



The Relationship Between Fluctuating Asymmetry and Performance in Event Horses

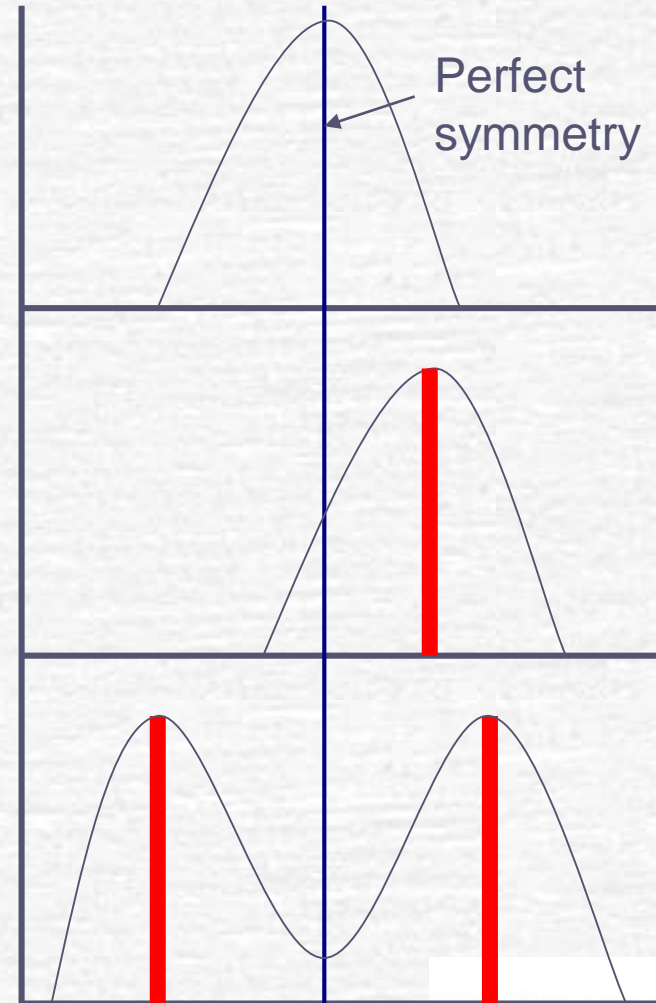
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Introduction

- Optimal condition
- Controlled by individual growth patterns
- Small *random* deviations
 - Fluctuating Asymmetry
 - Directional Asymmetry
 - Antisymmetry

Moller 1993; Manning *et al.* 1996



Introduction

- Manning and Ockenden (1994)
 - Racehorses with higher performance ratings demonstrated lower FA
 - 10 paired characteristics
 - Both functional and non-functional traits significant
- Manning and Pickup (1998)
 - Positive correlation between symmetry and athletic performance (speed) in male middle distance runners
 - Non-functional traits
 - Pinna length and nostril width strongly correlated
- What about other disciplines?

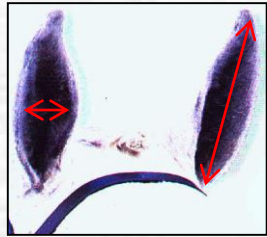
Aims

- To identify whether a relationship existed between anatomical symmetry and athletic ability in event horses.
- Which specific bilateral traits are most reflective of this relationship.

Methodology

- 18 horses who had competed and gained points at British Eventing advanced level during previous 2 years
- 15 horses bred to event but had proven incapable of progressing further than British Eventing novice/ intermediate level
- 13 bilateral traits measured
 - Functional and non-functional
- Callipers and a tape measure; accuracy of 0.1mm and 5mm respectively
 - As used by Manning and Pickup (1994)
- $FA = Li - Ri$
 - Resultant sign ignored as not looking at direction of asymmetry
- Mann Whitney u test (5% significance level)

Methodology



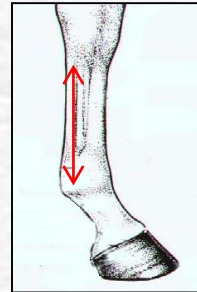
- Pinna length (0.33%) and width (1.74%)



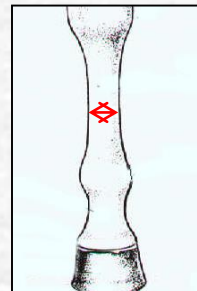
- Nostril length (0.48%) and width (3.69%)



