Shoe Anatomy

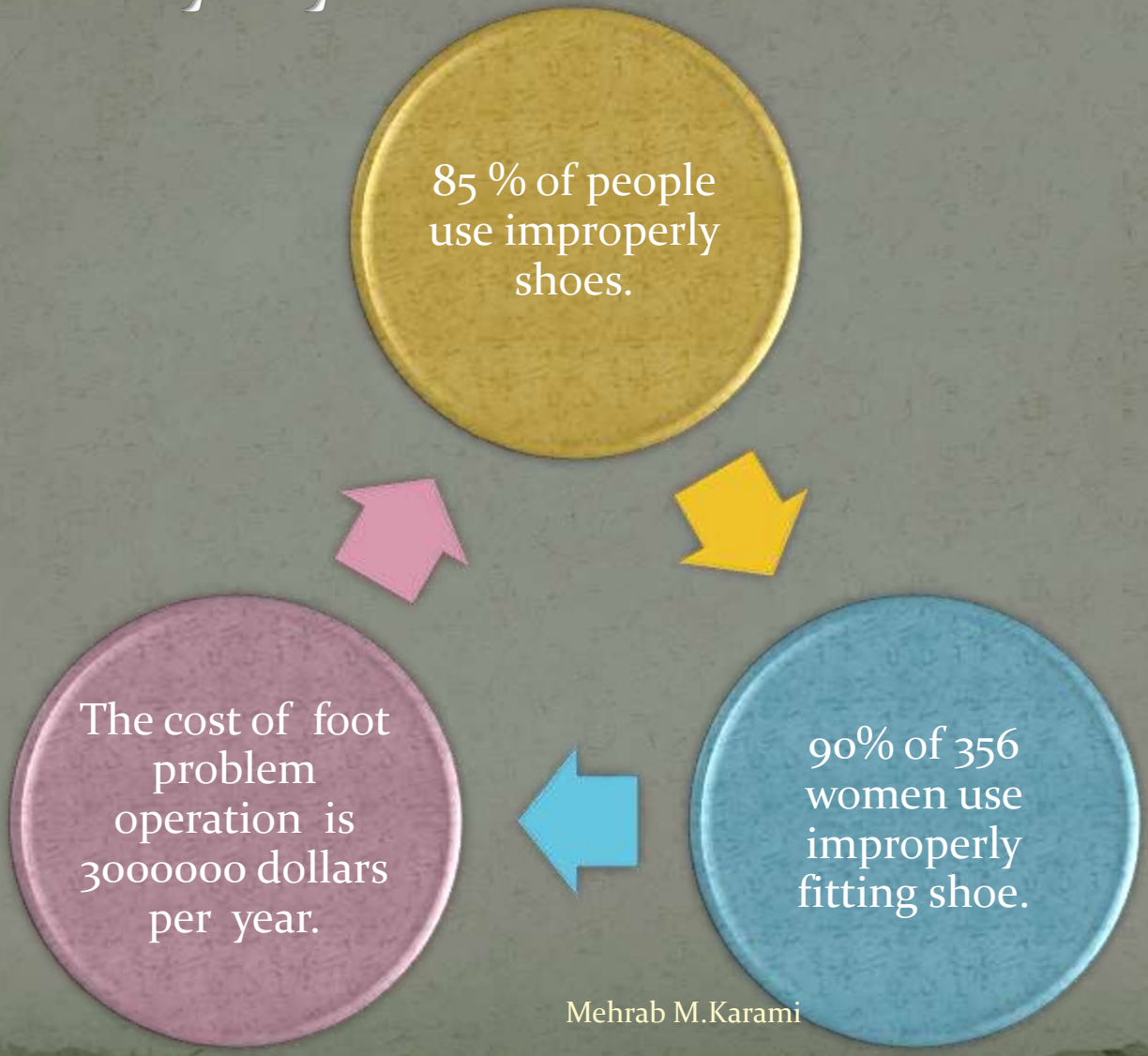
Mehrab M.Karami

Why do we wear shoes?

- Protection

- Special purpose (long standing, running, kicking ,…) to be comfortable in various conditions.

In a study by AOFAS

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Note the overall shape of toe tips as well as the width at point A and point B.
Both Greek and Egyptian types have narrow tip and wide tip types.

Shoes divided in 2 main parts

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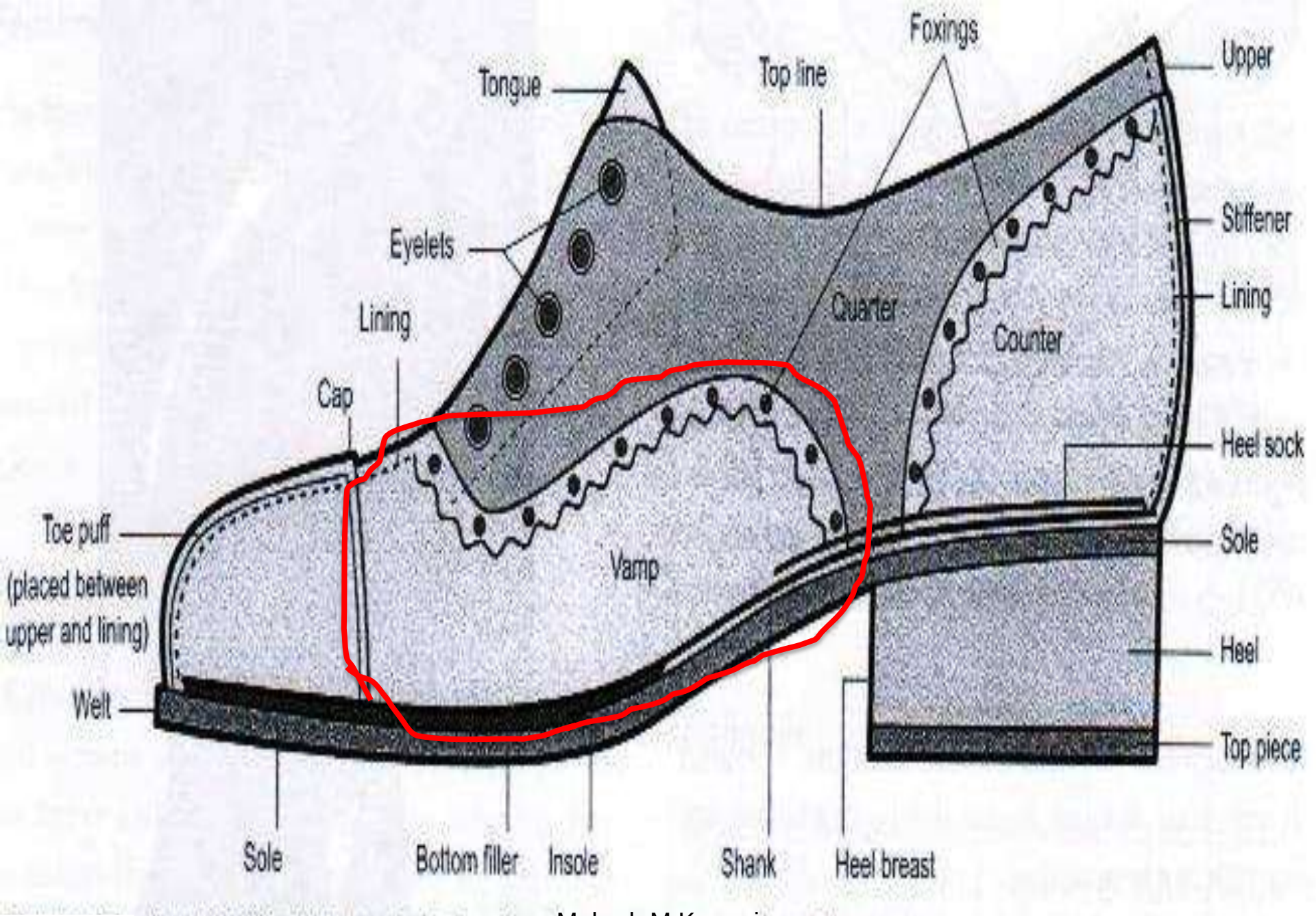
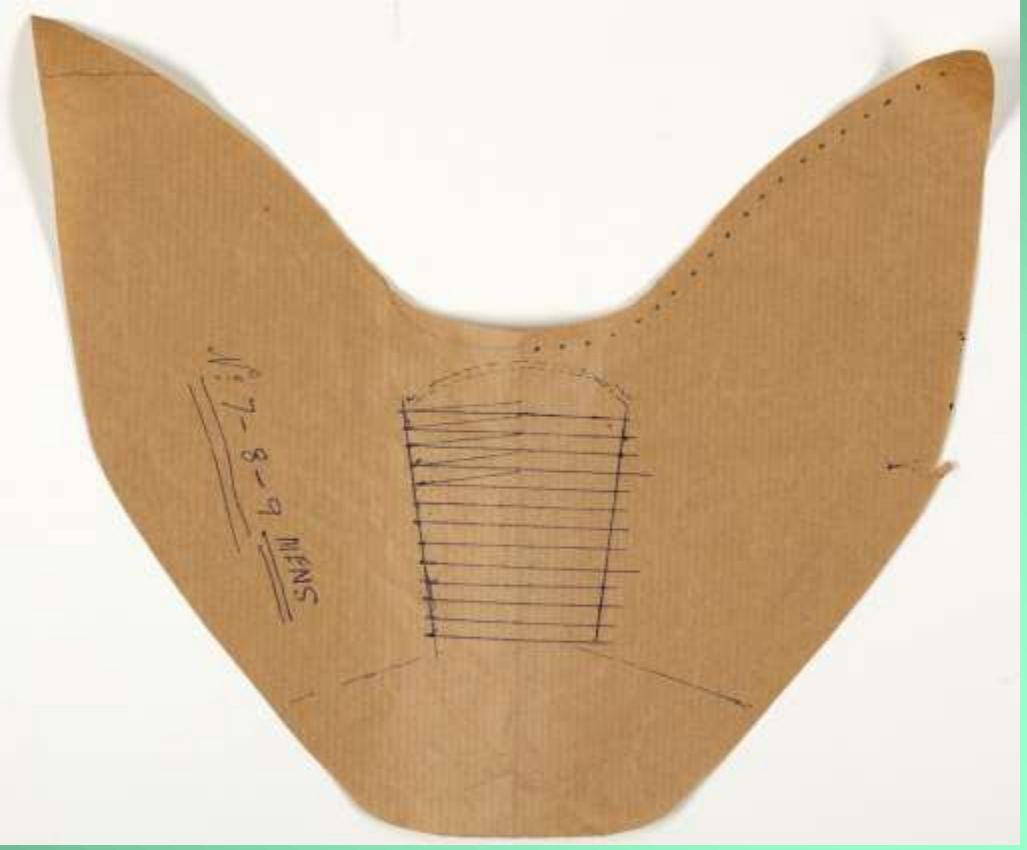
Upper parts

