



ReidyReel Forensics

FORENSIC PODIATRY WORKSHOP

Who wore these shoes?

Feet-in-shoes comparison: The Analysis and Comparison of Footwear

Selina Reidy (Footwear Examiner, Yorkshire and the Humber Identification Bureau)

Sarah Reel (Forensic Podiatrist & University of Huddersfield affiliate)

Footwear Analysis Session

Aim:

- ◉ To complete the footwear analysis form in preparation for a feet-in-shoes comparison
- ◉ To consider different parts of a shoe and how they:
 - > may change foot function
 - > Be changed by the functioning foot

Why do we need to undertake Feet-in-Shoes comparisons?



Background

- ◉ A feet-in-shoes examination usually involves the comparison of questioned and reference footwear of similar styles.

1. What is meant by questioned and reference footwear?

What is meant by questioned and reference footwear?

Questioned footwear

The regular wearer is in questioned. Footwear that is usually associated with a crime scene.



Reference footwear

The regular wearer is known. Its features are compared against the questioned footwear.



Process

A = Analysis

C = Comparison

E = Evaluation

V = Verification (peer review or
critical findings check)

This session will focus on 'analysis'

Feet-in-shoes Analysis Form

Exhibit Details

- ◉ Before opening the exhibit bags, note the following information

Case Reference Number		Questioned	Reference
-----------------------	--	------------	-----------

- ◉ The case number is the unique reference number that you allocate to help you identify the case in the future.
- ◉ E.g. FIS001/23
- ◉ Opening exhibit bags – take care not to damage the exhibit!
- ◉ Always start with the questioned pair of footwear first – why?

Exhibit Details

FOOTWEAR EXHIBITS:

Relating to/recovered from: _____

Use 'relating to' for questioned footwear and 'recovered from' for reference footwear

Item Number RIGHT:	Exhibit Description:		
Date and time seized:	Packaging Type:	Packaging Secure?	

The exhibit description should be as it is written on the continuity label/bag using 'sic' where necessary. E.g. 'Right Addidas [sic] trainer'

Describe the packaging eg brown paper, window evidence bag

State whether the packaging is intact/resealed etc.

In what circumstance might packaging be resealed?

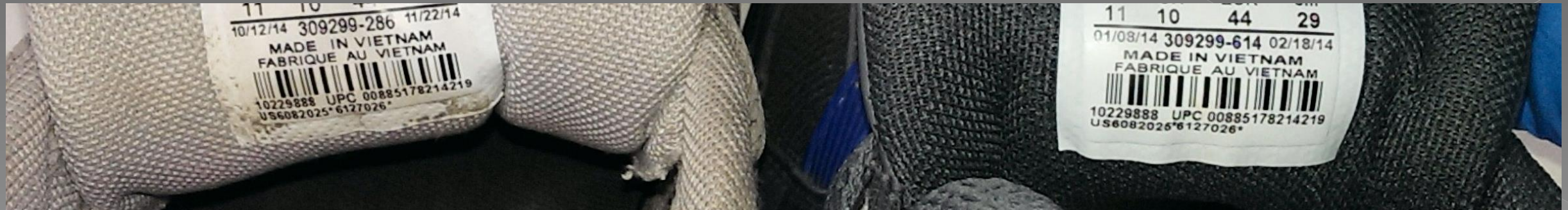
Footwear & Label Details

Make:

Model:

Made in:

Label Dates:



Marked Sizes

Marked Size:	US:	UK:	Eur:	CM:	Other:
--------------	-----	-----	------	-----	--------



Internal Shoe Length Measurement

Internally Measured Length	Right:	Left:
----------------------------	--------	-------

Why do we measure the internal length of footwear when it's written on the label?

It helps us check whether the marked size is accurate. If not, any inaccuracies may explain good or poor fit



Shoe Size Distribution

Why is knowing the shoe size important?

Male									
Size	5	6	7	8	9	10	11	12	13
%	1%	3%	11%	24%	29%	21%	9%	2%	1%

Female								
Size	2	3	4	5	6	7	8	9
%	1%	3%	12%	23%	29%	21%	9%	2%

Warning! Use any figures conservatively to give you a general overview. There are too many variables to quote and rely on figures specifically

Heel Height

Heel Height	Right:	Left:
-------------	--------	-------

- **What is it?**
 - The measured height of the front of the shoe heel
 - The height of the back of the shoe heel accounts for heel pitch
- **Why is it important?**
 - The heel influences the fit and function of the shoe on the foot
 - Heel height influences forefoot pressure & gait
- **Things to consider for the later comparison process:**
 - As the heel height increases, a smaller toe spring is required
 - As heel height increases, pronation is reduced.

