FLEXIBILITY

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You can say that flexibility is a prerequisite for any movement, either for sport or health purpose. It is as much as an exercise in sports gymnastics, or a goal-keeper stopping low balls in handball, or offering solutions for muscle aches or injuries.

The degree of flexibility of a given joint can sometimes prevent serious injury. This capability should be practised regularly if it is not, the movements we make in any physical activity will constantly limit our actions and reduce somewhat its effectiveness, leading, on occasions, to forced movements which in turn may cause injury to joints, sprains, etc. at a high rate, which would have been avoided.

Flexibility develops better in those early ages when the body has not yet reached a high degree of maturity.

1. OBJECTIVES

- To understand the need to acquire some flexibility to maintain healthy joint mobility and elasticity in our muscular system.
- To use the most adequate system to practise a variety of exercises that are balanced thus helping to improve physical capacity of flexibility.

2. CONCEPT OF FLEXIBILITY

Flexibility is considered a basic and necessary physical capacity to ensure the optimal use of other physical abilities.

The Royal Academy of Language (RAE) defines it as (sic) the quality of being flexible and explains the term as being able to bend easily.

Specialised authors refer to the range of motion (ROM). Muska Mosston defines flexibility as "the ability to increase the extent of movement in a given joint."

In short, and to understand it more easily it could be defined in the following manner:

> The degree of this ability is reflected in how movements may reach their maximum range of motion.

3. ESSENTIAL FACTORS IN FLEXIBILITY

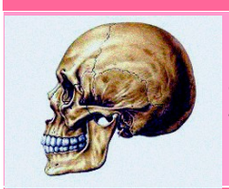
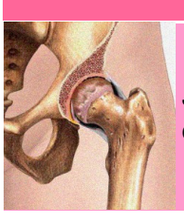
Flexibility is the integrating component of joint mobility and muscle elasticity, and it depends on both. Not only do broad gestures affect the static part of the musculoskeletal system (bones), but also its dynamic part (muscles and joints) as well.

Joint Mobility

It is a characteristic of joints that refers to the range of movement that can be generated in each.

The mobility of the joint is determined by the anatomical constitution. In this sense there are three types of joints:

In general all joints have natural limits of movement, which are the bones, ligaments and joint capsules. Basically, the last two with atrophy essentially limit joint mobility.

Sinarthrodial
 Joints that have no movement and no separation, i.e., there is no joint cavity. An example of this is the joints of the skull bones.
Amphiarthrosis
 Joints that have reduced movements and have an intra-articular cartilage disc through which movements are facilitated. A clear example is the intervertebral joint.
Diarthrosis
 Joints that enjoy the possibility of performing large movements and have joint space, i.e. a joint capsule, etc. For example the shoulder joint.

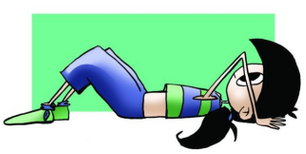
Muscle Elasticity and Extensibility

A property muscle tissue has is the ability to recover its original shape after being deformed by the application of a force is called muscle elasticity.

Differently, the variation in the muscle becomes the application of a force called **stretching or extensibility**.

4. DETERMINING FACTORS IN FLEXIBILITY

Similarly, flexibility is influenced to a greater or lesser degree by the following factors:



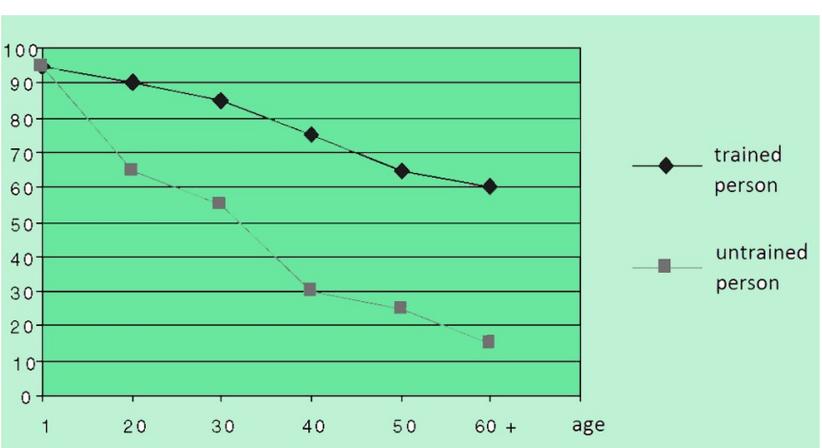
Hereditary and Gender

Genetic characteristics are the first conditioning factor of flexibility, that is, a priori some people are born more flexible than others.