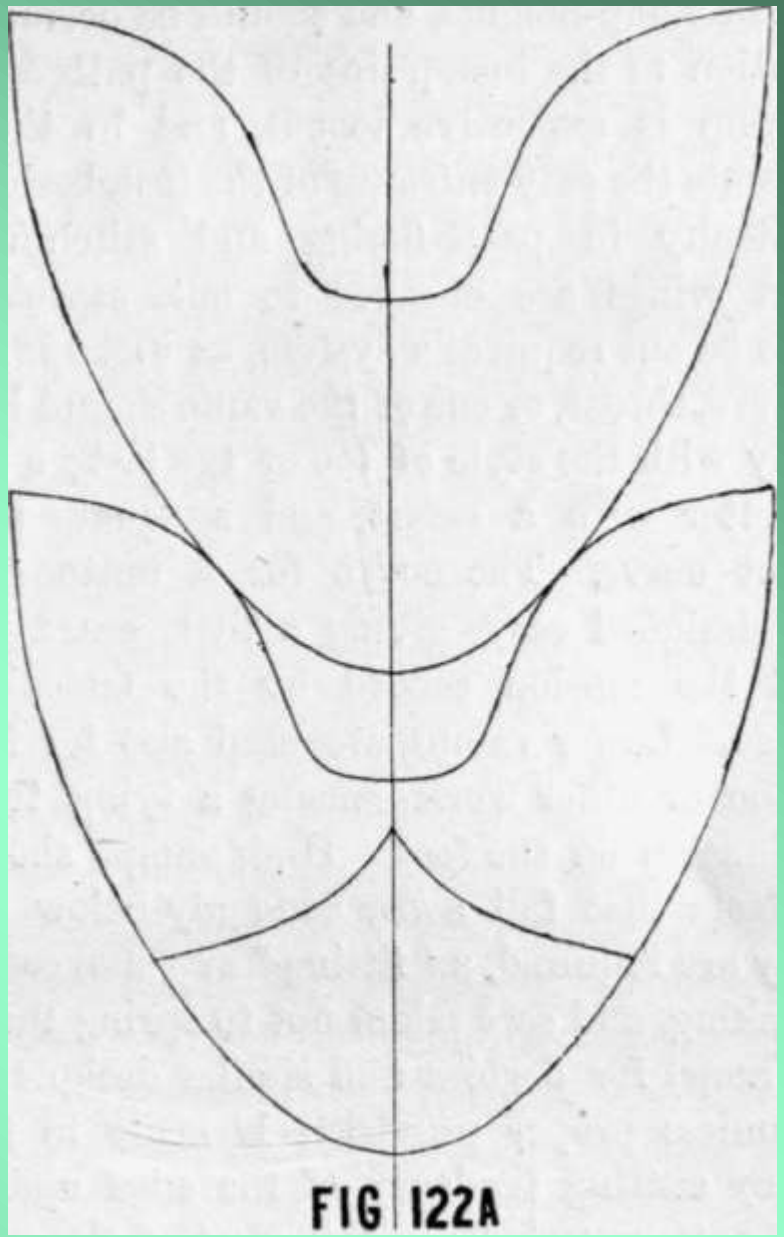
Vamp

- This is the part of the upper covering the front part of the shoe from the toe as far as the quarters.
- May consists 1 or more pieces.



A gent's Goodyear welted shoe showing components and positions.





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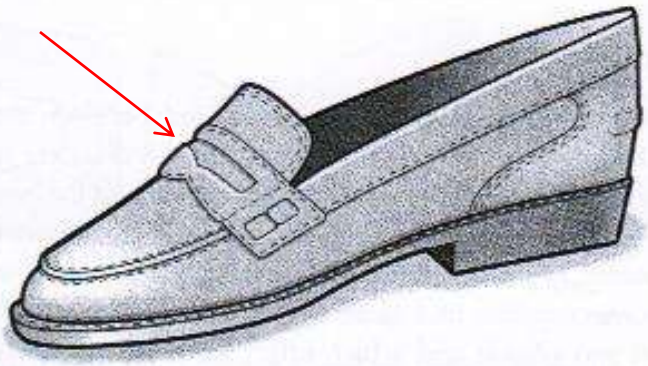
Saddles & bars

- The vamp may have a saddle or bar across it from joint to joint for 2 purposes:
- 1) To reinforce the shoe especially where flexing occur.
- 2) For good appearance (to cover a seam or gusset may be a vamp/quarter)

Saddles and bars



Line drawing of a half saddle decoration to vamp. (Reproduced with permission of Rossi & Tennant

Line drawing of a buckle and bar arrangement to a high-vamp shoe. (Reproduced with permission of Rossi & Tennant, 1993.)

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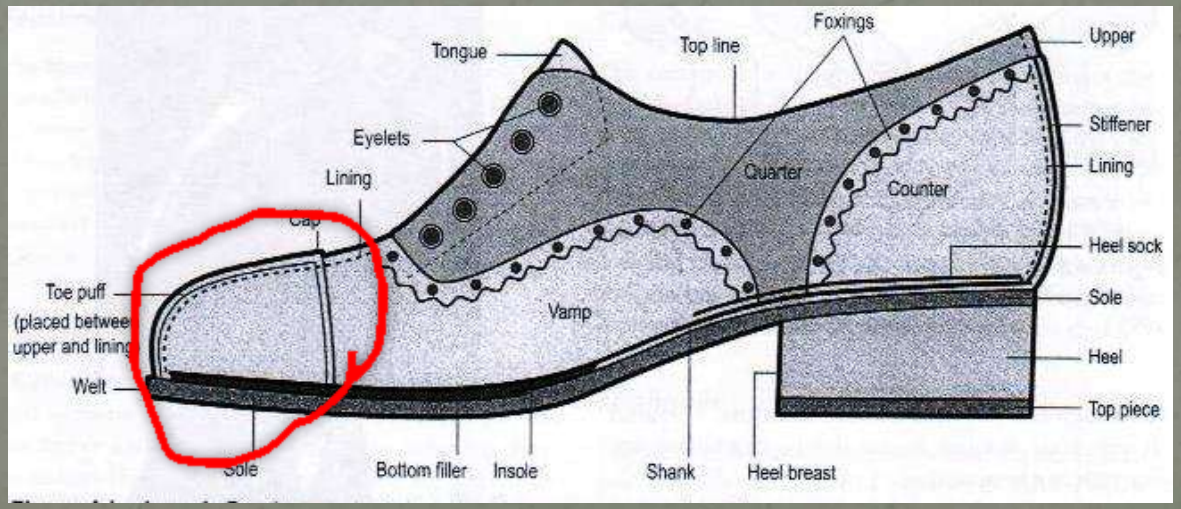
Toe Cap

- It is additional piece of material extending forwards from the vamp to the toe of the shoe. It is attached and placed over the toe stiffener.
- The shape the toe cap may be squared or rounded



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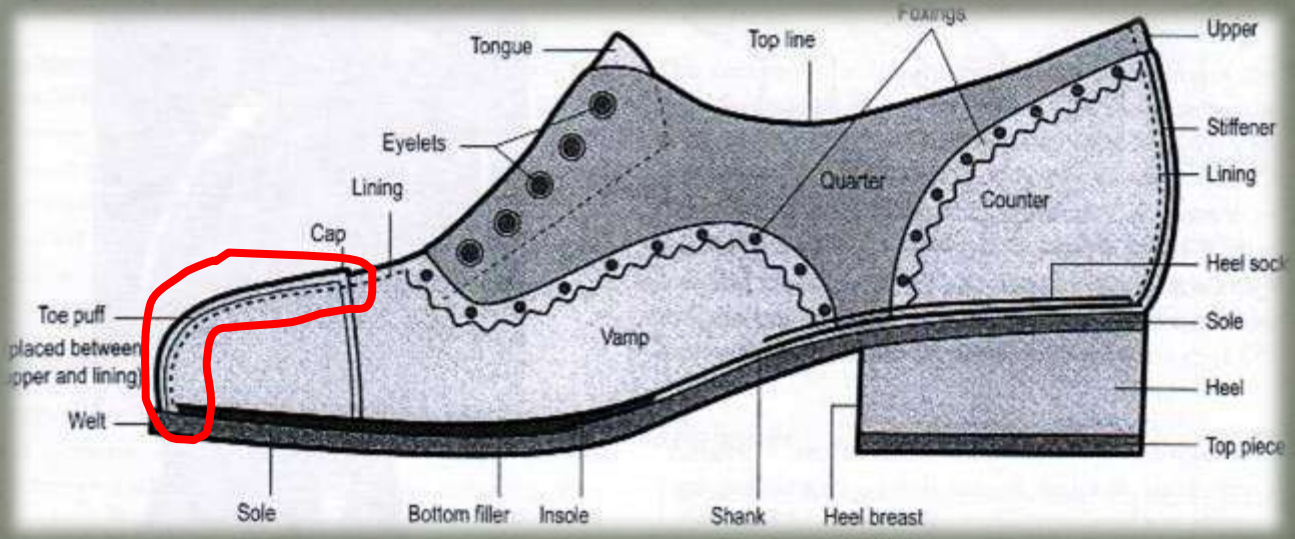
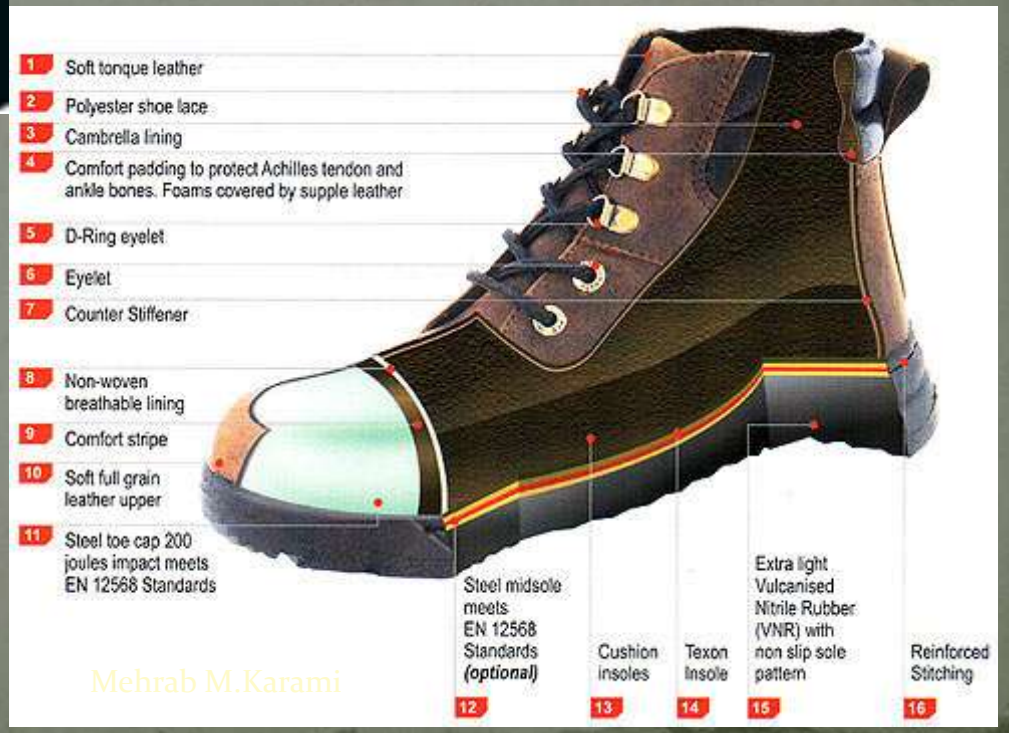
Toe Puff

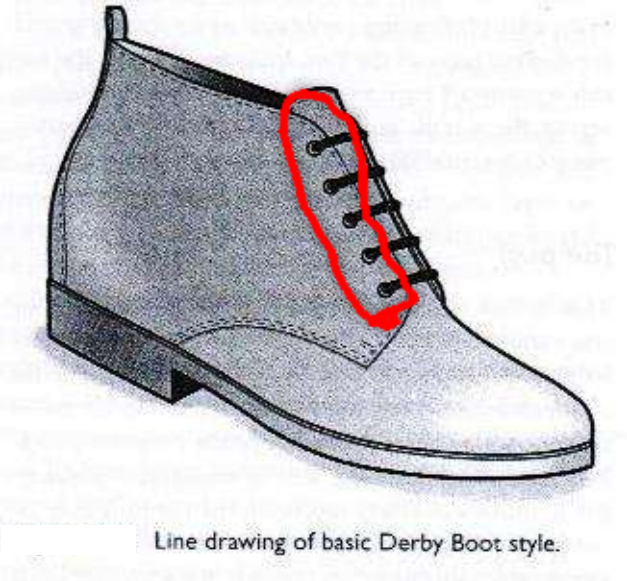
- This is the stiffener placed under the toe part of the vamp or toe cap to ensure that the shoe retains its shape in this area.
- Made from thermoplastic materials or strong leather
- Industrial safety foot wear.(metal)





Facing

Facing : The part which eyelets placed on



Line drawing of basic Derby Boot style.

