



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

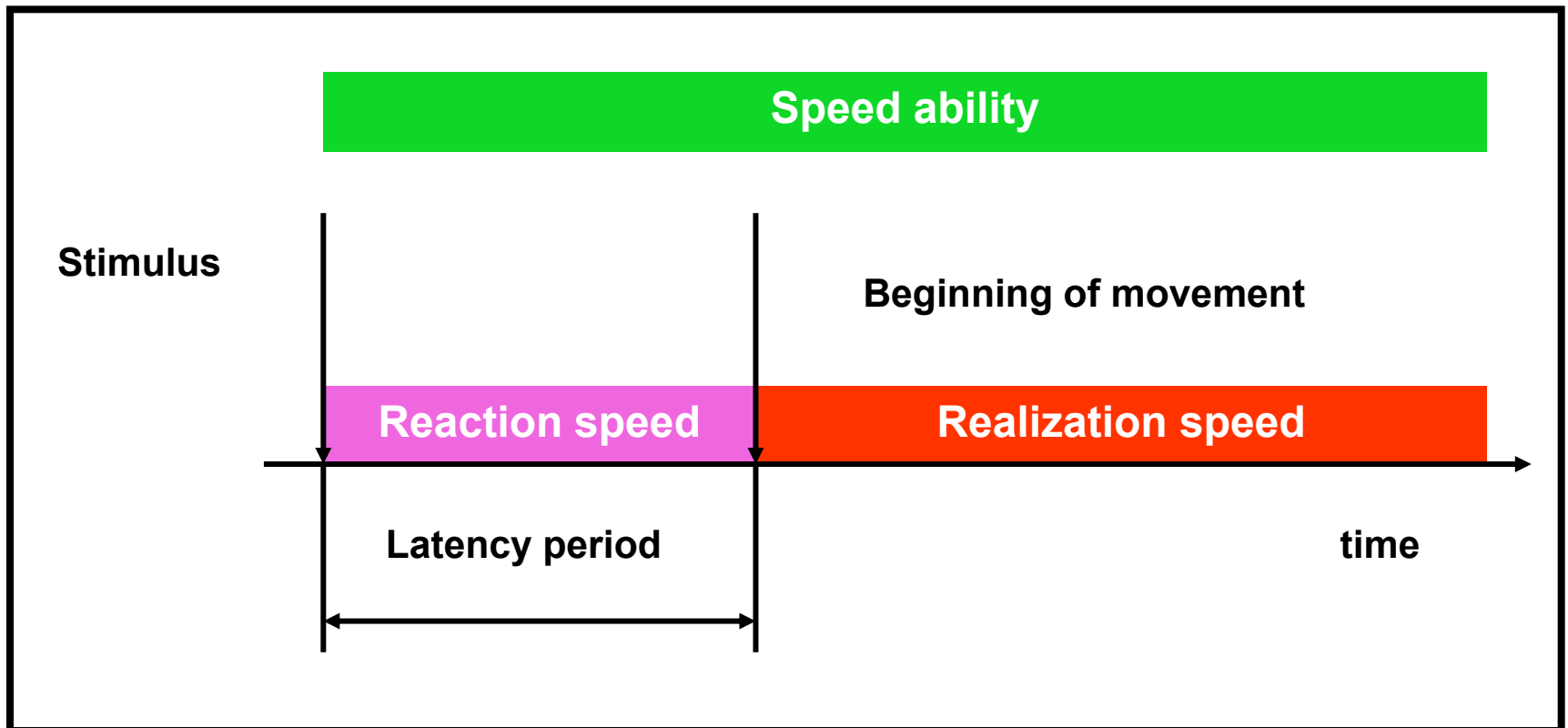
# SPEED DEVELOPMENT

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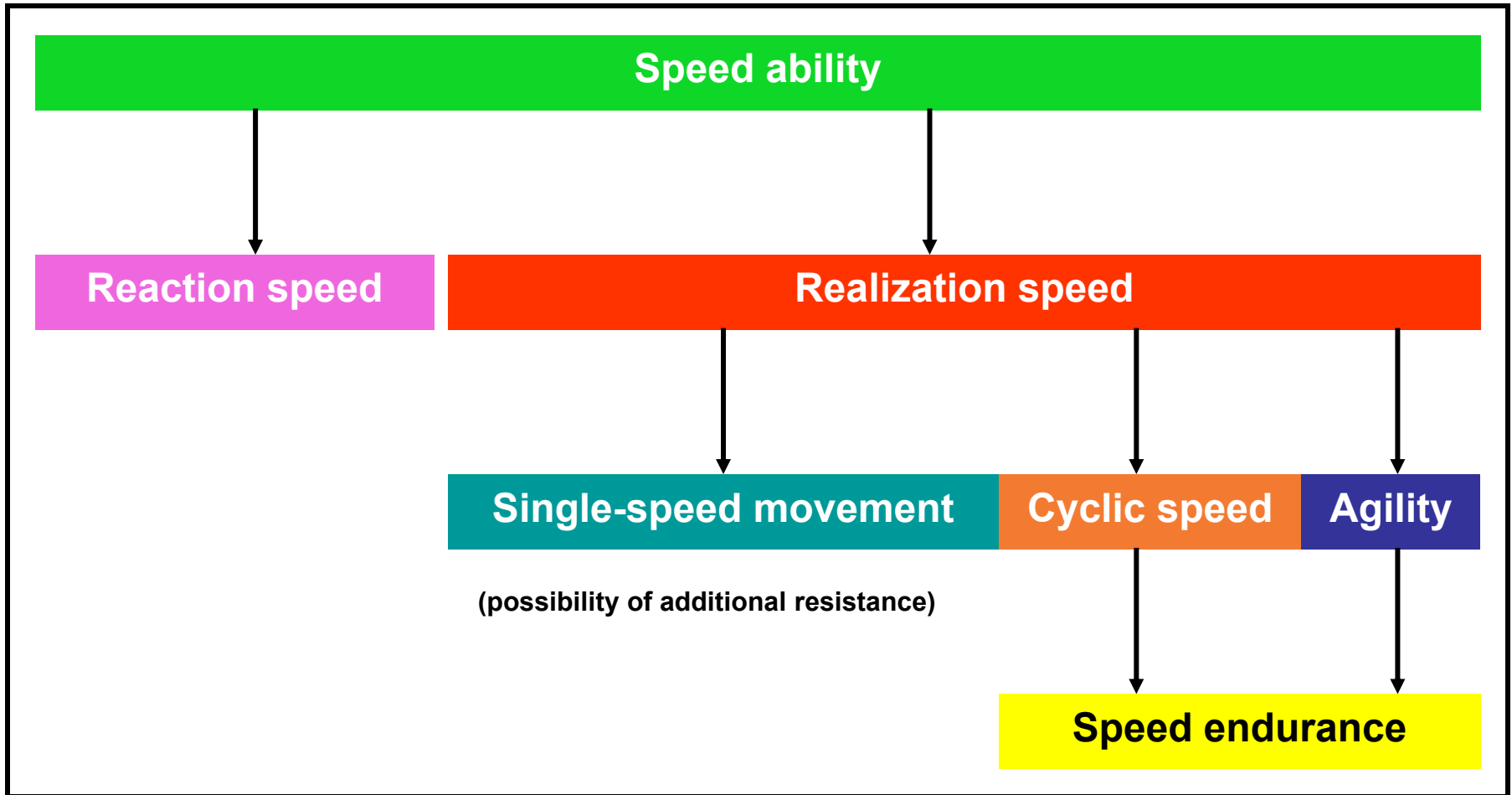
Projekt: Zvyšování jazykových kompetencí pracovníků FSpS MU a inovace výuky v oblasti kinantropologie, reg.č.: CZ.1.07/2.2.00/15.0199

**Speed** can generally be defined as an ability to reach high speed and frequency of cyclic, single-speed (acyclic) or combined movement through muscle contraction.