There are also clear differences between men and women. Women, because of anatomical and physiological factors, are more flexible than men.

Age

Over the years men gradually lose ROM. As you get older, the degree of flexibility decreases. Look at the graph.



Type of Regular Work

This factor acts as a medium capable of modifying the degree of ROM.

Inactivity causes more gradual loss of the index of flexibility. However, unbalanced activity in the body (i.e. a sport activity in which the dominant side is overused) causes a greater incidence of certain bone or muscle deformations or possible dislocations, muscle sinew tear, etc.

Ambient Temperature

It is a factor beyond the conditions of the individual, but more or less affects readiness for stretching; the higher the temperature the more flexibility becomes obvious.

Muscle Temperature

It is indicative that when a muscle contracts more forcefully and stretches more easily that it has reached the ideal temperature and one has done warm-up exercises.

Muscle Volume and Adipose Tissue

There is no doubt that large muscle mass in the femoral biceps and calves, for example, limit knee bending, as occurs with the fatty accumulation in the abdomen that limit forward and lateral flexion of the trunk.

5. MEASUREMENT OF FLEXIBILITY

Flexibility is measured with apparatus specially designed on some occasions and less sophisticated in others, to determine the degree of movement in a particular joint and apply relevant exercises to it.

There are tests that measure flexibility in various joints, such as shoulder, ankle, hip, etc., carried out in different positions, front and rear flexion of the trunk, abduction, etc.

Below are two types of tests to measure flexibility; they have been chosen for having proven to be the most used in schools for its simplicity in implementation and the involvement of a large number of joints.

Deep Body Flexion

Sample of the entrance examination conducted by Instituto Nacional de Educación Física (INEF) in Madrid, 1985:

Objective: To measure flexibility of the trunk and extremities.

Procedure: Position yourself on the apparatus as shown in the illustration,

Place both hands simultaneously back as far as possible.

Equipment: Apparatus with measuring tape to position the feet.

Standards:

- You cannot lift your feet, or perform rebounds.

- In the case of not positioning both hands at the same time the rearmost counts.

- Two attempts (the best scores) will be noted. You can see the scale rating on p. 132 of this book.

Anterior Trunk Flexion

Sample test taken from Álvarez del Villar's "La Preparación Física basada en el Atletismo".

Objective: To measure the flexibility of the trunk and limbs

Procedure: Barefoot and sitting on the floor with legs straight out, bend the trunk forward, placing one hand over the other, place them as far as possible.

Equipment: Apparatus for supporting the feet as well as sliding the hands slide on.

Standards:

- Do not bend your knees.

- No rebounds performed.

- Two attempts (the best scores) are performed. You can see the scale rating on p. 132 of this book.

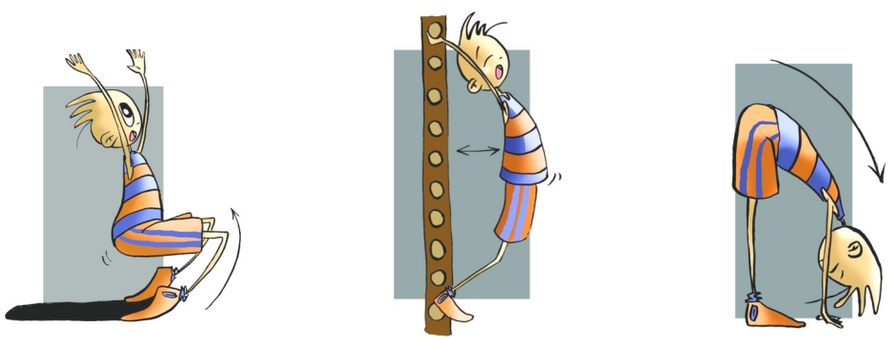
6. DEVELOPMENT OF FLEXIBILITY: METHODS

Before providing a description of ways to improve flexibility, it is advisable to present some preliminary considerations to facilitate its execution.