Toe Spring

Toe Spring Height	Right:	Left:
-------------------	--------	-------

- **What is it?**
- The distance between the ground and outsole at the toe tip



Toe Spring

Toe Spring Height	Right:	Left:
-------------------	--------	-------

- **What is it?**
- The distance between the ground and outsole at the toe tip

- **Why is it important?**
- Requirements of a toe spring vary with heel height and sole flexibility
- It can influence how easy the shoe is to walk in
- Toe springs and rigid rocker bottom outsoles reduces the work of the metatarsophalangeal joints

- **Things to consider for the later comparison process :**
- Manufactured toe spring, functional toe spring or both?

Footwear Style & Materials

Footwear Style (eg trainer etc):

Material Type (eg leather etc):

Material & Stability (Hard/soft):



Heel Counter

Heel Counter:	Yes	No
---------------	-----	----

- ◉ **What is it?**
- ◉ The back part, surrounding the heel of the foot usually contains a heel stiffener
- **Why is it important?**
 - Stabilises rear foot motion
 - Retains shoe shape
 - Integral to foot security and shoe fit
- **Things to consider for the later comparison process :**
 - Is a heel counter present?
 - Creases
 - Displacement
 - Lining wear



Toe Box & Toe Cap

Toe Cap:	Yes	No
Toe Box Style (eg tapered, shallow etc):		

- **What is it?**
- The roofed area over and around the toes
- Includes the toe cap
- **Why is it important?**
- Accommodates the toes
- **Considerations for the later comparison process:**
- Has a narrow or short toe box changed the toe position?
- Has a narrow or shallow toe box rubbed on the toes?
- Is there any deformity or damage to the inner lining?
- Do crease lines give any information on fit or tapering?

Fastening Mechanism

Fastening Mechanism (eg laces, no. of eyelets, technique etc):

- **Why is it important?**
 - Helps to secure the foot in the back of the shoe
 - Helps to accommodate changes to foot size
 - Helps to accommodate foot deformity

- **What to look for:**
 - Is it present and/or used?
 - Fastening technique – unusual or functional?
 - Is the fastening offset offering anti-pronatory support?

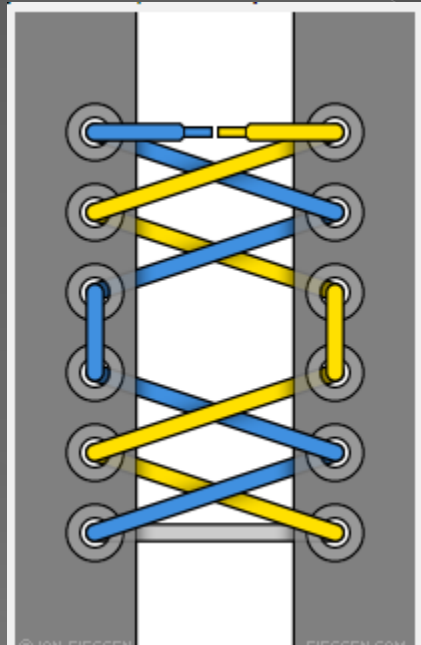
Fastening Mechanism

Fastening Mechanism (eg laces, no. of eyelets, technique etc):