### Basic areas of speed abilities



# Significant areas of the complex of speed abilities



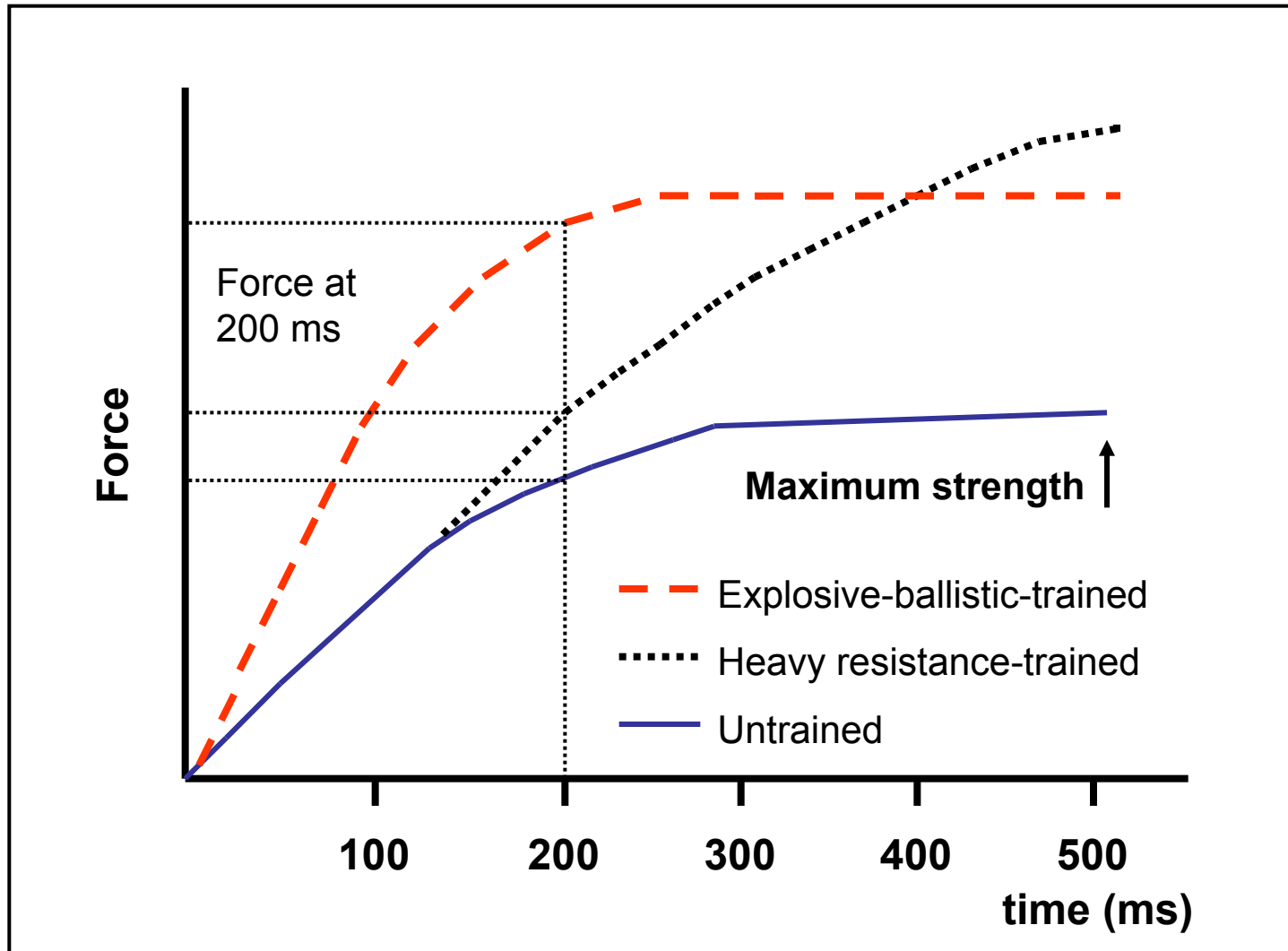
Development of speed is closely related to strength development