SOME RECOMMENDATIONS

- To promote the development of flexibility use exercises that require maximum joint movement, deep knee bends, rotations, etc.
- To achieve an acceptable level, flexibility exercises should be practised daily, in the morning, even twice a day, then reduced to two or three times weekly. It is convenient to develop your strength at the same time.
- What is important is the continuity and regularity as flexibility is a capacity that needs to be exercised as it rapidly declines from inactivity.
- It is essential to warm up before starting to do flexibility exercises, as the temperature reached by the muscle is an important advantage for its development.
- If we choose a technique to achieve a certain degree of flexibility, we are more inclined towards static stretching.
- If training flexibility becomes painful, it is very important to stop such workouts for a while to avoid greater problems. In any case it is always advisable to consult a specialist prior to this type of training. Work gradually never abruptly.

The aim of developing of flexibility is to increase the range of motion in the joints. At least it would be to maintain the present levels by doing exercises aimed at developing muscle elasticity to achieve maximum extension in movements.



The exercises that will configure flexibility workouts of each of these methods may be organised under mechanical motion performed, i.e. exercises flexion, extension, rotation, abduction, adduction or circumduction with; and / or the body part involved, i.e. exercises of arms, legs, hips, trunk, shoulders, etc.

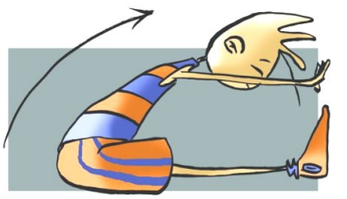
There are two basic methods to develop flexibility:

dynamic with such systems as static-active and ballistic systems, and

static with such systems as static-passive, isometric and PNF.

Static-Active

It is characterised by repetitions, reaching desired positions without using special devices or a partner. It involves repeating the movement after reaching, each time, its maximum point of tension as often as convenient.

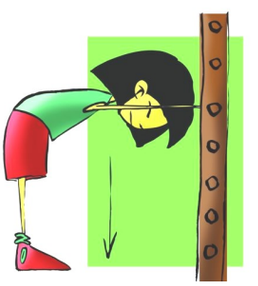


Ballistic

It is characterised by such movements as bouncing and swinging to achieve the greatest range of motion. You can use the help of a partner or an apparatus. In this case there are groups who are inclined to dismiss this method of stretching because their goals are supplemented with greater ease by the former, as it will be pointed out later. It is even argued that this type of stretching exercise produces, over time, damage to the corresponding muscle insertion. Other groups, however, defend and continue to use ballistic stretching. However, this method is hardly used today.

Static-Passive

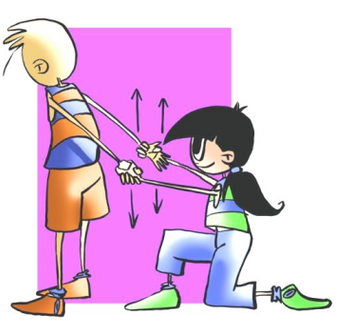
When the great degree of muscle tension is achieved with the help of a partner or apparatus or alone, but with little movement, we say that the method being used is passive stretching.



Isometric

It means stretching-contraction. It is widespread and practised by coaches and teachers. Although, as with the previous method, it reduces muscular dynamism, which goes against, apparently, the primary principle of physical activity: movement.

Of American origin, it emerged for therapeutic and rehabilitative use. It consists of a pre-isometric contraction in the muscle group being exercised, between 10 and 30 seconds (sec), followed by relaxation lasting about 2 or 3 sec. Stretching consists of slow, but maximum extension, with the usual help of a partner, who directs the position so stretching is done at various angles.



Proprioceptive Neuromuscular Facilitation (PNF)

Born in the English school with a therapeutic purpose that today is used, it is characterised by an extension or movement helped by a colleague being held from 10 to 15 sec approximately. It is followed by a slow and contrary resistance i.e. the subject contracts those muscles being stretched for 5 sec approx. to then the same previous extension is repeated with the same external support for another 10 to 15 sec approx. This system, among other things, facilitates locating the muscular area (proprioceptive sensation) that performs stretching, thanks to counter resistance.