Feather Edge

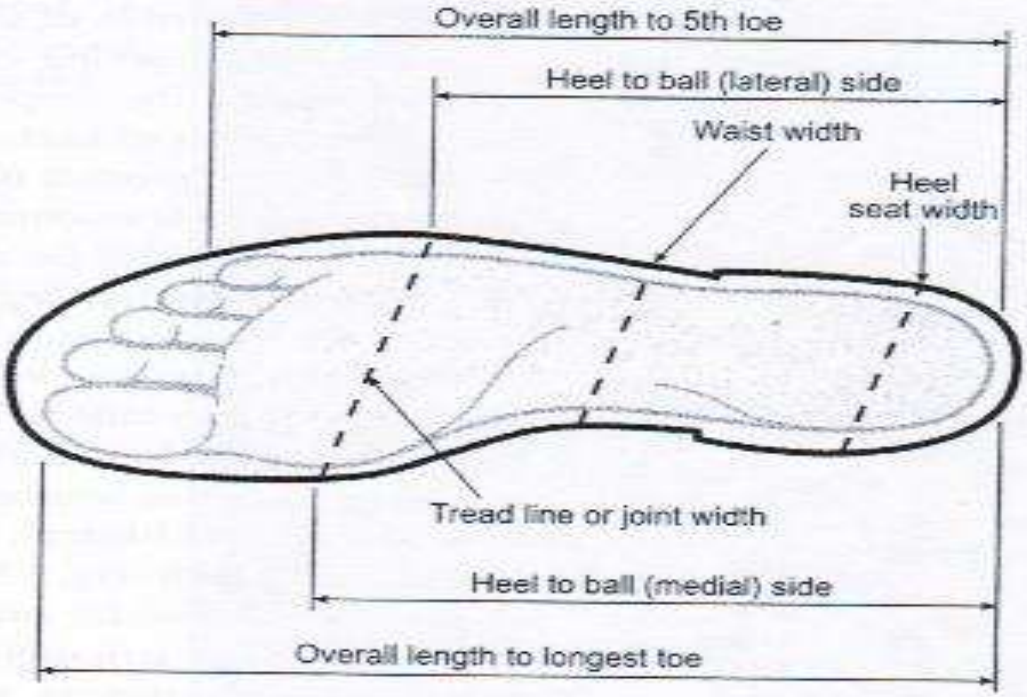
The lower part where the shoe upper meets the outsole is called the feather edge.

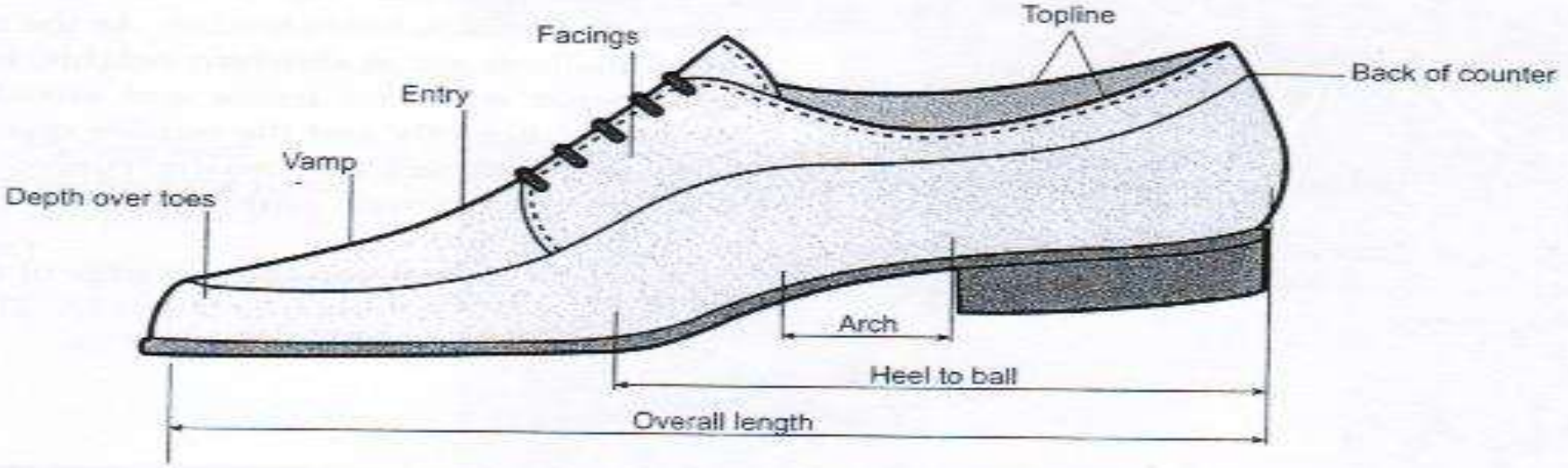
Tongues and tabs

- A tab or extra part to cover dorsum of foot .

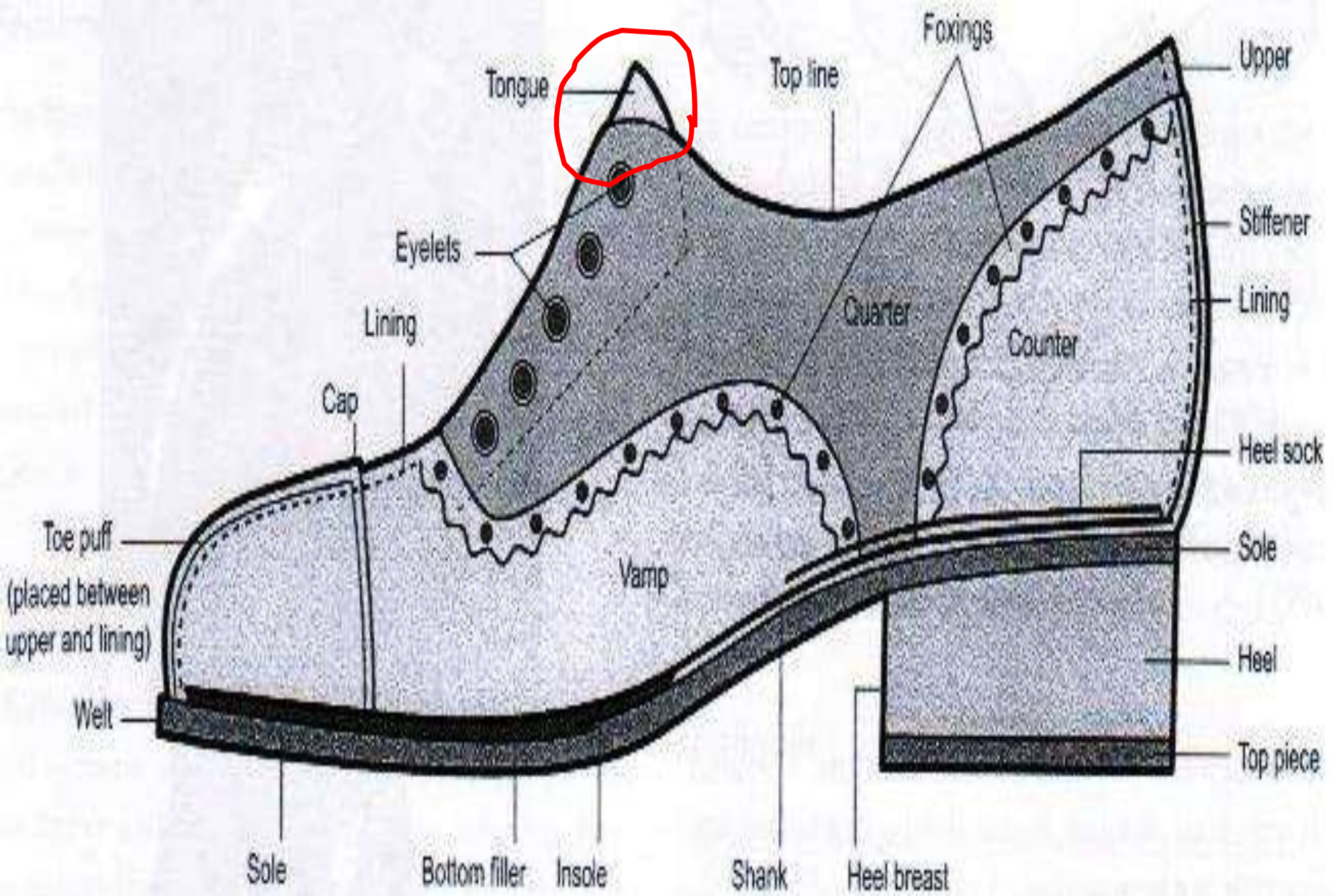
Top line or collar

- The top of the shoe that surrounds the opening for the foot is called the top line or collar(padding , Comfort)





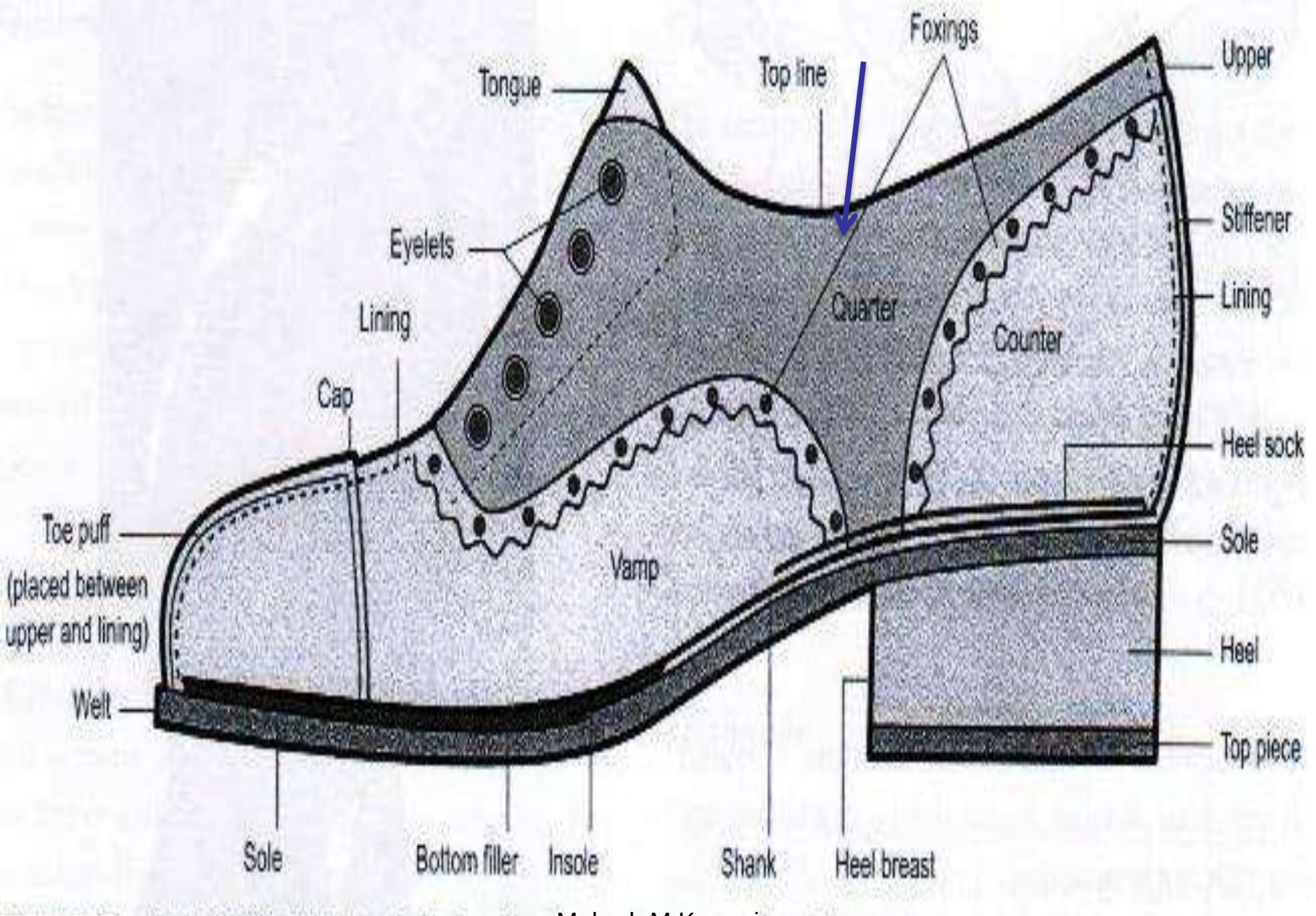
Shoe fitting points: plantar view and side view. Reproduced with permission of Rossi & Tennant 19



A gent's Goodyear welted shoe showing components and positions.

