elements. The use of such classifications may aid the therapist in choosing appropriate therapeutic activities. Recognizing that the performer moves in relation to the environmental surround, Gentle24 extended earlier taxonomies that identified motor-related abilities and incorporated environmental conditions and the movement of the performer's limbs through space. Singer and Gerson25 further extended this concept and developed a task classification scheme that categorized motor skills in regard to the demands placed on the performer, specifically, whether the task was externally paced or self-paced in relation to the use of feedback. To this scheme, they matched cognitions and strategies that enhanced skill acquisition and performance. Specific cognitive processes were identified during three sequential stages associated with input, central processing, and output demands. For example, cognitive strategies associated with the use of incoming sensory information included readiness and orienting to appropriate sensory cues, anticipation and expectation of upcoming events, focus on and selective attention to the most relevant cues and the upcoming required movement, and recognition of the most relevant cues and allocation of attention to different cues at appropriate times.

Clinicians may not be able to decrease a child's response time sufficiently because of the severity of the motor impairment. Training on coincident timing tasks, using cognitive strategies, therefore may improve the child's ability to respond to environmental demands and to compensate for the motor deficit. Improved CA would allow the child to start the response earlier, thereby compensating for a longer response time. In addition, the results reported supporting the influence of motor response and stimulus speed demands on CA performance may be helpful in guiding

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**Table 2. Examples of Strategies for Promoting Perceptual-Motor Learning During Training with an Electric Wheelchair**

<table>
<thead>
<tr>
<th>Training Strategy</th>
<th>Example</th>
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<tbody>
<tr>
<td>Compare characteristics of task with those previously learned</td>
<td>To teach concept of timing required to turn into doorway, compare need to push control device before letter lights up on word scanner with need to turn wheelchair control before getting to desired location</td>
</tr>
<tr>
<td>Identify most important cues</td>
<td>Direct attention to point where patient's knees line up with beginning of door opening</td>
</tr>
<tr>
<td>Promote mental rehearsal</td>
<td>Encourage patient to state aloud when he or she would initiate the motor action</td>
</tr>
<tr>
<td>Promote self-evaluation of performance</td>
<td>After each attempt, encourage patient to judge whether the motor response was timed accurately, too early, or too late; if too late, direct attention to point further ahead (ie, patient's feet lined up with door opening)</td>
</tr>
<tr>
<td>Promote adaptation to stress</td>
<td>Increase number of other people using corridor and passing through doorway</td>
</tr>
</tbody>
</table>
the therapist in choosing and establishing, for example, sensitivity of a control for an electric wheelchair. Smooth control in starting, stopping, and changing direction requires taking one's response time into consideration when initiating the command movement. Because stimulus speed has been identified as influencing accuracy in the classroom setting, it is important to ascertain and structure the optimal stimulus speed of a word scanner. A stimulus speed that is too fast may over-awhore the child. In contrast, a speed that is too slow may cause the child to be more prone to distractions in the room or to stop his or her initial response and then be too late.

**Suggestions for Future Research**

There remains a dearth of research on the role of cognitive strategies during perceptual-motor tasks. Although several studies have identified changes in performance outcome as a function of age, developmental changes in cognitive strategy and differences between nonhandicapped and developmentally disabled children need further clarification. We need to describe how strategies change with maturation and experience in order to assess our patients and to facilitate progress to the next stage.

Specific strategies associated with superior performance during coincident timing tasks also need to be identified. We need to better understand the relationship among accuracy, movement time, and starting time. Observational descriptions of subject behaviors need to be analyzed in light of subject reports of cognitive strategies. These analyses may further elucidate how children use sensory information as well as identify the most relevant cues in the environment. Attentional abilities in terms of temporal aspects, that is, when the performer attends to specific stimuli and how task conditions may affect attention, need to be more richly described.

In addition, the effect of teaching cognitive strategies and the identification of optimal conditions for learning perceptual-motor tasks needs to be examined through intervention studies. We also need to examine whether improved cognitive strategies as the result of intervention in the experimental situation can be carried over to real-life situations.

**Summary**

This article presented information on the role of cognitive strategies in the development of motor competence. Research studies on the effects of information-processing skills, preferred movement time, and experience as well as the effects of stimulus speed and motor response during coincident timing tasks were critically analyzed with regard to methodological approaches and meaningfulness of the findings. It was hypothesized that children with developmental disabilities may lack sufficient movement experiences to develop the ability to cope with environmental demands and that ineffective cognitive strategies may contribute to difficulty during functional tasks requiring coincident timing. Motor learning is thought to be enhanced by the use of context-condition situations, and it may be beneficial for therapists to include coincident timing activities and functional environments in their therapeutic regimens.

**References**