

## ABOUT SPORTS PROGRESSIONS

Peter Bristotte - August 8, 2020

Sports Sciences have already shown that it is paramount for sports organizations, coaches, school programs and teachers to consider concepts related to human growth and maturation, as well the dense theories of motor development, when a young athlete starts their journey in the world of oriented physical activity and sports. Learning a sport, especially during childhood and adolescence involves many phases and stages related to biological growth and cognitive development, that influence how one will learn a movement or a skill, when they will learn it better, and how a supposed expected increase in terms of performance should look like.

Science has already shown the progression of the motor development, in which the Reflexive Movement Phase (sub-cortically controlled, from 0-4 months) is the base for the subsequent Rudimentary Movement Phase (0-2 years, with a big development of basic stability skills and some locomotion and manipulation skills), followed by a Fundamental Movement Phase (2-8 years of age), where the fundamental motor skills will be developed - an these will form the base *per se* for the sport specific motor skills, and finally the Specialized Movement Phase (from around 10 years of age - in a transitory stage, to an application stage - 12-13 years of age, to a lifelong utilization stage - from 14 years of age).

Several sports base their specialized motor skills (fundamentals) in the fundamental motor skills or a combination of them. A refinement of the fundamentals, so much required for the higher levels of play at any sport will be based on a great background of the fundamental motor skills: rolling, jumping, hopping, leaping, galloping, sliding, dodging, skipping, swimming, static balance, dynamic balance, reaching, grasping, throwing, catching, kicking, trapping, dribbling, striking, etc. Furthermore, multiple fundamentals from many sports share a same rudimentary movement pattern and for that reason, by experiencing several sports and mastering the fundamental motor skills and the greatest variety of possible combinations of them before 10-12 years of age will increase immensely one's chances to succeed in a chosen sport.

In terms of motor development, a young athlete playing a determined sport will be seen at first as a multitude of differently connected fundamental motor skills that, with time, will turn from uncoordinated to coordinated, into a fluid specialized motor skill, particular of that sport, but that will probably share its basic dynamic with other sports.

Another important point of view concerns one's cognitive development. The well know Scammon's curves of systemic growth shows that the human biological growth - considering the growth of different body systems - ends somewhere between ages 18 to 20. This means that one's lymphoid system, neural system, genital system and generally the entire being will be fully grown by that age. By looking at the "general growth line" it is easy to understand that from age 12 on there is a rapid increase in the systems of the body - including the musculoskeletal system, due to the growth spurt - and when this is put together with the neural growth - that grows

rapidly from birth to around age 12 - it reasonably explains the phases of motor development. The human body then, learns the movements in phases when it is growing and developing.

However what the Scammon's curve from 1923 doesn't show is that even though the neural system is almost fully grown by age 12, it is not fully developed. The curve cognition development in humans is not the same as the curve of cellular/tissue growth, that is, even though the brain reaches its full mass growth around the beginning of the growth spurt, one's cognitive development is not.

The human cognitive development is a much slower process. The majority of the theories that explain such development considers it in phases or stages. One of the most widely known perspectives about cognitive development is the cognitive stage theory of a Swiss psychologist named Jean Piaget (other great experts in the area are Gessel, Erikson and Spock, who also have a great work on emotional development). Piaget is considered among the experts in the area as an interactionist, that is, his theory is that intellectual development results from an active, dynamic interplay between a child and her environment, and this fits perfectly the universe of learning sports.

For Piaget, there are four stages of human cognitive development:

1. **Sensorimotor.** In the sensorimotor stage (birth to approximately 2 years), the infant is transformed from a creature who responds mostly with reflexes to one who can organize sensorimotor activity in response to the environment - to reach for a toy, for example, or to pull back from a frightening stranger. A baby gradually becomes more organized, and his activities become less random. Through each encounter with the environment, the infant progresses from a reflex stage to trial-and-error learning and simple problem solving.
2. **Preoperational.** In the preoperational stage (approximately 2 to 7 years), a child's thinking, by adult standards, is illogical and focused entirely on themselves. Children begin to use symbols to represent objects, places, and people. Symbols - images that represent some object or person - are sight, sound, or touch sensations evoked internally. In play, children in this stage act out their views of the world, using a system of symbols to represent what they see in their environment.
3. **Concrete operational.** By the concrete operational stage (around 7 to 11 years), children begin to gain the ability to think logically and to understand concepts they use in dealing with the immediate environment.
4. **Formal operational.** One has arrived at the formal operational stage (12 years and older) when one starts thinking in abstract terms as well as concrete ones. Adolescents, for example, can discuss theoretical issues as well as real ones.

The formal operational stage, that starts around 12 years of age and lasts for a lifetime, includes the cognitive development of abstract and theoretical issues and this cognitive ability can be divided into specific cognitive domains: attention, memory, language, visuospatial abilities, and executive functioning/reasoning.

What happens in school is a great example of a progressive cognitive demand process. Schools across the whole world base their curriculum in learning progressions. Learning progressions refer to the purposeful sequencing of teaching and learning expectations across multiple developmental stages, ages, or grade levels. There are two main characteristics of learning progressions: (1) the standards described at each level are intended to address the specific learning needs and abilities of students at a particular stage of their intellectual, emotional, social, and physical development, and (2) the standards reflect clearly articulated sequences - i.e., the learning expectations for each grade level build upon previous expectations while preparing students for more challenging concepts and more sophisticated coursework at the next level. The basic idea is to make sure that students are learning age-appropriate material (knowledge and skills that are neither too advanced nor too rudimentary), and that teachers are sequencing learning effectively and avoiding the inadvertent repetition of material that was taught in earlier grades.

The learning progressions have been basing the content progression in schools, where young athletes invest a considerable part of their days. The question is: why would it be different in the world of sports? Why not to present a purposeful sequencing of teaching and learning expectations across multiple developmental stages and ages in sports?

The purpose of this article is to reason with the sports community so that sports curriculums consider a progression of contents:

1. **Fundamentals (technique)** are to have a progressive sequence that considers increasing levels of complexity both in understanding and execution: simple and basic techniques are taught, trained, played and incorporated in the athletic repertoire first, followed by progressively advanced and complex techniques
2. **Strategy/Tactics topics** (plays, offensive and defensive systems) are to start simple and easy to be understood, trained and executed in a competitive environment, followed by progressively more complex strategies/tactics.

In “volleyball terms” (here I do not have the intention to explain why a 5x1 system with completely specialized functions is more complex than a 6x6 or 6x0 system with no specialized functions), to require a young athlete to practice and to compete what is expected for adults, is like to ask a 5th/6th grader to eloquently solve calculus problems (derivatives and integrals) when they are just mastering basic mathematical operations with natural numbers.

On the courts and fields out there (as well as platforms, pools, etc.), athletes are to learn and to play the sport under a rigorously planned progression, that considers their current level of development (physical, cognitive, social, affective and emotional) not only in practice, but in competition, not through some weeks or months, but through many years.

Let's go, you and me, let's help a whole new generation of smart, well rounded and expert athletes to rise, with time and patience, with study and effort, based on Science!