Quarters

- 2 sections which form the back , out side part of the upper and lay over the instep to close the facings.
- Most shoes have 2 quarters.
- 2 parts known as inside and outside.



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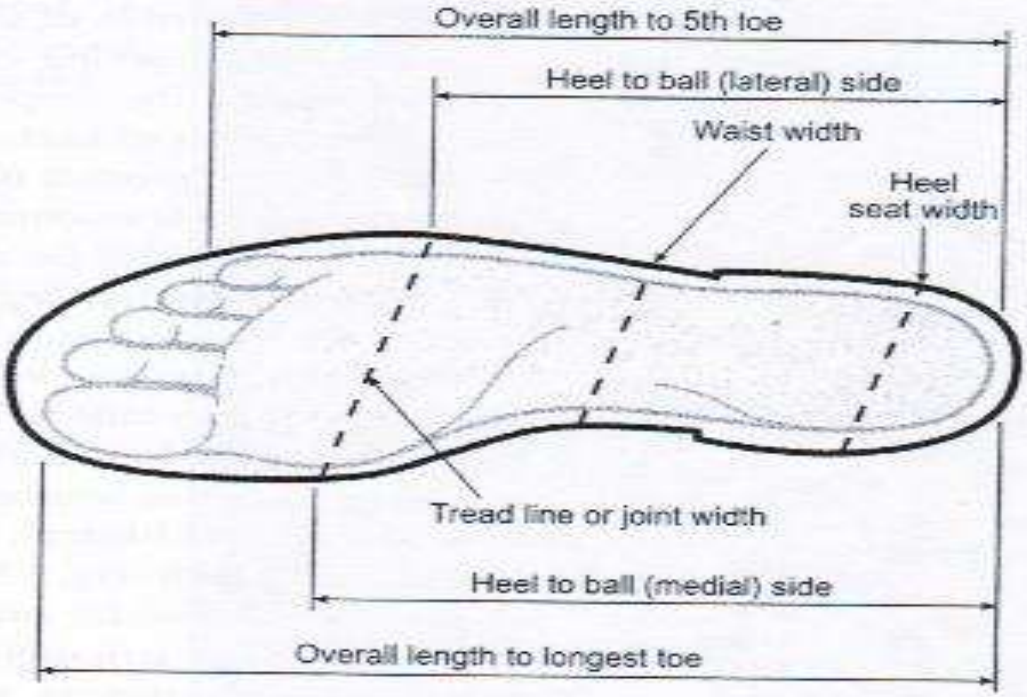
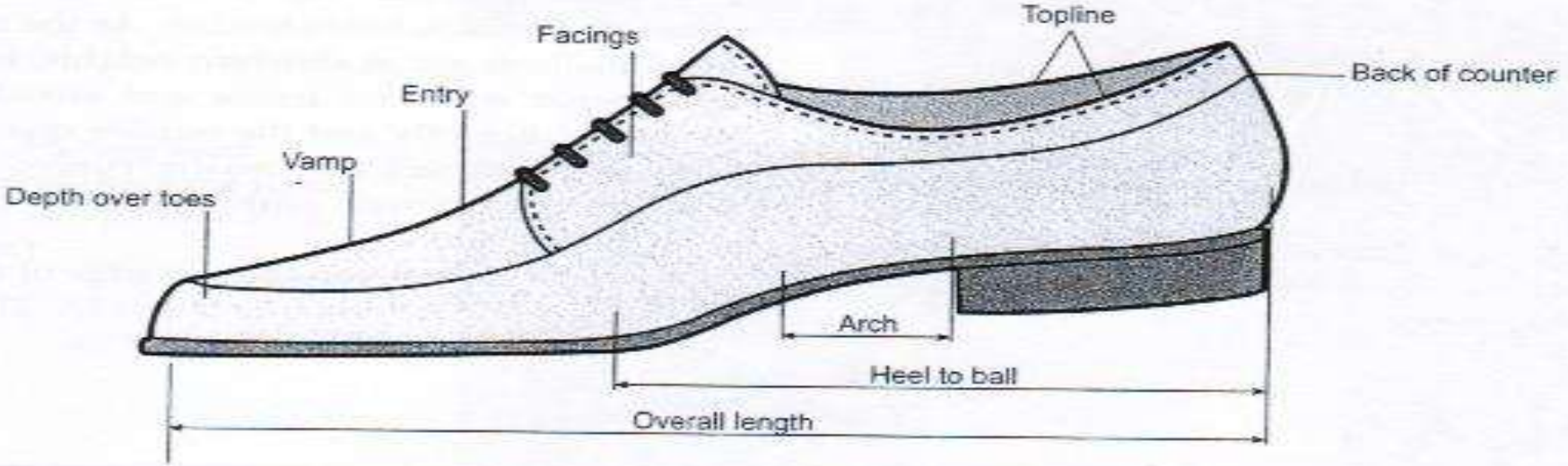
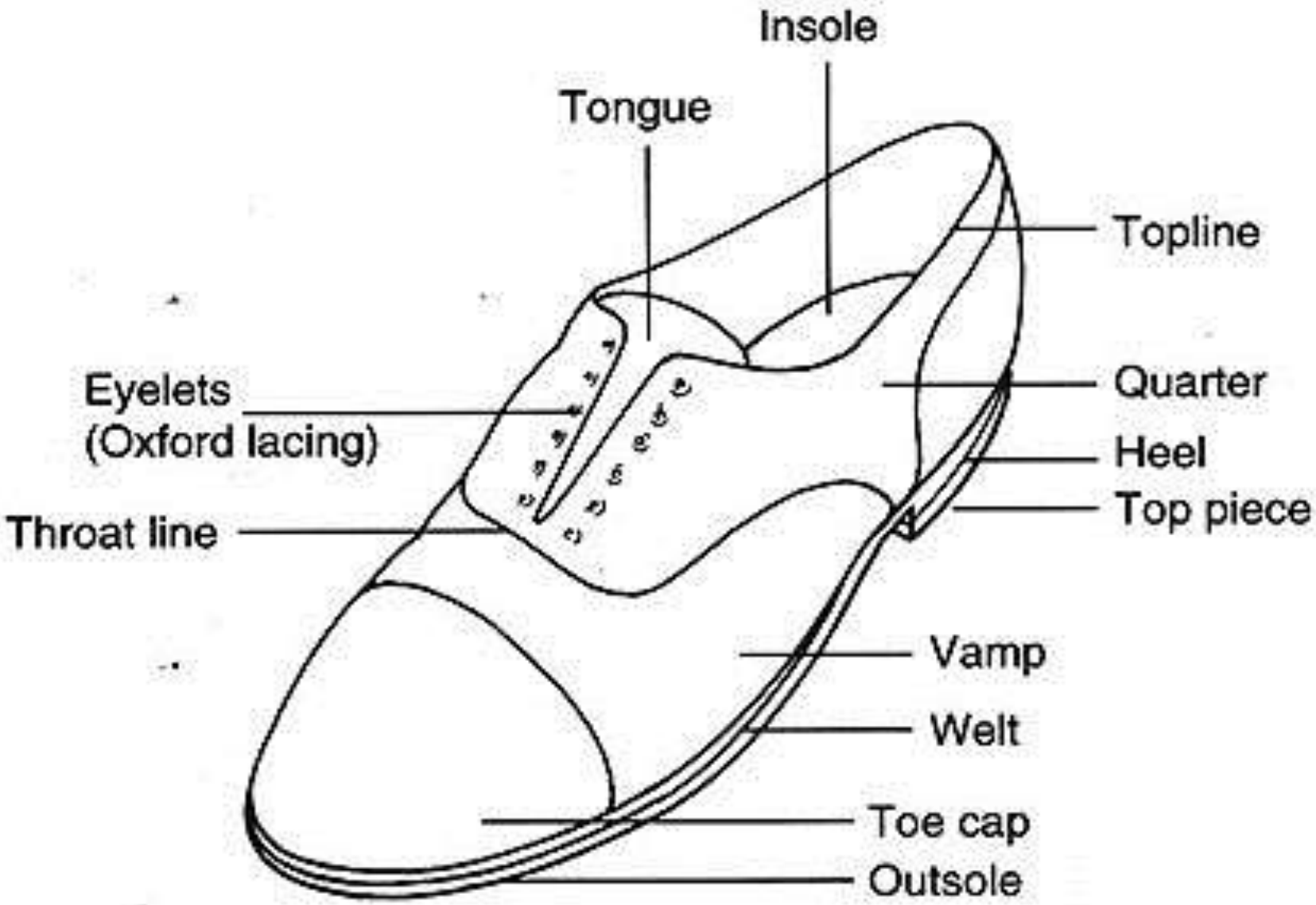




Shoe fitting points: plantar view and si[illegible] reproduced with permission of Rossi & Tennant 19[illegible]

Throat or Entry

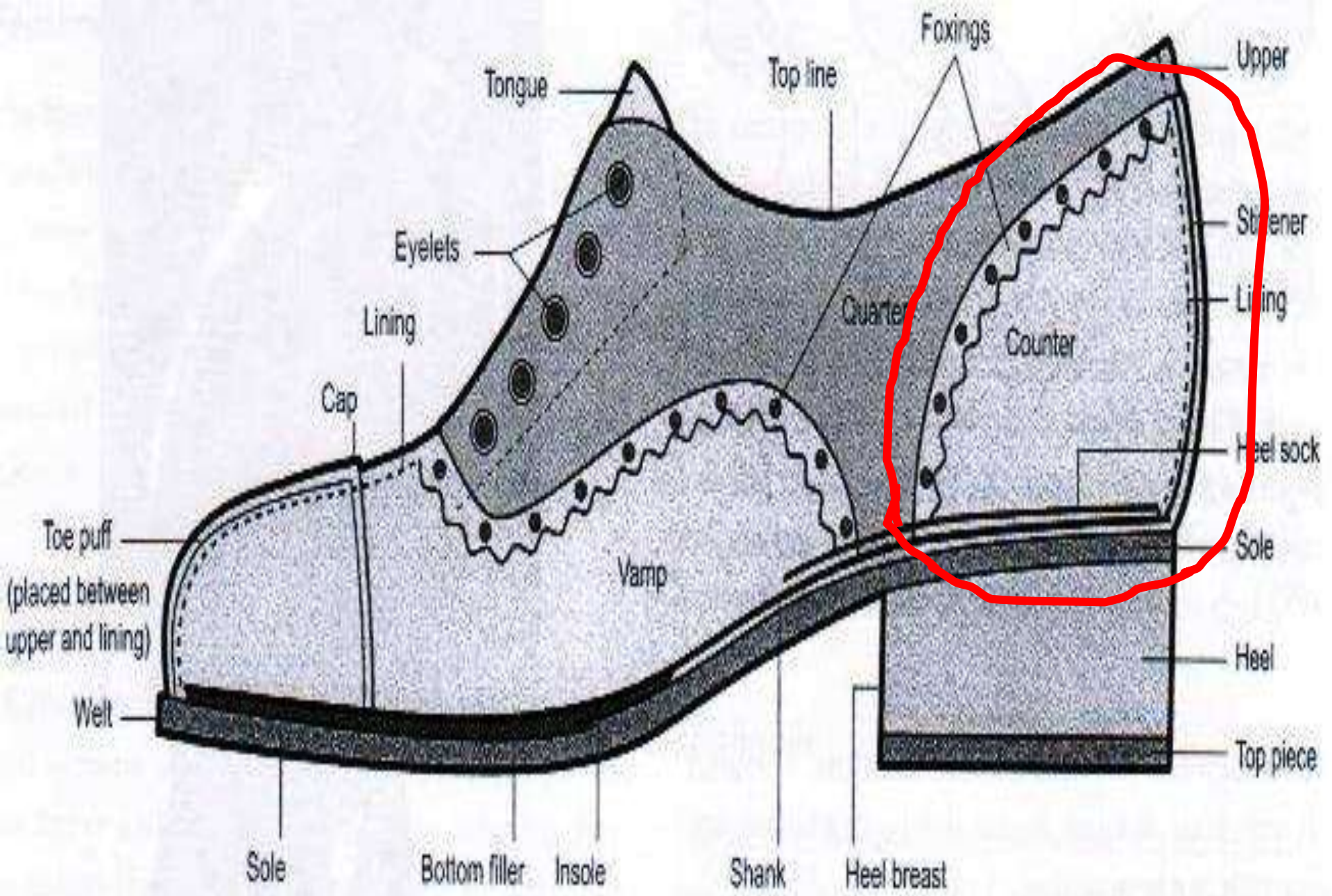
- The throat or entry is the entry point for the foot in to the vamp.
- The position of the entry is determined by the length of the vamp and type of facing.(long or short)
- The gap between the counter and foot is 4 to 6 mm.