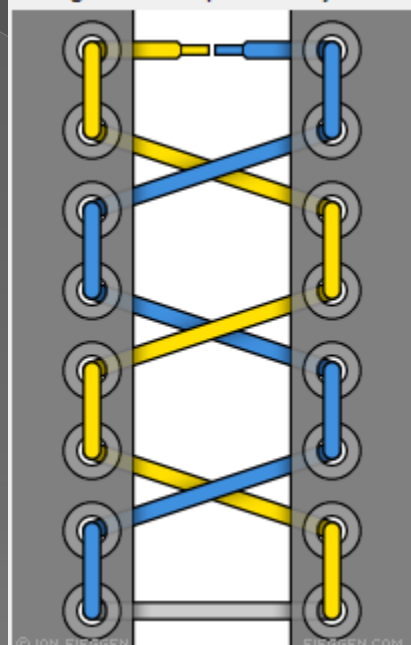


Fastening Mechanism

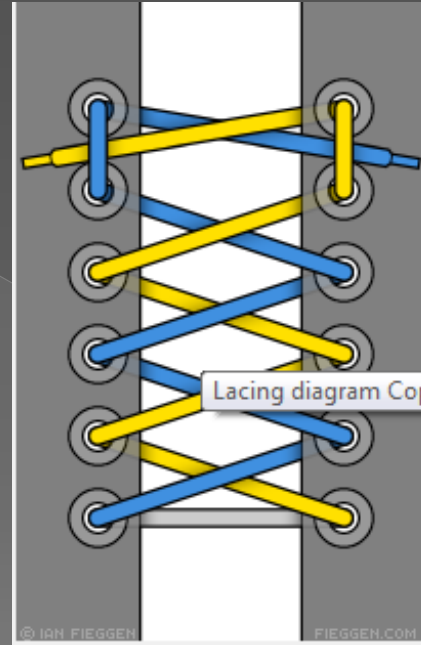
Gap Lacing



Army Lacing



Lock Lacing



Lock Laces



Fieggen, I (2016) Retrieved from

<https://www.fieggen.com/shoelace/lacingmethods.htm>

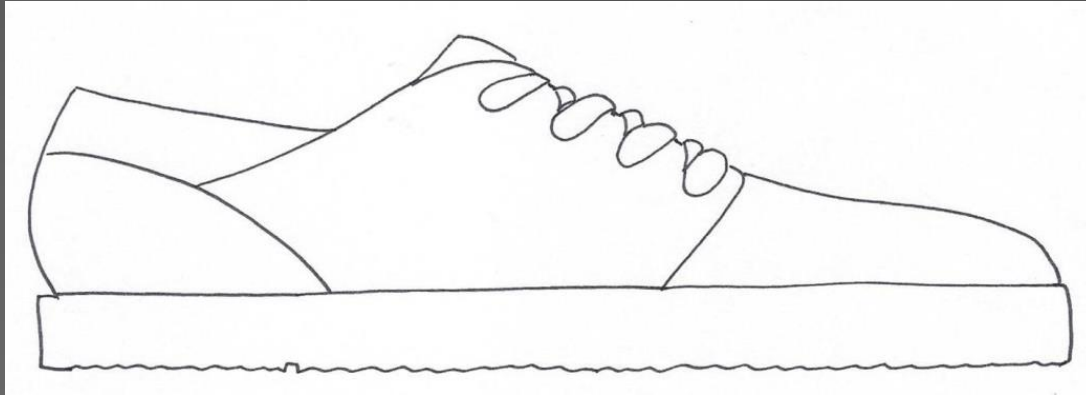
Installing Lock Laces: <https://www.youtube.com/watch?v=Q384O8SdRzM>