**Strength impulse**

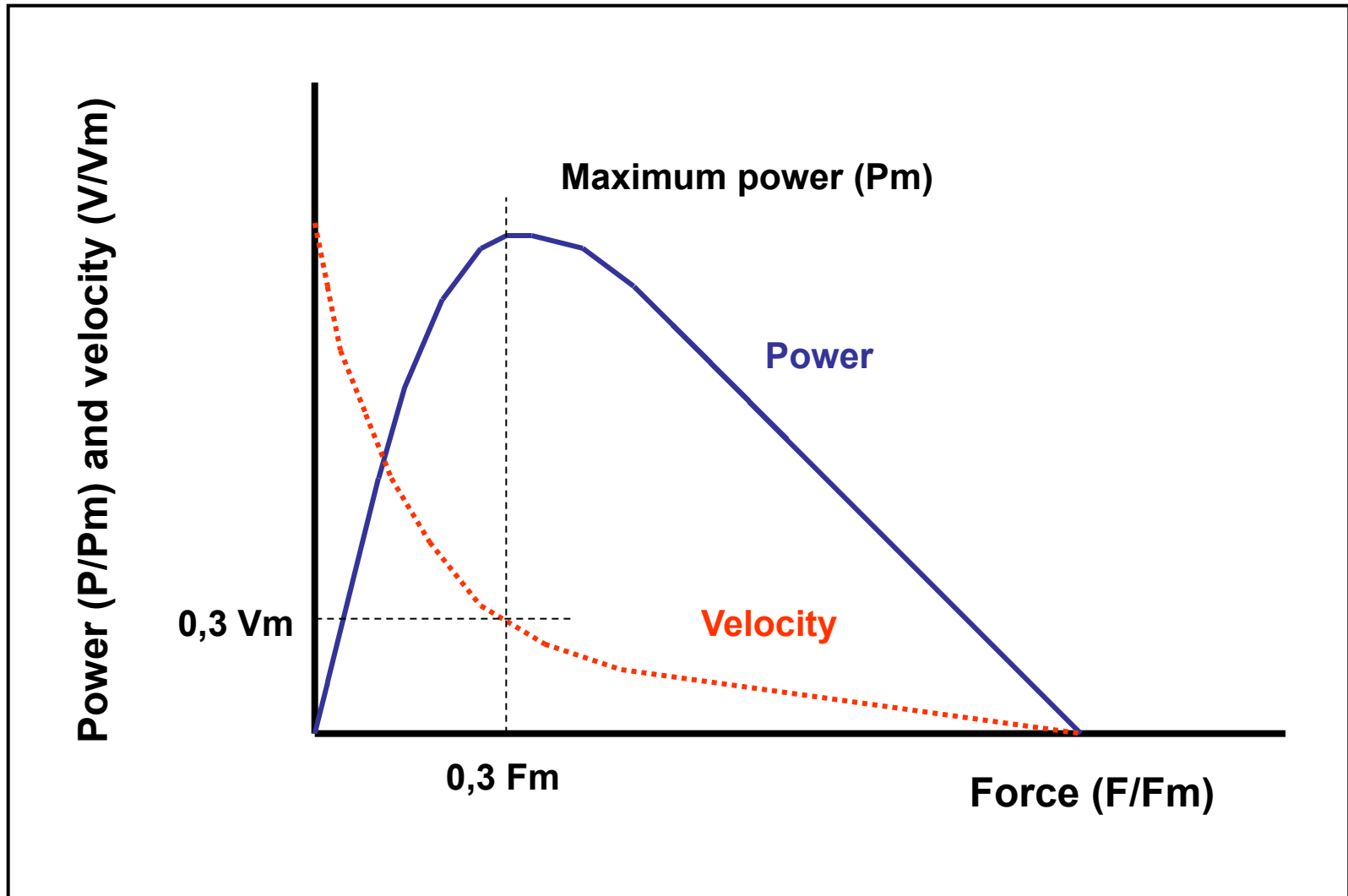
**Net power output**

**Stretch shortening cycle (SSC)**

**Strength impulse** which is given by an ability to apply as big force as possible in restricted time given by a specific sports event. Strength impulse is then equal to the change of momentum of the athlete or tools.



**Net power output** which is understood as the result of the product of applied force and speed while performing a specific movement within a given sports skill.