Insole
Tongue
Topline
Eyelets
(Oxford lacing)
Quarter
Heel
Top piece
Throat line
Vamp
Welt
Toe cap
Outsole

Counters

The counter is a reinforcement placed between the outside and the lining at the back of the quarters to prevent the upper from collapsing and to hold the heel of the foot securely.

Lack of counter lead to pliable and very soft back of shoes which offers no support to control the rear foot.



A gent's Goodyear welted shoe showing components and positions.

Appliques

- Extra parts added to upper and other shoe parts which help to reinforce or shape the shoe . For example small butter fly on children shoes.

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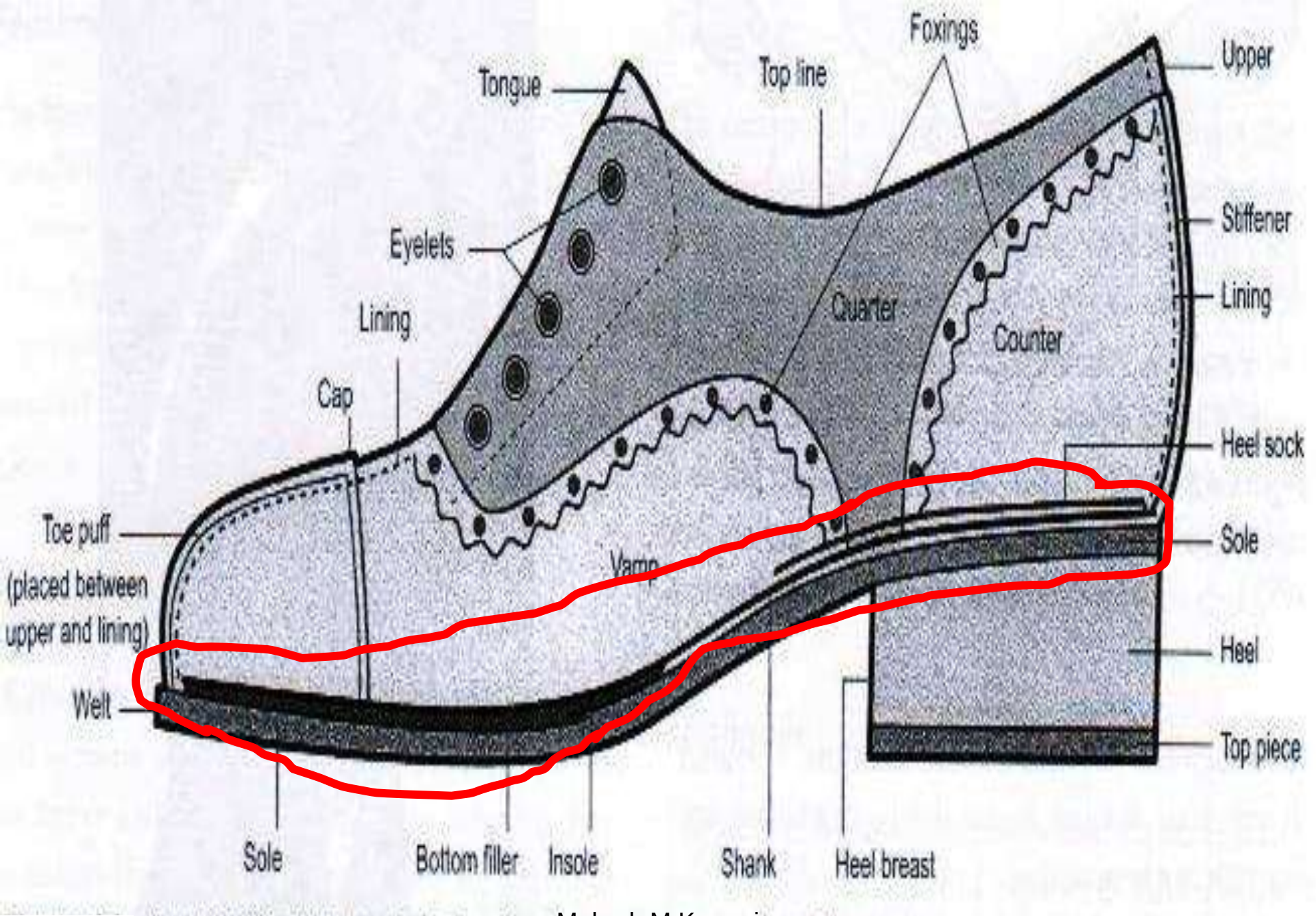
Sole

Insole (layer closest to foot)

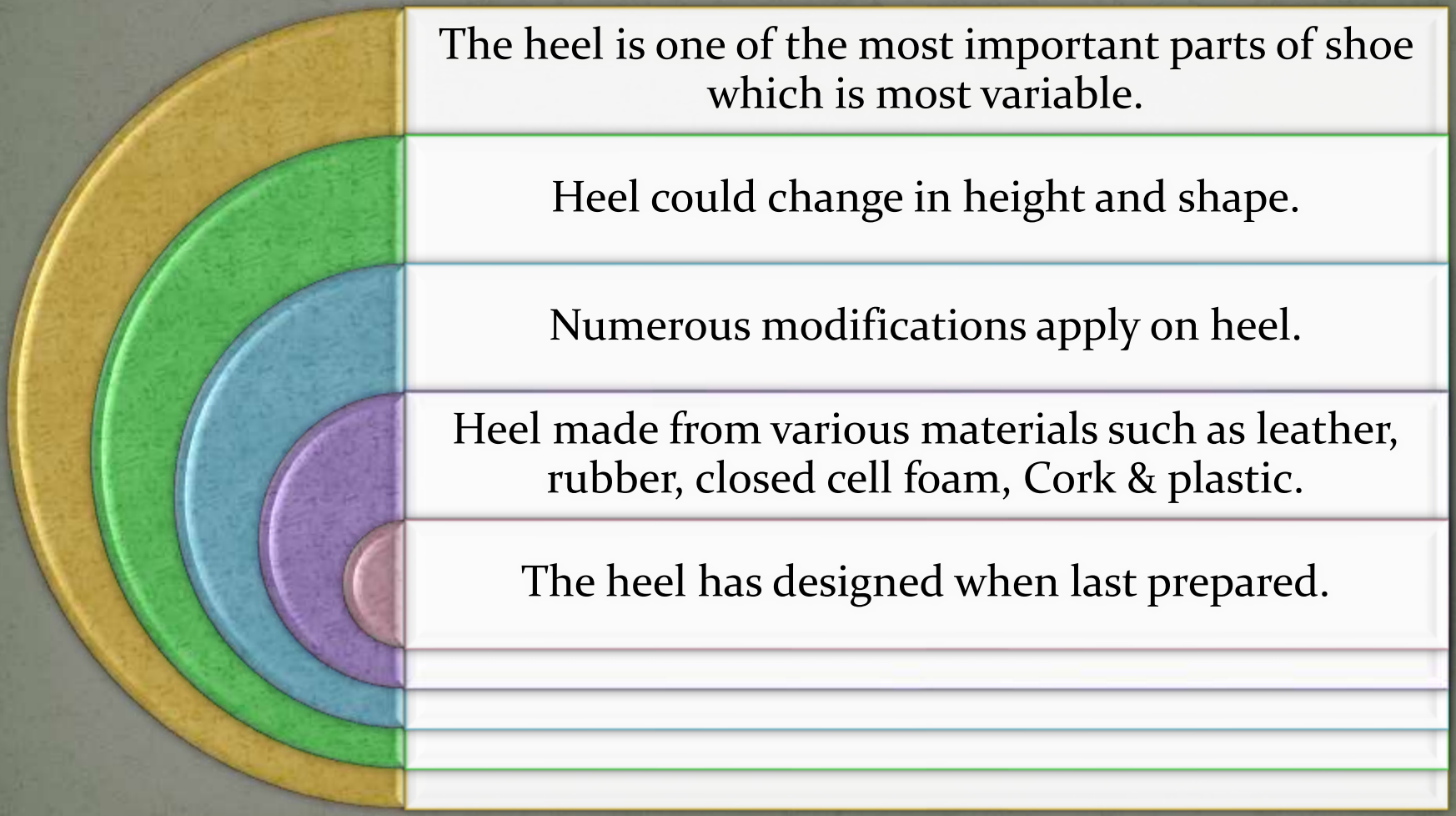
Mid sole (Layer directly below the inside that adds extra support stability & comfort (not all shoe have midsole)

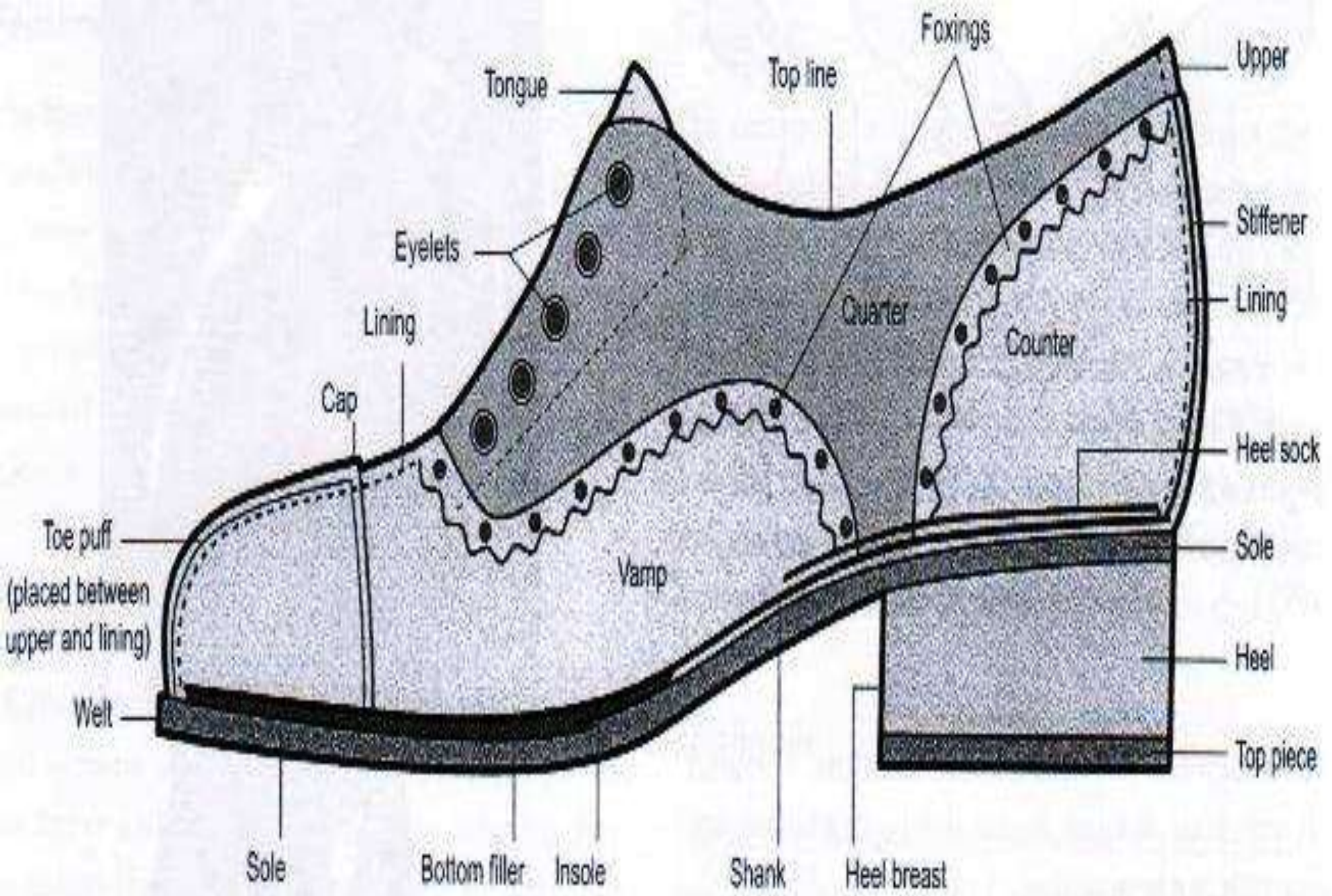
Out sole (layer contacts to ground)



A gent's Goodyear welted shoe showing components and positions.