Outsole style



Footwear Upper Annotations

Crease marks, distortions, damage etc

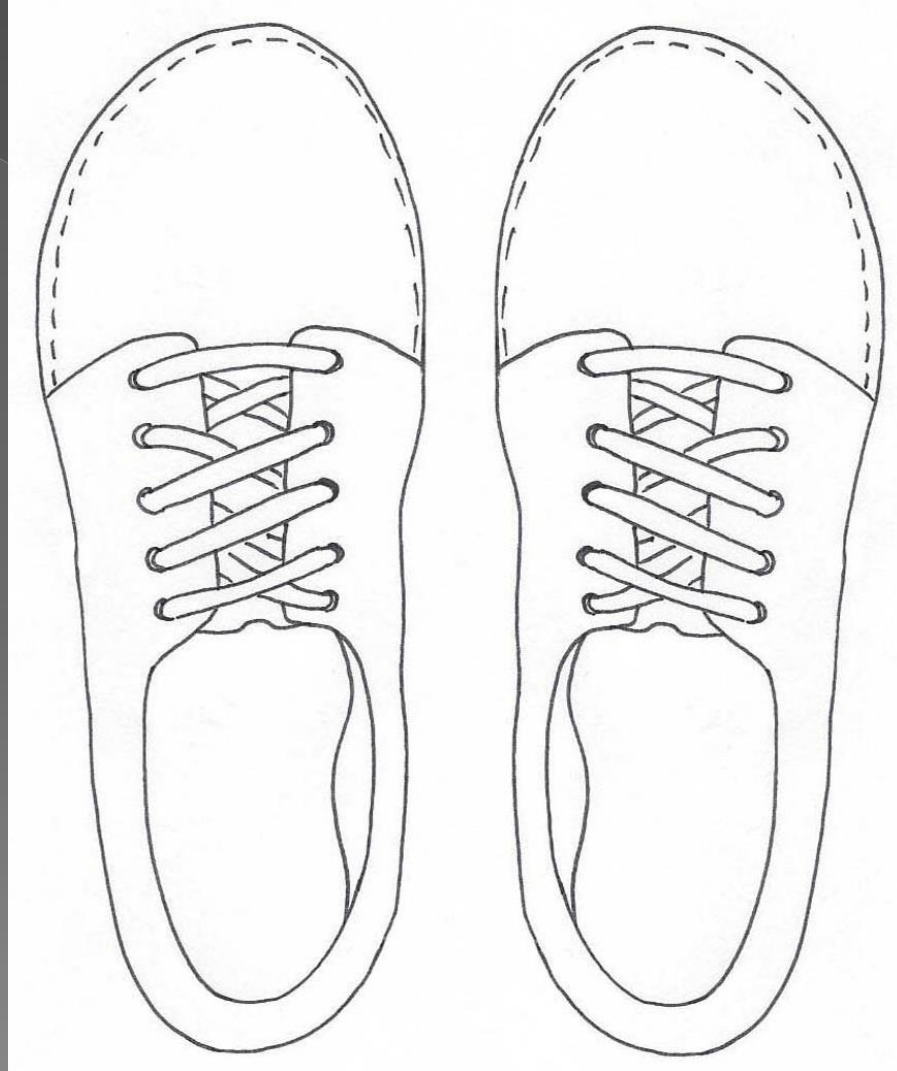


Comments (including degree of wear):

Photographed:



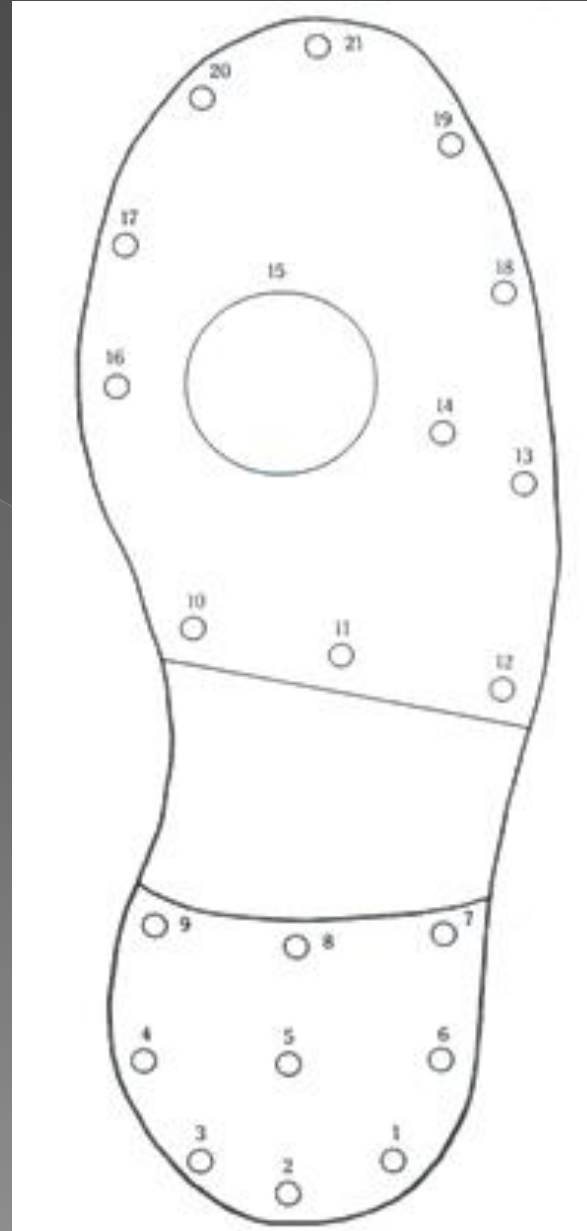
Footwear Upper Annotations



Comments (including degree of wear):

Photographed:

