BLOODY BARE FOOTPRINTS - WHAT SIZE WILL THEY MAKE?

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International Association of
Bloodstain Pattern Analysts News,
Vol 14, #2, June, 1998, pp 1-5
Bloody Footprints

Disclaimer: The opinions expressed are those of the author and do not necessarily reflect the views of the U.S. Air Force or the Department of Defense.

METHODS

This research was initiated after receiving a case in which a bloody bare footprint was left at the scene of the murder of a newborn child. There was insufficient ridge detail in the bare footprint to compare it with the suspect's inked print. Therefore, the question of whether the suspect had or could have produced the print based on the size of the print was put forth. Research of footprint and bloody print information through various sources revealed no documented information on the expected resultant size of a bloody footprint from a known foot. In other words, it was unknown whether a person making a bare footprint would leave a print that would measure the same size as their foot, smaller than their foot (due to the curvature of the foot), or larger than their foot (due to the weight of the person and a "squashing out" effect).

In an effort to determine the answer to this question, experiments were undertaken in which people made bloody footprints. Initially, we measured the bare foot of each person at six different points. The measurements were made with a 12" Dial Verner Caliper (accurate to .001"). Then each individual had two purple top tubes of their own blood drawn. This blood was then "painted" onto their bare foot with a paintbrush. Once a sufficient coating of blood was on the foot, they then stepped onto a surface, in a motion similar to a slow walk. These prints were allowed to air dry and then they were photographed and measured, using the corresponding six measurements that were previously taken of the foot itself. Experiments involved numerous persons of varying weight and foot size.

A second variable was addressed in that we had the individuals produce footprints on various types of floor surfaces. This was done to determine if the resulting size of the bloody footprint relative to the size of the actual foot would change on different surfaces. Footprints were made on asphalt tile, brick, carpet (short pile), rubber flooring, and wood.

RESULTS

The below data represents the research findings in these experiments. All measurements are in inches. The terms used in the data charts are defined as follows:

Difference: The difference between the actual foot measurement and the measurement of the same area of the foot on the blood print.

Average: Sum of all the differences divided by the number of measurements.

Range: Distance between the largest positive difference and the largest negative difference.

ASPHALT TILE

Center Heel to Big Toe	Center Heel to Middle Toe	Center Heel to Little Toe
-.045	+.004	+.208
-.183	+.214	+.275
-.816	-.134	-.198
+.044	+.037	+.382
+.322	+.176	-.045
+.236	+.516	-.020
+.552	+.512	-.086
+.197	+.480	------
Ave: +.038	Ave: +.231	Ave: +.074
Range: 1.368	Range: .65	Range: .58

Big Toe to Little Toe	Medial Knuckle to Lateral Knuckle	Heel
------	+.019	-.010
+.151	+.113	-.098
------	-.010	------
+.562	+.220	-.131
+.427	+.182	+.131
------	------	-.325
+.292	+.198	-.103
+.700	+.355	-.025
Ave: +.426	Ave: +.154	Ave: -.08
Range: .549	Range: .456	Range: .456

BRICK

Center Heel to Big Toe	Center Heel to Middle Toe	Center Heel to Little Toe
-.099	+.005	-.289
-.069	+.291	+.061
-.061	-.172	-.166
+.109	+.111	+.006
+.022	-.044	+.031
+.362	+.597	-.034
+.450	+.478	+.343
-.095	+.219	-.072
Ave: +.01	Ave: +.186	Ave: +.003
Range: 1.051	Range: .769	Range: .63

Big Toe to Little Toe	Medial Knuckle to Lateral Knuckle	Heel
+.334	+.179	-.026
+.176	+.204	-.127
------	+.009	-.567
+.497	+.254	+.061
+.243	+.003	-.121
+.360	+.100	-.036
+.612	+.395	-.169
+.562	+.415	+.176
Ave: +.448	Ave: +.195	Ave: -.101
Range: .436	Range: .412	Range: .743

