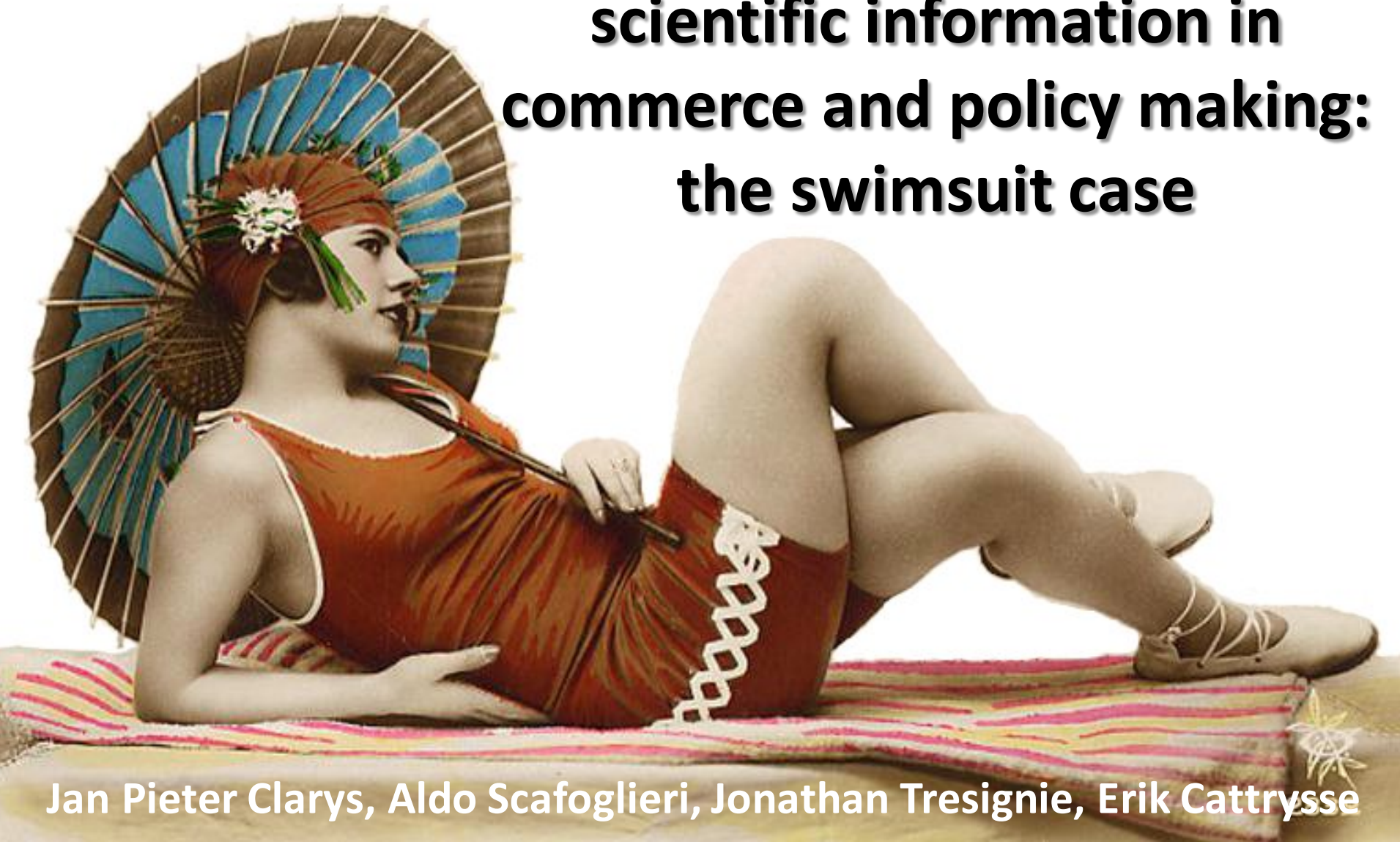


Dubious use or misuse of scientific information in commerce and policy making: the swimsuit case



Jan Pieter Clarys, Aldo Scafoglieri, Jonathan Tresignie, Erik Cattrysse

Experimental Anatomy - Vrije Universiteit Brussel

REMINDER

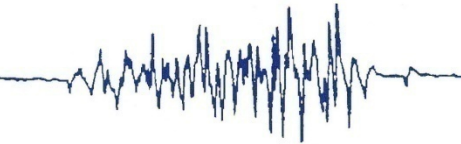
21st century

1st decennium

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+ 130 records and Olympic Medals