Footwear Outsole Annotations

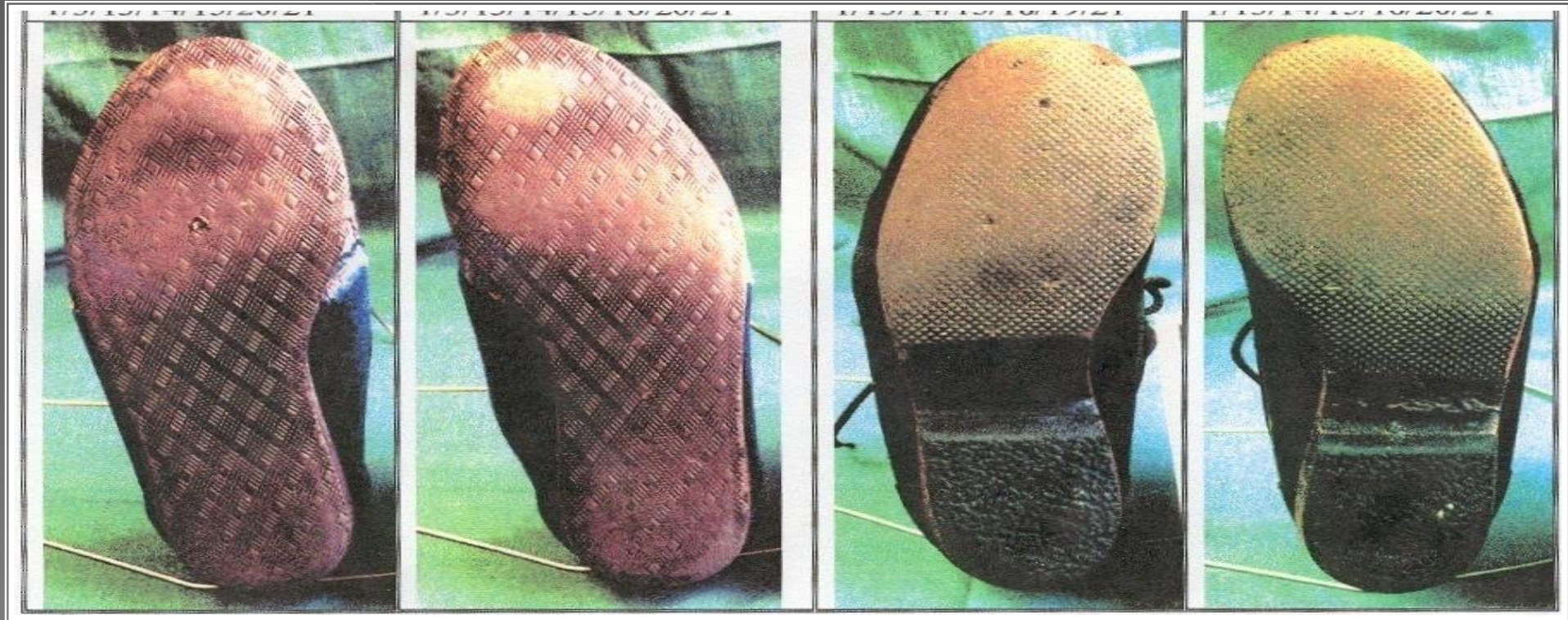


Focal point codes:

Comments (degree of wear):

Outsole Wear Patterns

Outsole wear patterns cannot be linked with causal pathology in isolation - require a context for interpretation



Insole Analysis

Detachable:	Fixed:	Permission to cut open shoes granted by:	Date:
--------------------	---------------	---	--------------

What may you have to consider if the insole is removable?

- Insoles that have moved around in the shoe when walking. This may suggest a different foot length or shape
- Replaced insoles may suggest more or less wear than the rest of the trainer
- Swapped insole (with another person?)
- More than one insole (to make a worn shoe more comfortable or improve fit of a shoe that's too big for the foot)

Insole Analysis

Insole Footprint Impression Visible?

Right

Left



Insole Analysis: Measurements & Overlay

Mock exercise:

Using a marker, an acetate sheet and a photograph of the insole, create an overlay of the footprint impression.

This, in addition to measurements taken, would be used as part of the comparison stage.

Gunn Lines	Left	Comments
Heel to 1 st	mm	
Heel to 2 nd	mm	
Heel to 3 rd	mm	
Heel to 4 th	mm	
Heel to 5 th	mm	



Insole Analysis: Measurement results from mock exercise

Gunn Lines	Left (mm)
Heel to 1 st	27.75
Heel to 2 nd	27.40
Heel to 3 rd	26.90
Heel to 4 th	25.45
Heel to 5 th	(23.60) Indiscernible

Internal Wear Marks & Fit: Upper

Right: Site	Feature/Comments

Left: Site	Feature/Comments



Final Comments

Additional Comments:

Suggested referral to other speciality if applicable:

Examination Completed By:	Signed:	Date:
Forensic Assistant (if Applicable):	Signed:	Date:



Any Questions?

ReidyReel@gmail.com