Key innate factors affecting speed abilities are as follows:

- Qualities of the central nervous system, mainly the speed of stimulus transmission.
- The ability of the nervous system to quickly alternate stimulation and decrement during muscle innervation which directly affects the speed of contraction and relaxation of muscles.
- The ability of the central nervous system to react sensitively to only low level of stretch reflex which appears in the muscle spindle (muscle length sensor) and it evokes subsequent contraction during muscle stretch.
- The ability of intermuscular coordination between antagonist and agonist muscle groups.
- First, the amount of creatinphosphate (CP) and ATP for the start of motor activity and second, available amount of carbohydrates.
- Predominance of fast muscle fibers (muscle fibers of type II).

# General parameters of load during speed development

→	Load intensity:	maximal
→	Work interval:	10 to 15s
→	Rest interval:	2-5 min
→	Number of repetitions:	10-15 repetitions
→	Way of rest:	active

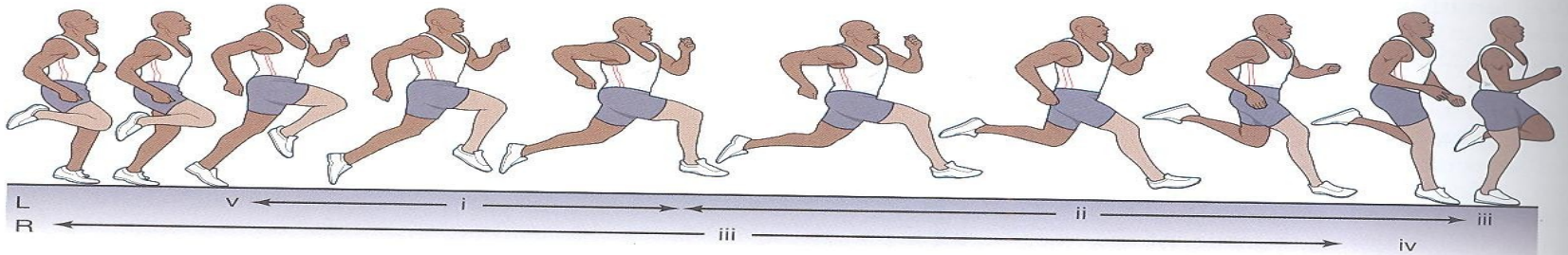
CP resynthesis depending on the duration of rest interval

Duration of rest interval (s)	Repletion of CP (%)
<10	<50
30	50
60	75
90	88
120	94
>120	100