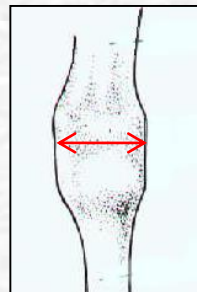
- Fore and hind proximal phalanx length (1.19%; 1.65%) and width (1.08%; 1.62%)



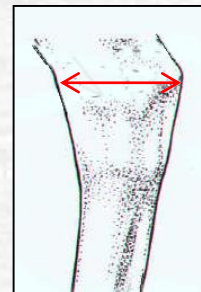
- MCI length (0.72%) and width (0%)



- MT length (0.47%) and width (0.65%)

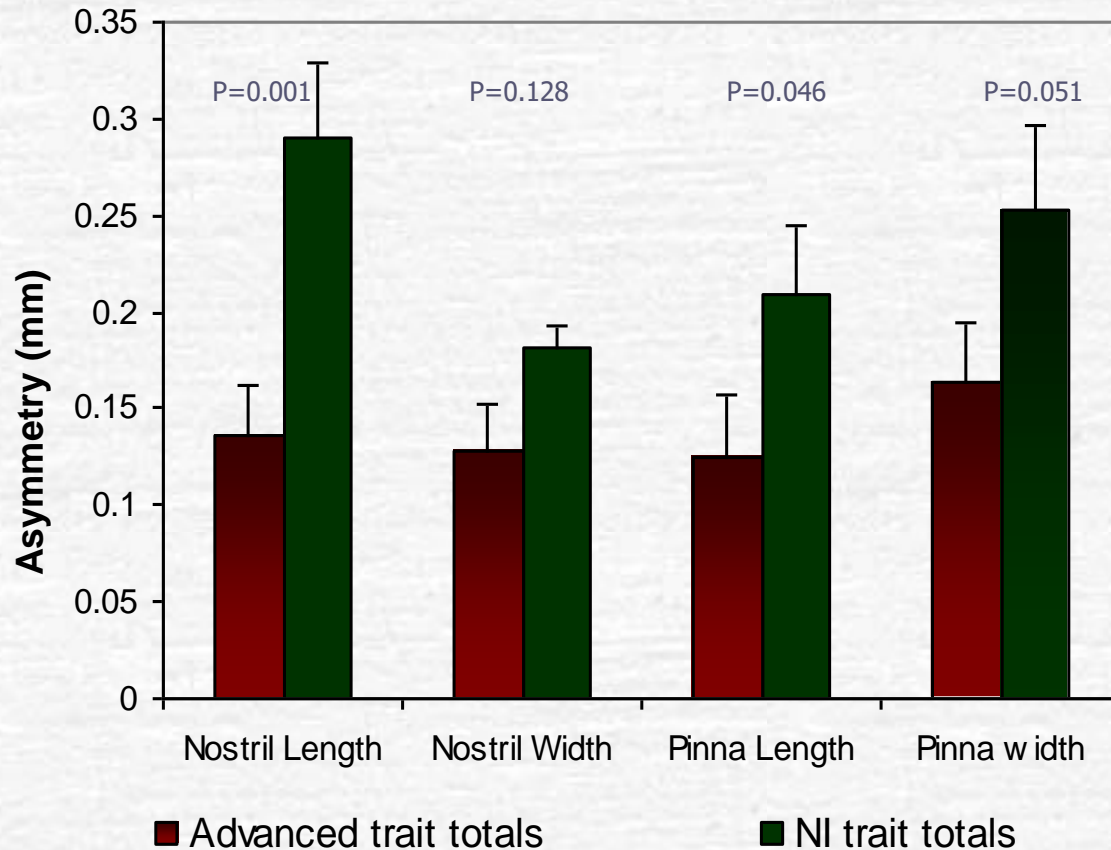


- Carpal width (0.55%) and circumference (0.54%)