METHODS TO IMPROVE FLEXIBILITY	
Dynamic	Passive
- Static-Active - Ballistic	- Static-Passive - Isometric - PNF

7. QUESTIONNAIRE AND ACTIVITIES

1. What do you mean by flexibility?

2. What factors can somehow influence this capacity?

3. What sports specialities is more flexibility needed?

4. Measure yourself with your classmate and explain the differences.

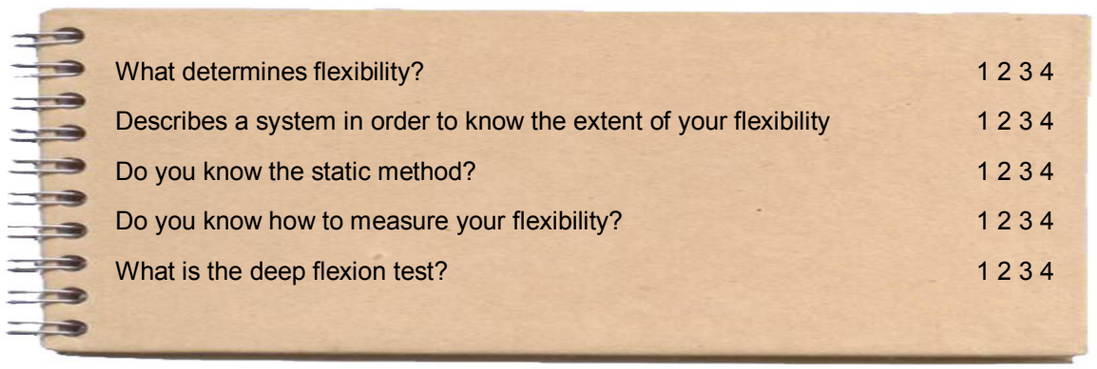
5. Explain to your partner some tips for developing flexibility.

6. Calculate the degree of flexibility among the members of your family.

7. Write down in your notebook unknown vocabulary from this unit.

8. SELF-EVALUATION QUESTIONS

Choose the following responses to the questions below: 1 (if you do not know), 2 (if you are not sure), 3 (if you know it reasonably well), and 4 (if you know it very well). If your results are between 5 and 8 points, you should revise the unit. If you score between 9 and 12, you will have to have a talk with your teacher. If your score is between 13 and 16, you are borderline pass, but if your total is 17 or higher, congratulations are in order because you are doing well.



What determines flexibility?	1 2 3 4
Describes a system in order to know the extent of your flexibility	1 2 3 4
Do you know the static method?	1 2 3 4
Do you know how to measure your flexibility?	1 2 3 4
What is the deep flexion test?	1 2 3 4

9. SUMMARY CHART

<table>
<tr><td rowspan="15">FLEXIBILITY</td><td>Concept</td><td colspan="2">The ability for movements to reach their maximum level of extension.</td></tr>
<tr><td rowspan="4">Essential Factors</td><td rowspan="3">Joint Mobility</td><td>Sinarthrodial</td></tr>
<tr><td>Amphiarthrosis</td></tr>
<tr><td>Diarthrosis</td></tr>
<tr><td colspan="2">Elasticity and Extensibility of Muscles</td></tr>
<tr><td rowspan="4">Determining Factors</td><td colspan="2">Genetics and Gender</td></tr>
<tr><td colspan="2">Age</td></tr>
<tr><td colspan="2">Ambient Temperature</td></tr>
<tr><td colspan="2">Type of Work</td></tr>
<tr><td rowspan="2">Medicine</td><td colspan="2">Muscle Temperature, Muscle Volume and/or Adipose Tissue</td></tr>
<tr><td colspan="2">Anterior Flexion</td></tr>
<tr><td rowspan="5">Training Methods</td><td colspan="2">Deep Body Flexion</td></tr>
<tr><td rowspan="2">Dynamic</td><td>Static-Active</td></tr>
<tr><td>Ballistic</td></tr>
<tr><td rowspan="3">Passive</td><td>Static-Passive</td></tr>
<tr><td>Isometric</td></tr>
<tr><td>PNF</td></tr>
<tr><td rowspan="6">Aspects to Consider</td><td colspan="2">Carry out extensive movements.</td></tr>
<tr><td colspan="2">Warm up.</td></tr>
<tr><td colspan="2">Work daily at first, and then exercise on alternate days. .</td></tr>
<tr><td colspan="2">The passive technique is the most acceptable one.</td></tr>
<tr><td colspan="2">Beware of abruptness.</td></tr>
<tr><td colspan="2">If there is pain, rest.</td></tr>
<tr><td colspan="2">Regularity and continuity are important.</td></tr>
</table>