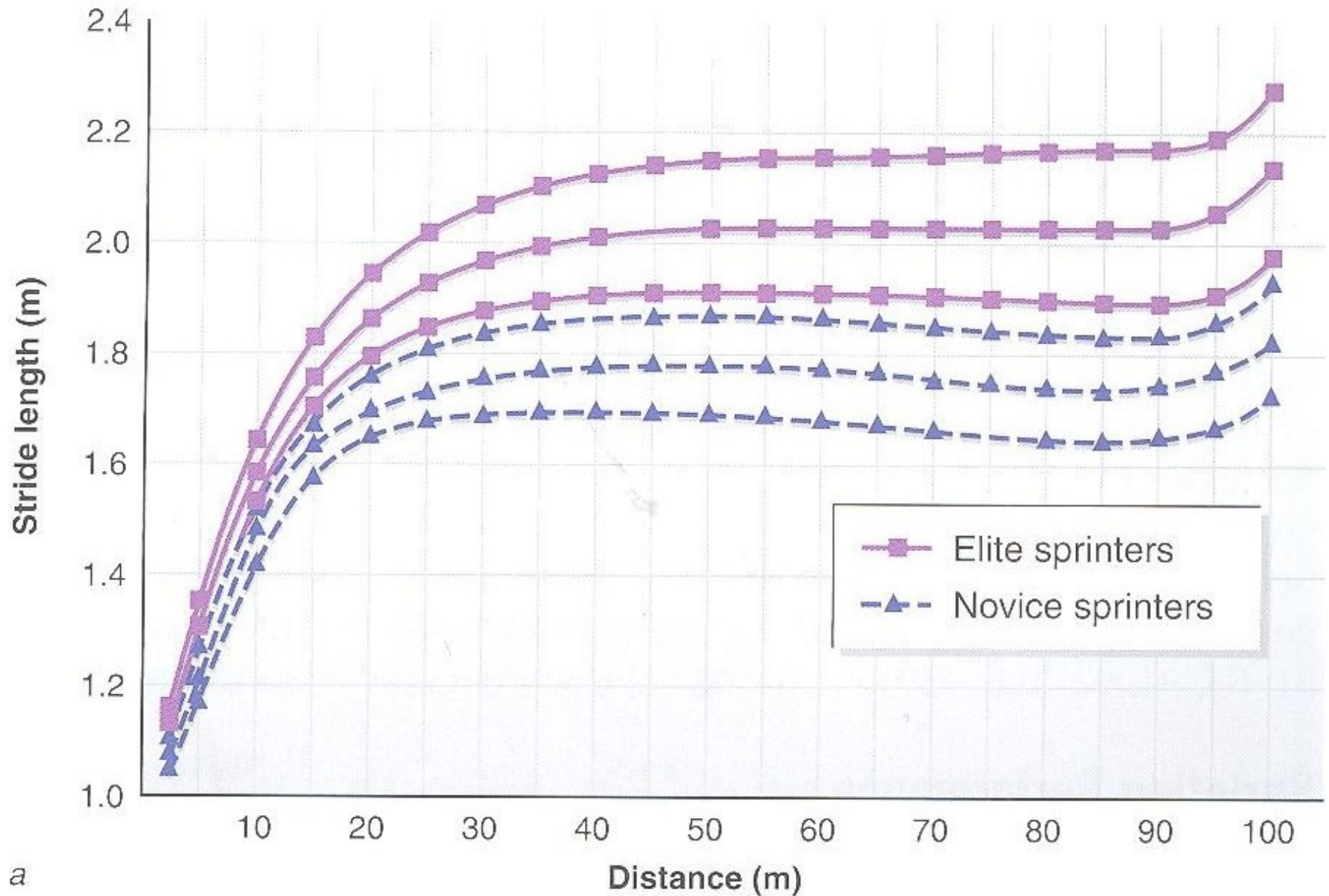


# Velocity of running

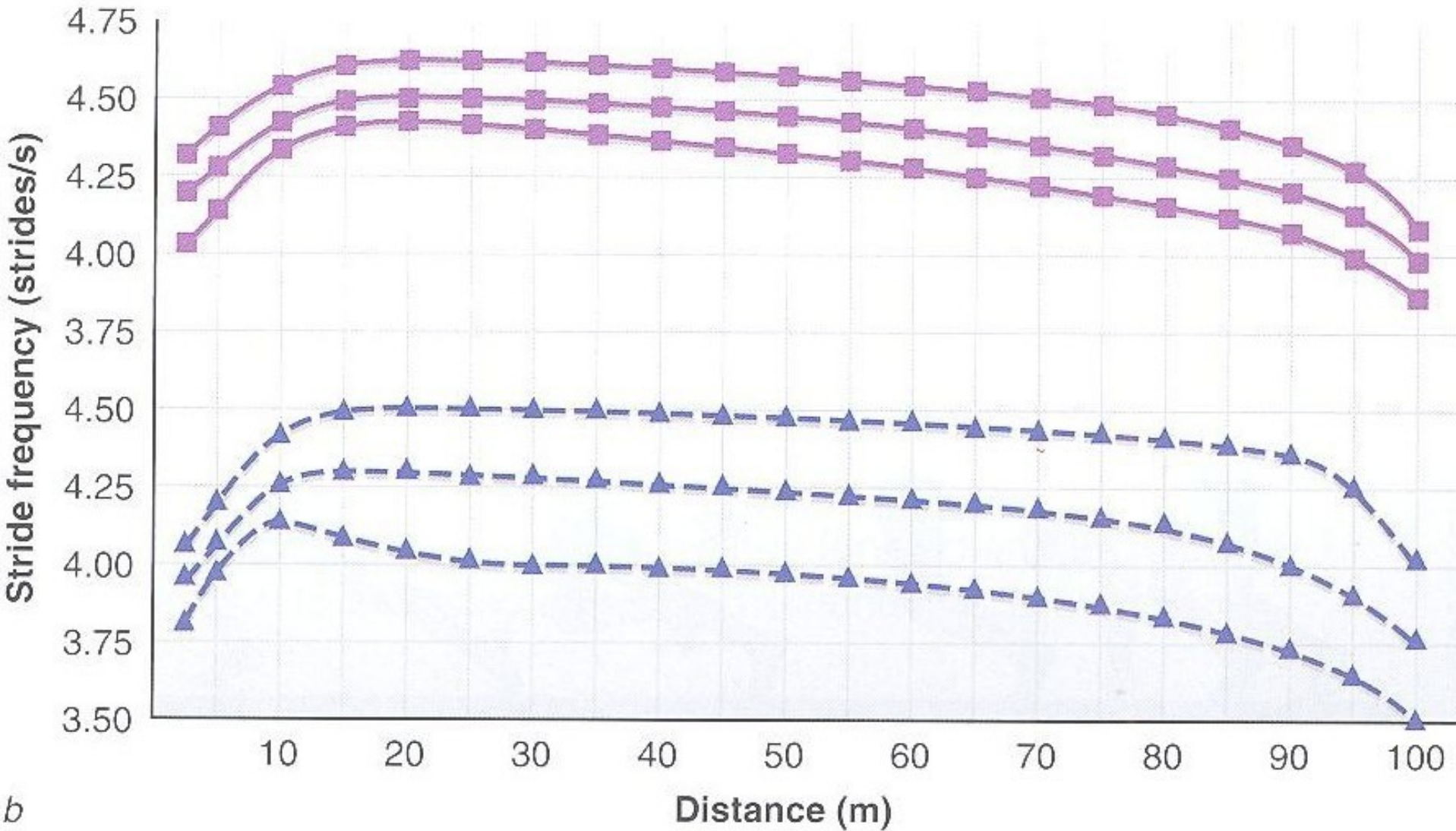
- Ballistic movement
- Alternating flight phase and single-leg support phase
- Velocity of running is interaction of:
  - ➔ stride frequency
  - ➔ stride length
- Stride frequency seems to be more trainable than stride length