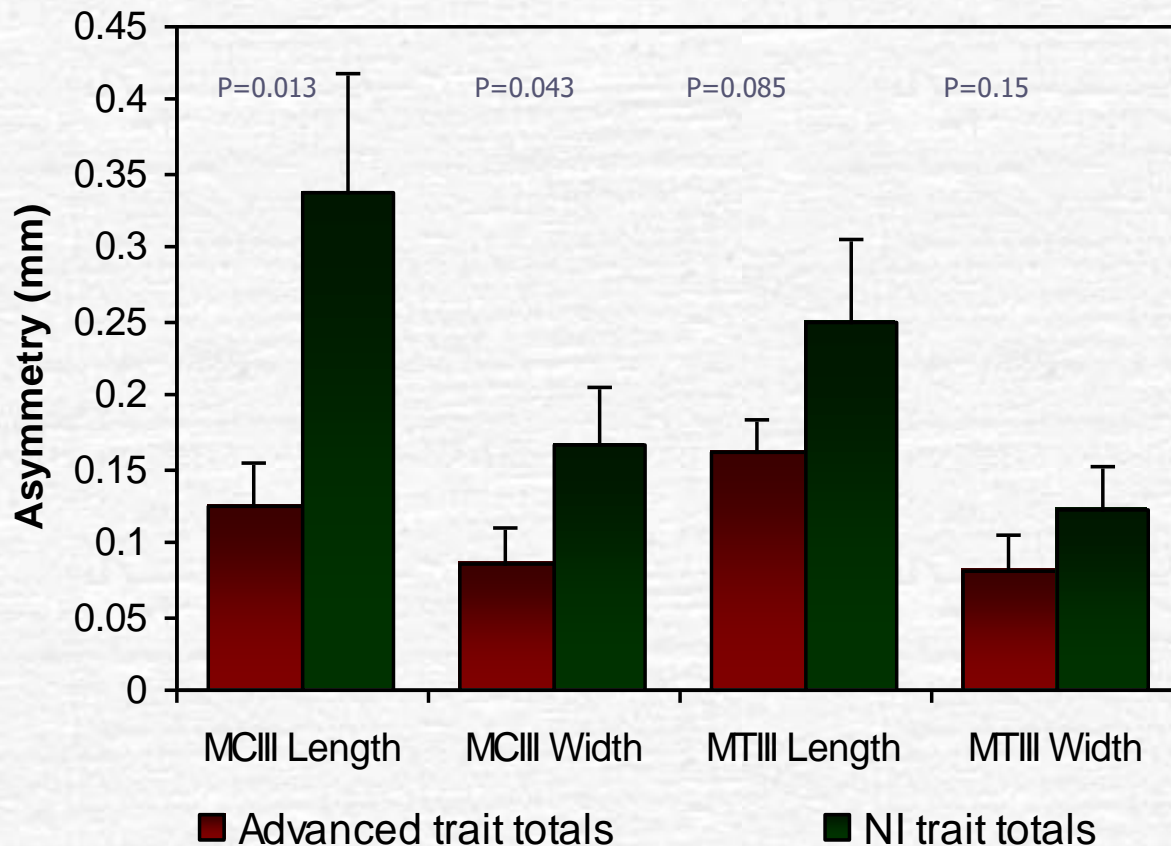
- Tarsal width (0.29%)

Results – Traits of the head



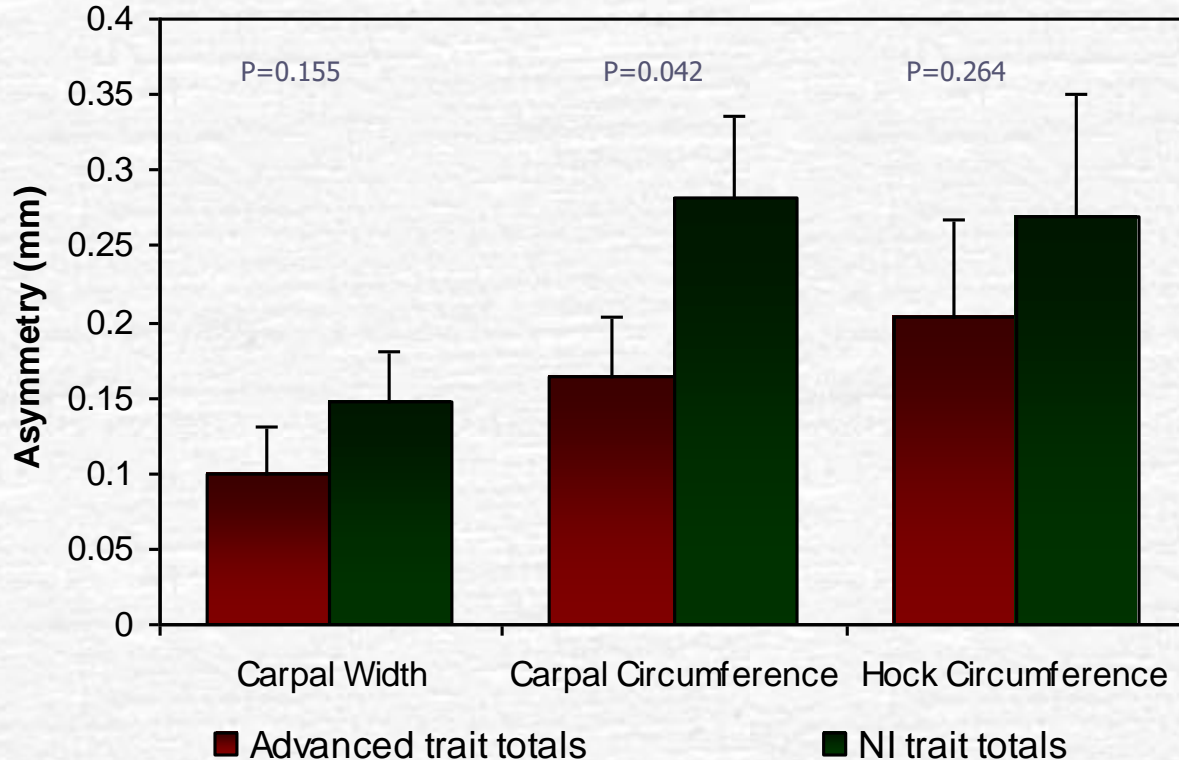
Asymmetry as percentage of trait size		
Trait	Advanced	NI
Nostril Length	2.22	4.54
Nostril Width	3.64	5.53
Pinna Length	0.81	1.37
Pinna Width	2.70	4.05