REMINDER

**Records and Olympic Medals
have been associated with
High Tech Swimwear**



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REMINDER

**High Tech Swimwear
was associated with drag reduction**



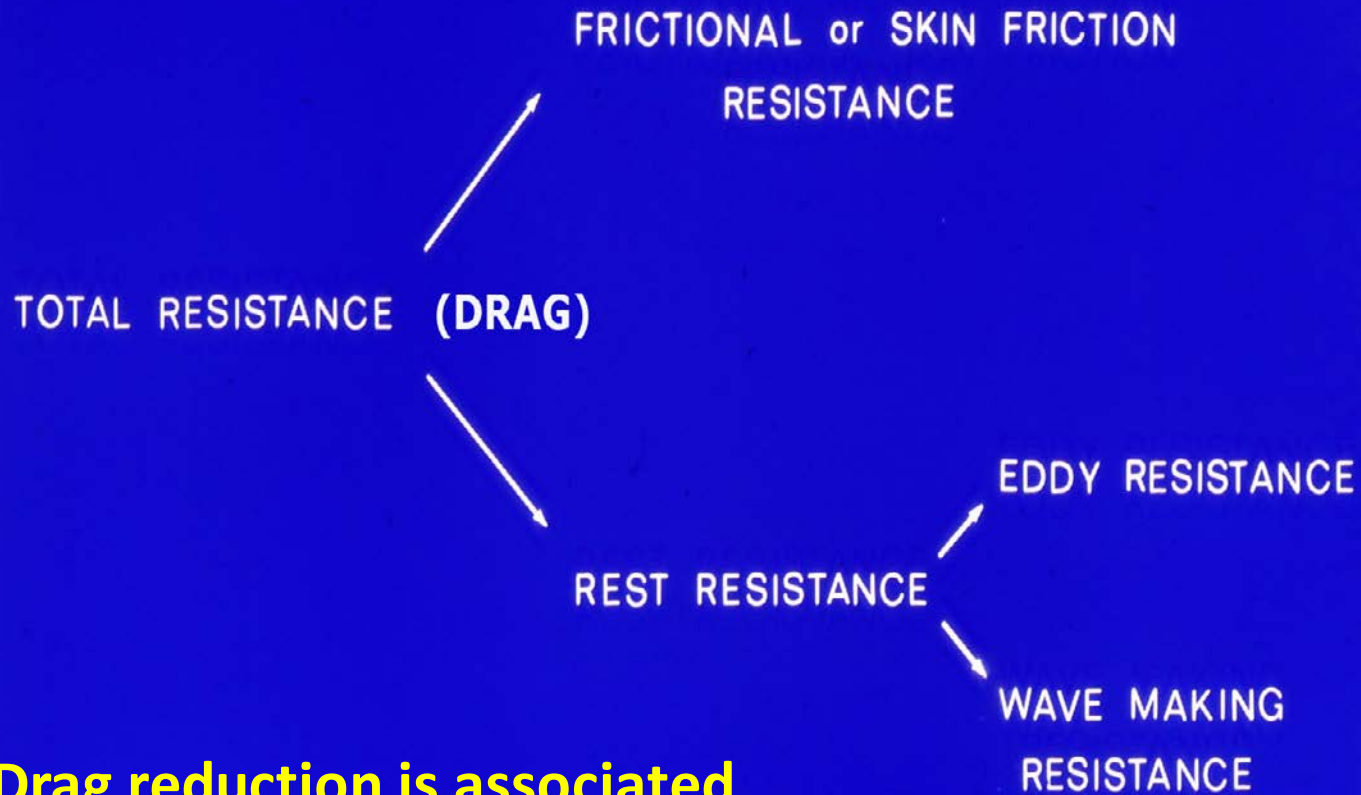
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REMINDER



Drag reduction is associated with frictional and wavemaking resistance

REMINDER

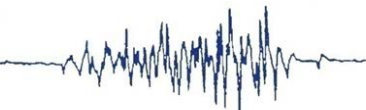
**Frictional and wavemaking
resistance are associated with
Body Form**