Heel


The heel is one of the most important parts of shoe which is most variable.
Heel could change in height and shape.
Numerous modifications apply on heel.
Heel made from various materials such as leather, rubber, closed cell foam, Cork & plastic.
The heel has designed when last prepared.



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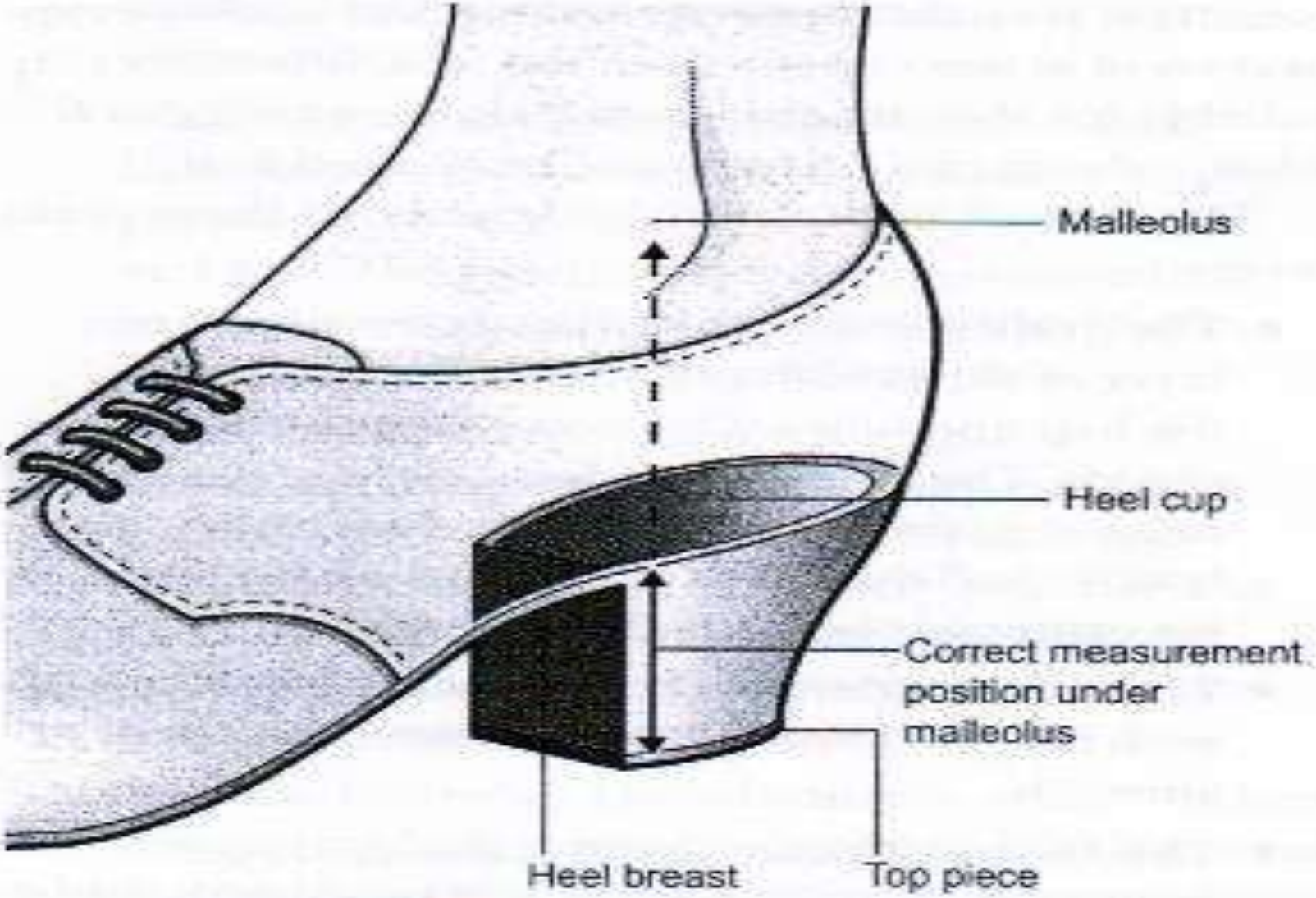
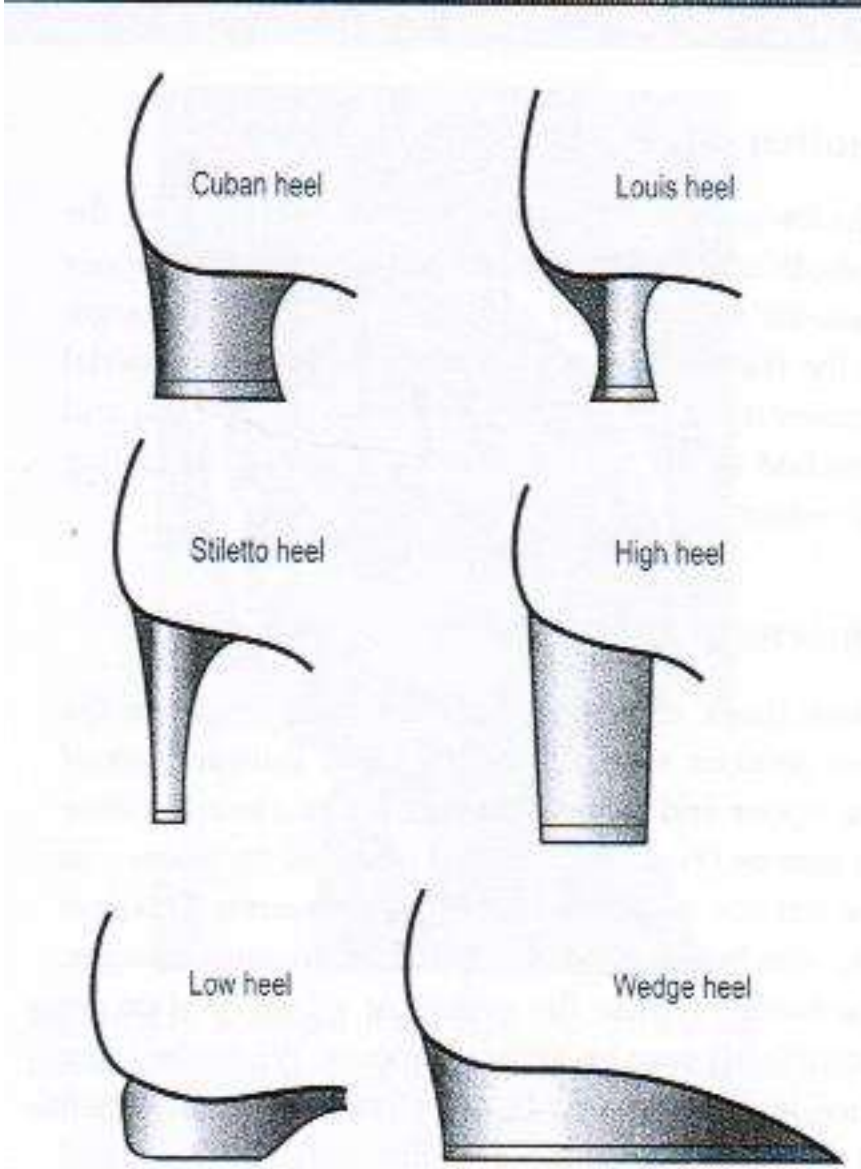
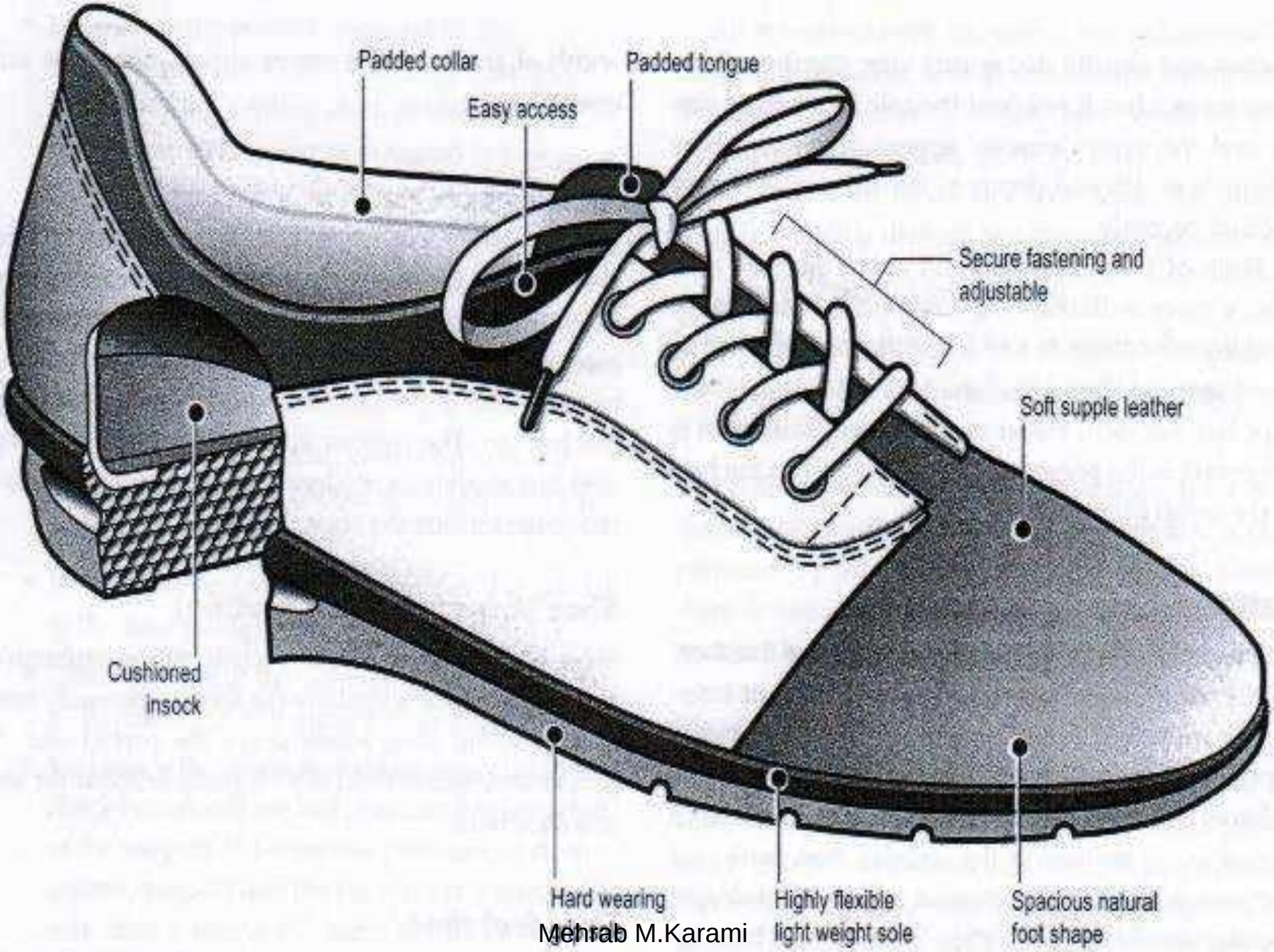


Anatomy of the heel and where to measure heel height correctly.