## Stride length

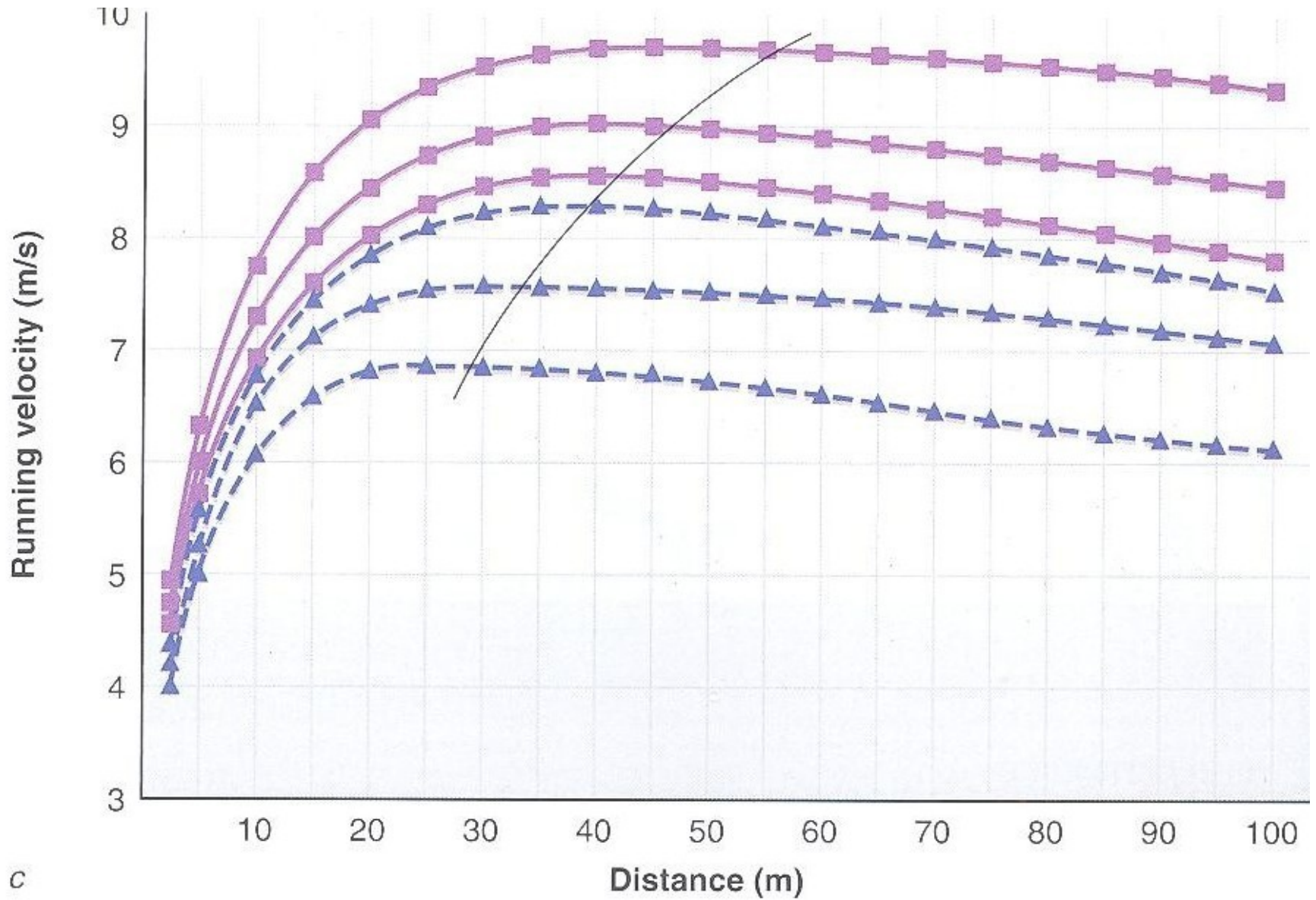


## Stride frequency



b

# Running velocity



# Basic aim of sprint training

- Reach high stride frequency with optimum stride length
- Explosive take-off with minimum vertical impulse.

# Methods of developing speed and agility

Among the key parameters that influence speed, there are:

Force impulse

Net power output

Stretch shortening cycle (SCC)

**Stride frequency**

**Stride length**

## Primary Methods

- The primary method for developing speed is performing proper movement technique of a specific motor ability.

# Secondary Methods

## Resistance method

This method includes gravity-resisted running (e.g., uphill or upstairs sprinting) or other means of achieving an overload effect (e.g., harness, parachute, or weighted vest).

## Assistance method

Sprint assistance includes gravity-assisted running (e.g., downhill sprinting on a shallow 3-7° slope), high-speed towing (e.g., harness and stretch cord), or other means of achieving an overspeed effect.

# Tertiary methods

- **Flexibility**
- **Strength**
- **Speed endurance**

Load interval:	6-20s	(20s-2mins)
Rest interval:	1:4	(1:3)
Load intensity:	maximal	(maximal)
Way of rest:	active	(active)



# Methods of developing reaction speed

- **Repetition method**  
The core of this method is repeated reactions to a given stimulus (e.g. reaction to start-up signal in swimming).
- **Sensoric method**  
The method broadens repetition method. The athlete attempts to subectively assess the duration of performing the reaction to a given stimulus.
- **Method of reaction to selective stimulus**  
A proper reaction to selective stimuli in sports games and resistance sports is often related to game experience and anticipation.

# Specifics of speed development

- High heritability
- 80 - 90% muscle fibers II. Type (fast)
- Development of “pure” speed between 12-13 years
- The organism must not be tired.
- The athlete must be in a good mood and must be self-motivated to train speed.
- Speed training must be preceded by good stretching.
- All exercises must be carried out with maximum intensity.
- The technique of applied exercises must be perfectly mastered.
- Speed exercises must be placed at the beginning of a training session.



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Děkuji za pozornost