Results – Traits of the long bones



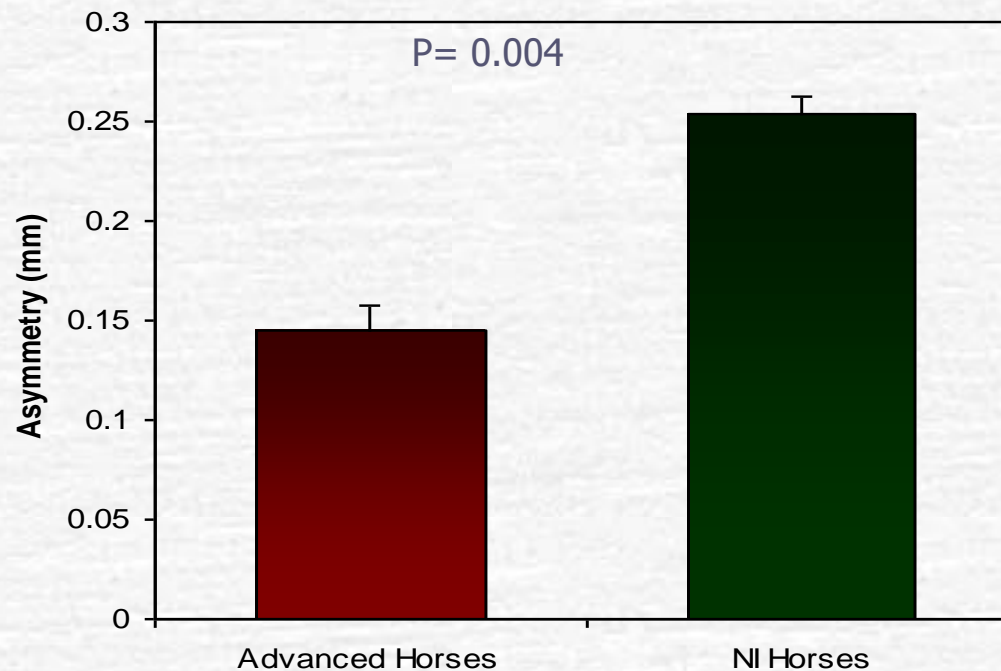
Asymmetry as percentage of trait size		
Trait	Advanced	NI
MCIII Length	0.62	1.74
MCIII Width	1.78	3.54
MTIII Length	0.65	1.02
MTIII Width	1.80	2.72

Results – Carpal & tarsal joint traits



Asymmetry as percentage of trait size		
Trait	Advanced	NI
Carpal Width	0.29	0.44
Carpal Circumference	1.52	2.68
Hock Circumference	0.48	0.64

Results – Mean Asymmetry



Discussion

- Non- functional traits show greater range of asymmetry
- Asymmetry in functional traits not considered large enough to cause biomechanical alterations
- Reflective of internal disturbances?
- Phenotypic indicator of genotypic quality?

Conclusion

- The results reinforce previous research findings indicating that the elite equine athletes demonstrate a much lower trait asymmetry.
- The results agree with previous finding that non-functional traits are more strongly affected and may therefore be a better reflection of performance potential than functional traits.
- These findings could be used to identify potentially superior equine athletes at a young age
- Could be furthered to identify any association with injury prevalence