) Comparison of different heel shapes. (Reproduced with permission of Rossi & Tennant 1993.)



Example of the features to look for in the 'ideal' shoe.

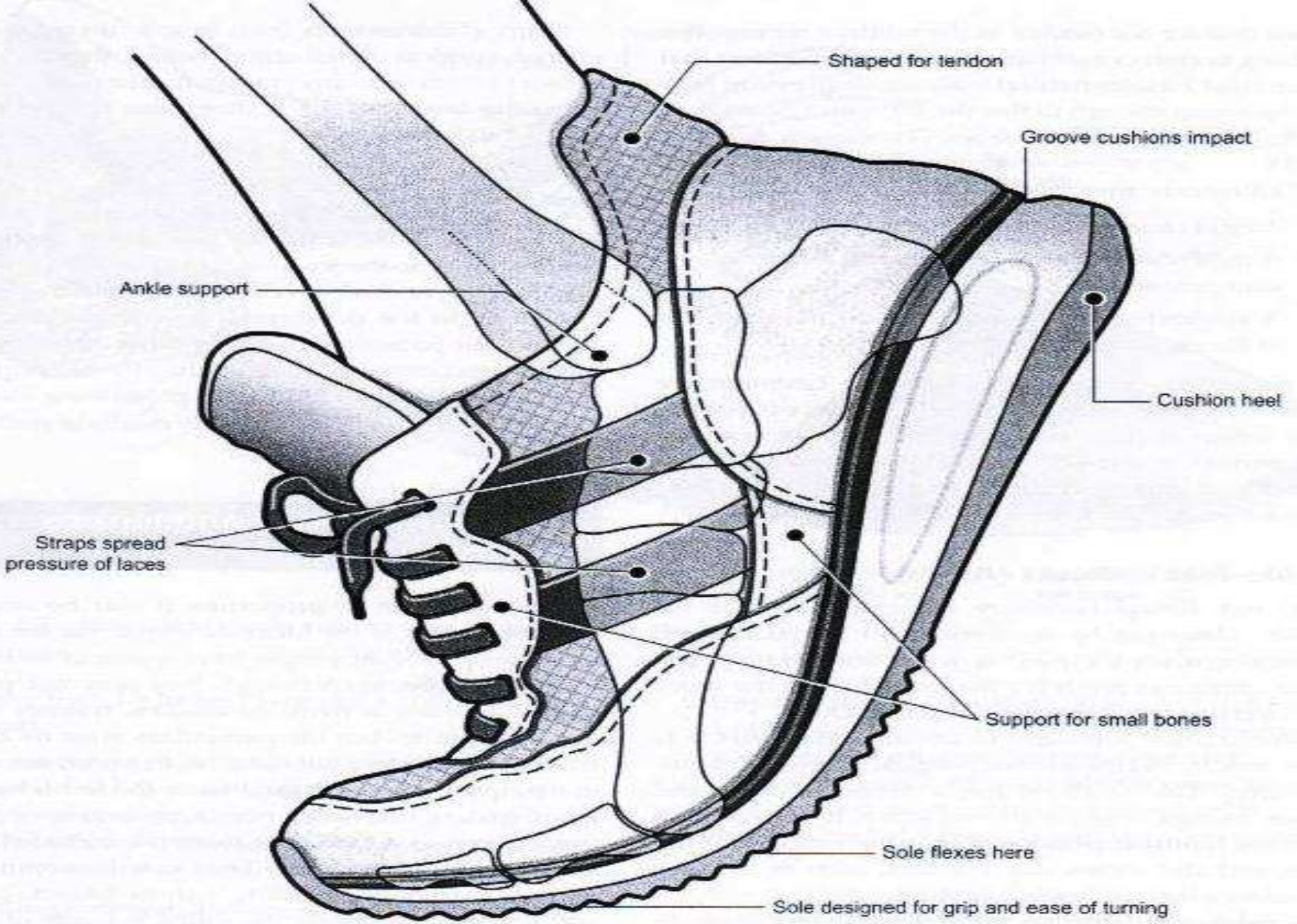


Figure 6.8 The first 'trainer shoes' came in about 1990. This diagram demonstrates how the then innovative desig worked with the foot structure for support and proper flexion.

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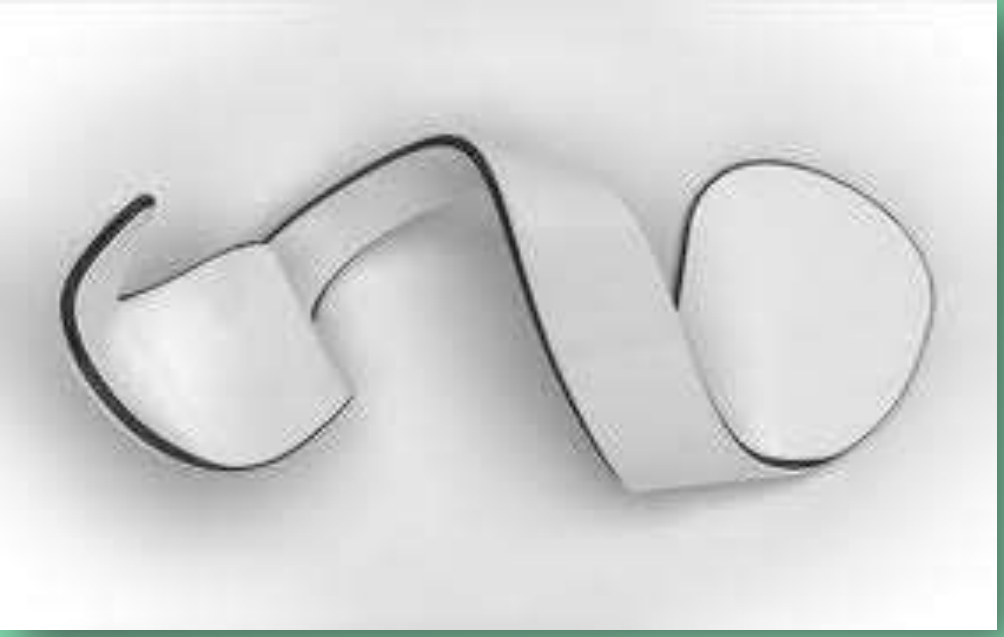

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Last

The Shape of the shoes is determined entirely by the last upon which it is maid.

The last is a solid 3D plastic or wooden model.

A last is measured at several points including:

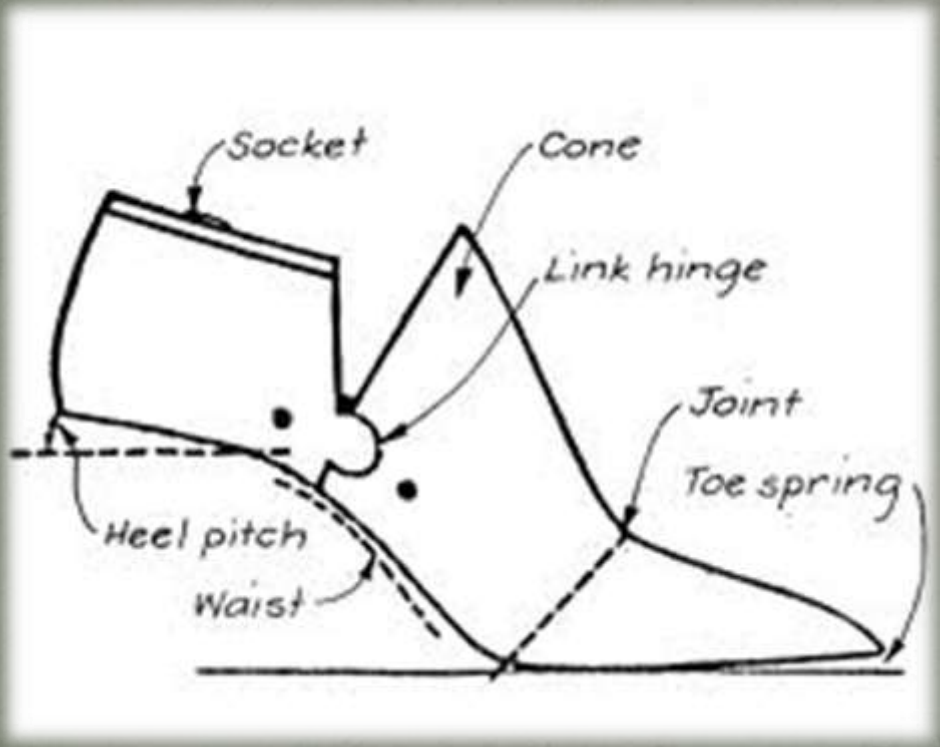
Heel to toe

Heel to ball

Circumferential measurement at the ball

Waist

Instep & Heel



Back curve: the area that is shaped to fit closely to the heel of the foot

Cone: a solid shape , become narrower at the top

Feather edge: the boundary line around the upper where it joins the welt or the sole or the corresponding line around an insole or last

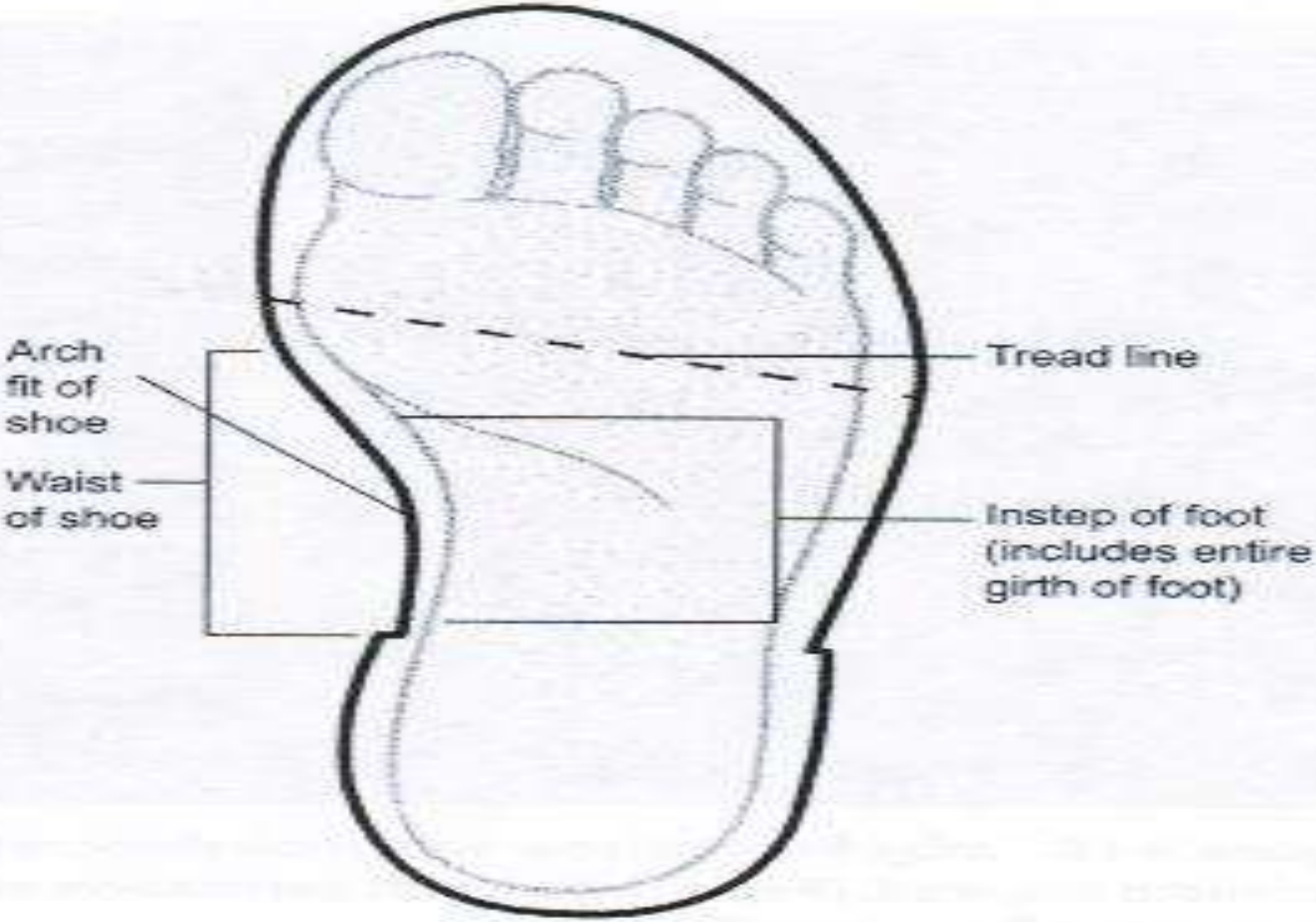
Forepart: the front part of the last from the waist forward.