CARPET

Center Heel to Big Toe	Center Heel to Middle Toe	Center Heel to Little Toe
+.412	+.218	-.078
-.068	+.382	------
-.279	+.101	-.055
+.288	+.134	-.012
+.171	+.095	+.129
+.359	+.386	-.176
+1.25	+.796	+.495
-.390	-.208	-.324
Ave: +.218	Ave: +.238	Ave: -.003
Range: 1.529	Range: 1.004	Range: .819

Big Toe to Little Toe	Medial Knuckle to Lateral Knuckle	Heel
+.355	+.128	-.011
------	+.291	-.149
------	-.080	-.359
+.568	+.278	+.057
+.370	+.291	-.109
+.521	+.242	+.148
+.713	+.377	-.032
+.388	+.247	+.007
Ave: +.486	Ave: +.222	Ave: -.056
Range: .358	Range: .457	Range: .507

RUBBER FLOORING

Center Heel to Big Toe	Center Heel to Middle Toe	Center Heel to Little Toe
+.409	-.027	-.070
-.108	+.459	+.165
-.419	+.492	-.059
+.233	+.352	+.169
+.421	+.382	+.406
+.216	+.107	-.174
+.387	+.358	+.277
-.258	+.345	-.130
Ave: +.110	Ave: +.309	Ave: +.073
Range: .84	Range: .519	Range: .58

Big Toe to Little Toe	Medial Knuckle to Lateral Knuckle	Heel
+.335	+.216	+.046
+.288	-.370	-.118
------	+.081	-.440
+.446	+.113	+.225
+.363	+.280	-.045
+.352	-.009	-.070
+.565	+.078	-.171
+.360	+.200	+.119
Ave: +.339	Ave: +.074	Ave: -.057
Range: .277	Range: .65	Range: .665

WOOD

Center Heel to Big Toe	Center Heel to Middle Toe	Center Heel to Little Toe
+.278	+.472	+.278
-.059	+.233	-.059
-.571	-.036	-.571
+.240	+.277	+.240
-.108	+.048	-.108
+.269	+.458	+.269
+.624	+.643	+.624
-.033	+.091	-.033
Ave: +.08	Ave: +.273	Ave: +.041
Range: 1.195	Range: .679	Range: .713

Big Toe to Little Toe	Medial Knuckle to Lateral Knuckle	Heel
+.472	+.278	+.472
+.233	-.059	+.233
-.036	-.571	-.036
+.277	+.240	+.277
+.048	-.108	+.048
+.458	+.269	+.458
+.643	+.624	+.643
+.091	-.033	+.091
Ave: +.386	Ave: +.225	Ave: -.118
Range: .428	Range: .337	Range: .33

OVERALL

Asphalt Tile
Ave: +.141
Range: 1.516

Brick
Ave: +.124
Range: 1.198

Carpet
Ave: +.184
Range: 1.609

Rubber Flooring
Ave: +.141
Range: 1.005

Wood
Ave: +.148
Range: 1.214

Largest Positive Difference: + 1.25

Largest Negative Difference: -.601

CONCLUSIONS

Based on this small number of samples, it appears that the answer to our first research question is "YES"- to all three!! In other words, the size of the bloody bare footprint can be smaller, larger, or equal to the actual foot making the print. There does appear to be a reasonable range ~~of~~ difference that can be expected on either side of the actual size of the foot.

Two possible trends could possibly be developing from this sample of data. One is that the surfaces on which the print is made might be an unremarkable variable in what we expect from the size of the print. The second is that the heel width measurement in the bloody print appears to be relatively consistently smaller than the actual heel width.

Very obviously, there needs to be further research on all of these topics with many more samples obtained before any strong conclusions can be drawn. Since presenting this research at the Seattle IABPA Meeting, I have become aware of some significant research Mr. Robert Kennedy of the Royal Canadian Mounted Police has undertaken in this area. Hopefully, this is something he will be able to follow through with and present at a later time.