Heel pitch: an angle between heel and baseline

Joint: the main line of flexing of the foot.

Toe spring: angle of the sole forepart and baseline

Waist: area anterior to the seat



Relationship between instep of foot and waist of shoe. (Modified with permission of Rossi & Tennant 1984.)

Objectives in shoe selection

- Proper fit
- Purpose

Shoes styles

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Shoe Style (base on shoe upper)

- Gibson (Blucher),(Derby), (Lace style), men & Ladies
- Oxford (Balmor)(men & Ladies)
- Mary Jane (ladies)
- Boots (men & Ladies)
- Trainer (men& ladies)

Vamp

- This is the part of the upper covering the front part of the shoe from the toe as far as the quarters.

- Quarter:2 sections which form the back , out side part of the upper and lay over the instep to close the facings.

Gibson principles

- The vamp overlies the quarter
- Very suitable
- 3 – 6 eyelets, allow to easy donning and more adjustable.
- A good style for adapting with orthoses
- Ideal style to modify vamp.

Gibson shoes(blucher or derby)

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Line drawing of a simple Gibson or Derby (Blucher) style.

Oxford

Good choice for men
Little room for orthotics

Line drawing of traditional Oxford or Bal style.

- I) Blucher

- II) Balmoral

Mary Jane

- A closed, low-cut shoe with one or more straps across the instep.
- Broad and rounded toebox, low heels, and thin outsoles
- **A good style that many people can wear**
- **Strap may cause extreme pressure on dorsum of foot**

Boots

***A lace – up boot style is very helpful, gives good control and plenty of space for orthotics.**
***Heavy**
***Limited range of motion**
Too cumbersome and bulky

Trainer

*Very suitable & comfortable
*Work well with orthotics
*Ease of adjustment
•Cusion structure
•Tennis shoes are the best

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What do the patients want from foot wear?

- Patients complaints:
- Limited number of styles
- Limited color options
- Weight of the shoe
- Comfort and fit
- Ease of putting the shoe on
- Elevated foot temperature when wearing the shoe.

Shoe sizing

- In twentieth century dramatic advances occur In nutrition & healthcare.
- Consequently people are growing taller and larger.
- Then the feet become larger and wider.
- King Edward II of England decreed that 3 barely corns placed end to end which named 1 inch.
- 1 Foot is equal to 36 corn or 12 inches.

Shoe sizing

- In 1880 the world's first proper shoe sizing system was invented by an American (Edwin B simson)
- This system depends on proportional measurements for last.
- Include: length,ball width, waist and heel
- He set up individual systems for infant's, children's, women's and men's lasts.
- Half size identified first time in this system.
- His system used the one-third of an inch measurement for each size .

Shoe Sizing System

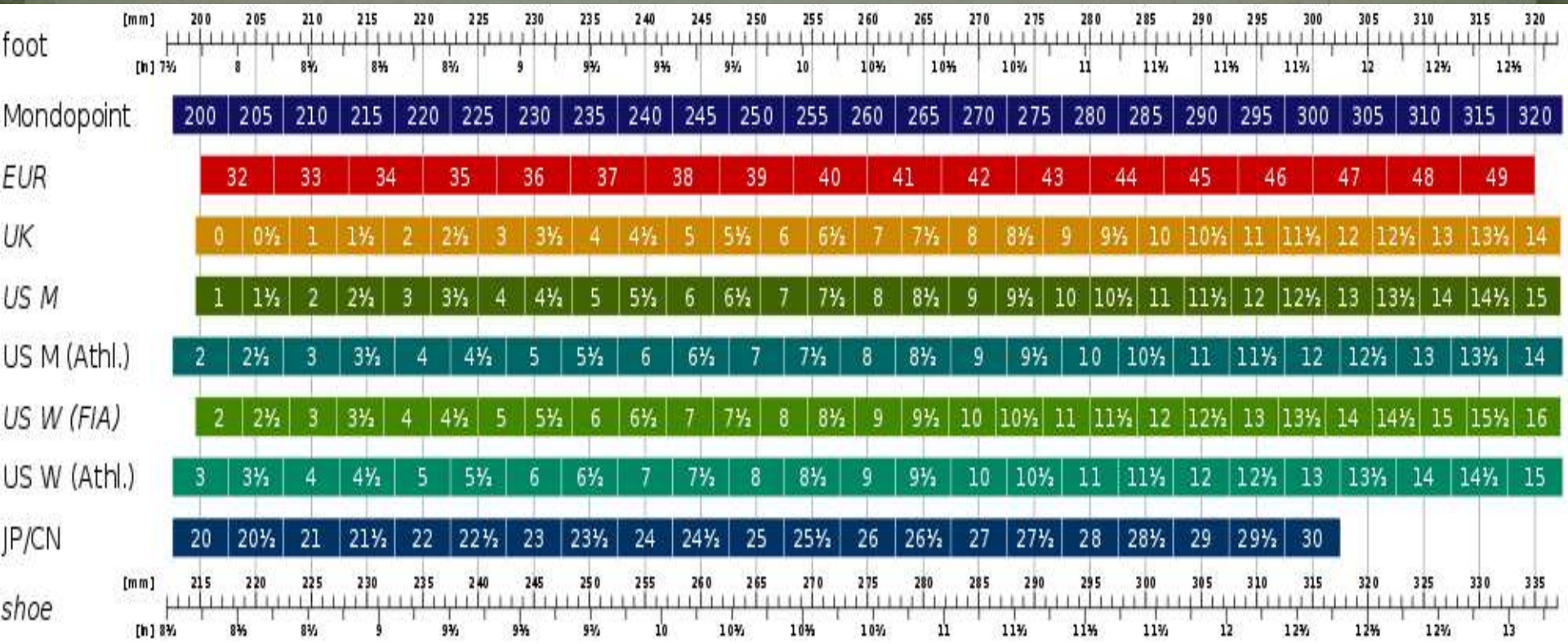
1- The English system

2- The American system

3- The continental or Paris points system

4- The Japanese or centimeter system

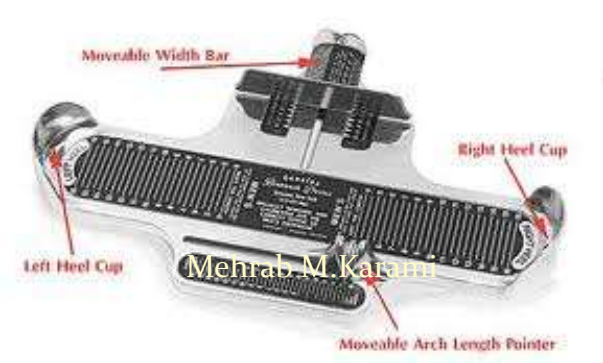
The Same Sizing System



- Paris point: shoe size = foot length (cm) + 2/3 foot length
- Uk: adult shoe size = 3 x last length in inches – 25
- USA: adult shoe size = 3 x last length in inches - 21

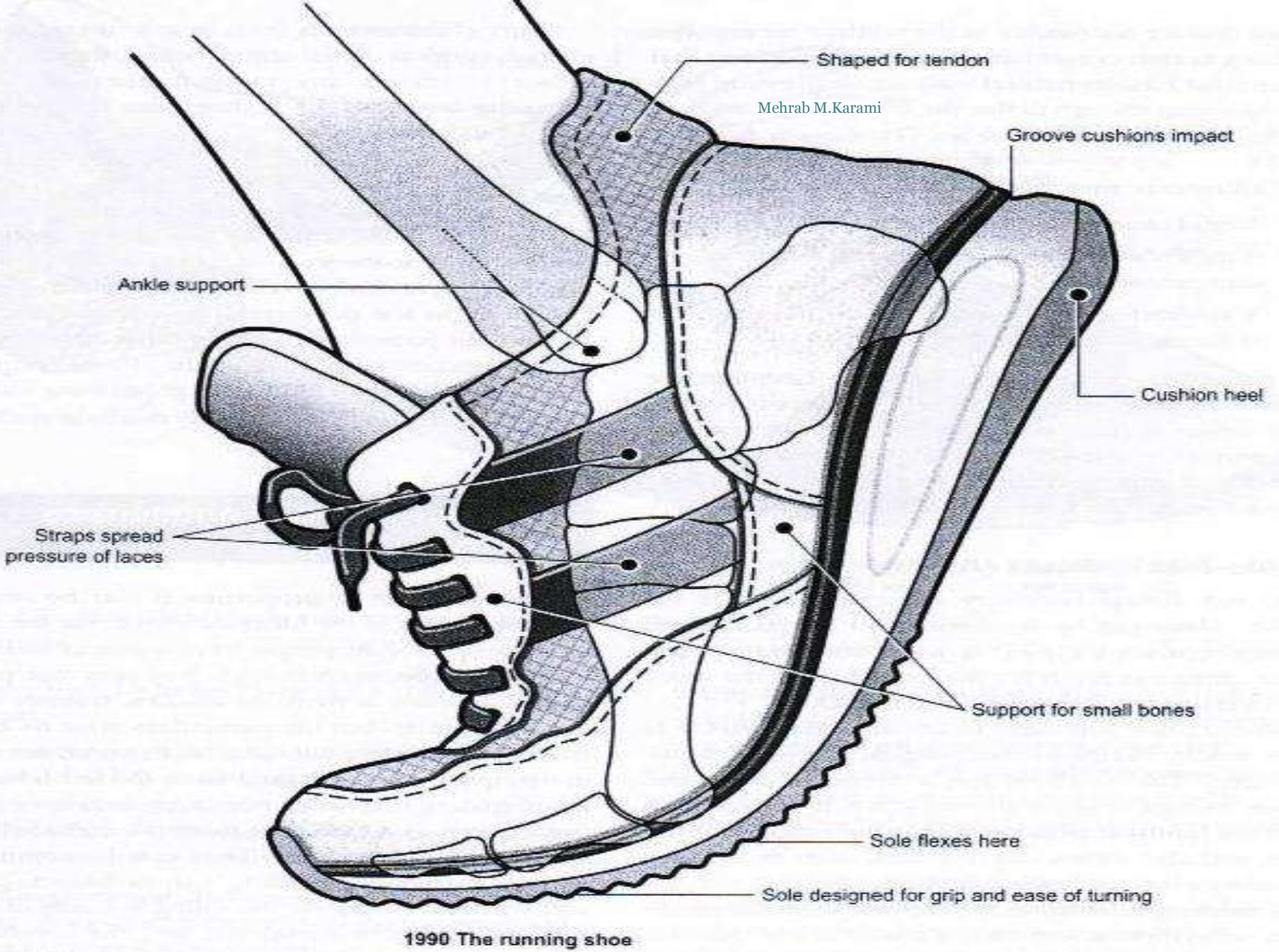
Measuring Devices

- Last maker's size stick: a box wood device similar to a ruler with one fixed end and a sliding arm. Patient must be in semi weight bearing position.
- Electronic device (measure length & width)
- Brannok de vice (length, width, heel to ball)
- Scanning (CAD CAM devices)
- Usual measure tape



Sport shoes

- Stroble construction: means that exact width and girth measurements are not critical like trainer shoes.
- All the sport shoes has a same basic pattern but the construction technique will vary according to the type of shoe and the rigidity required.



1990 The running shoe

The first 'trainer shoes' came in about 1990. This diagram demonstrates how the then innovative desig
worked with the foot structure for support and proper flexion.

Work place footwear

- Durability to repellent heavy forces. like falling hammer on toes.
- For long standing works , footwear must be very comfort.

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Diabetic footwear

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