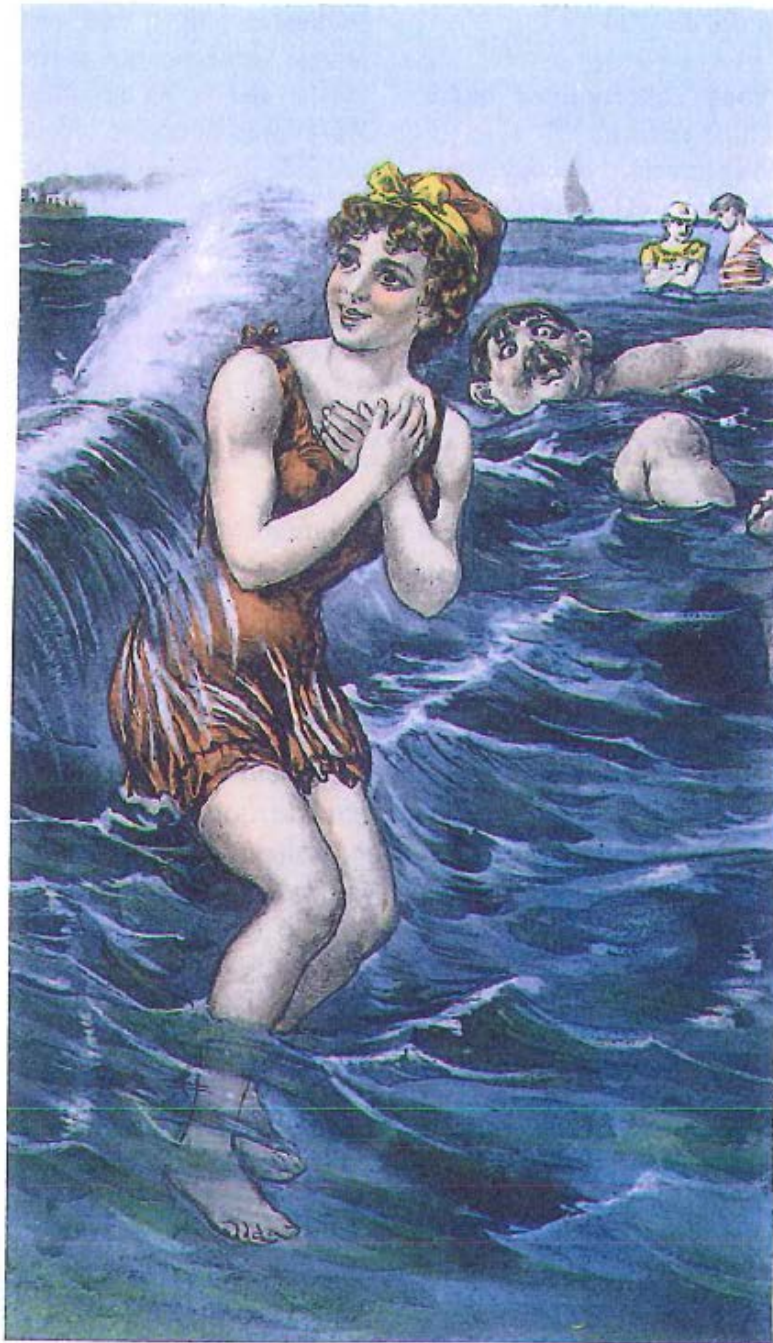


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Carte dessinée par un artiste anonyme. Non oblitérée.

REMINDER

Frictional and wavemaking drag can be measured “directly” on harmonic/hydrofoil type passive bodies.

In all other cases it can be predicted (calculated) only.

REMINDER

Passive Drag (D_p) is the resistance of a stabilized body taken in tow

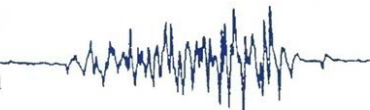
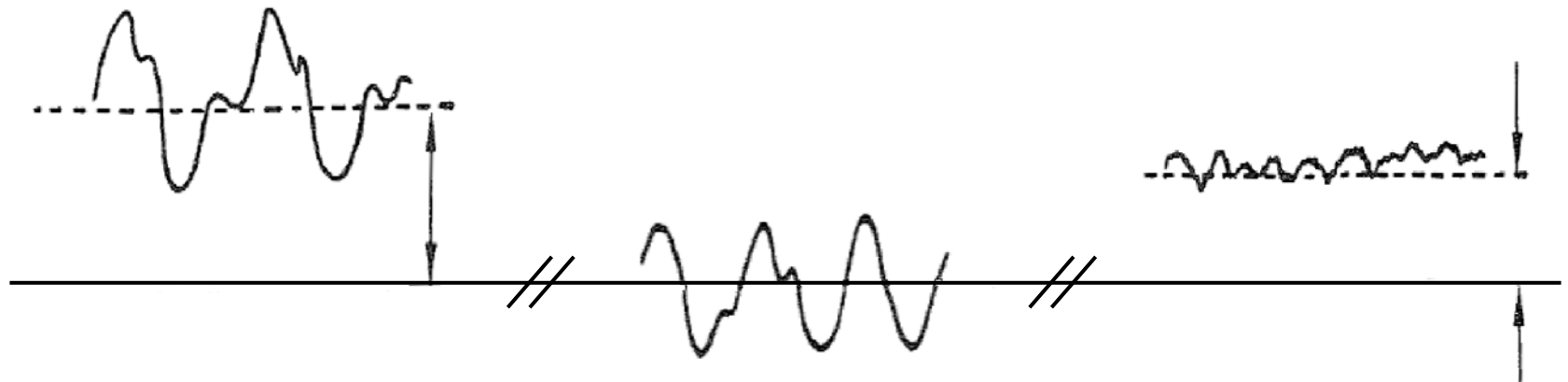
Active or Swimming Drag (D_s) is the resistance of a fully unstable body

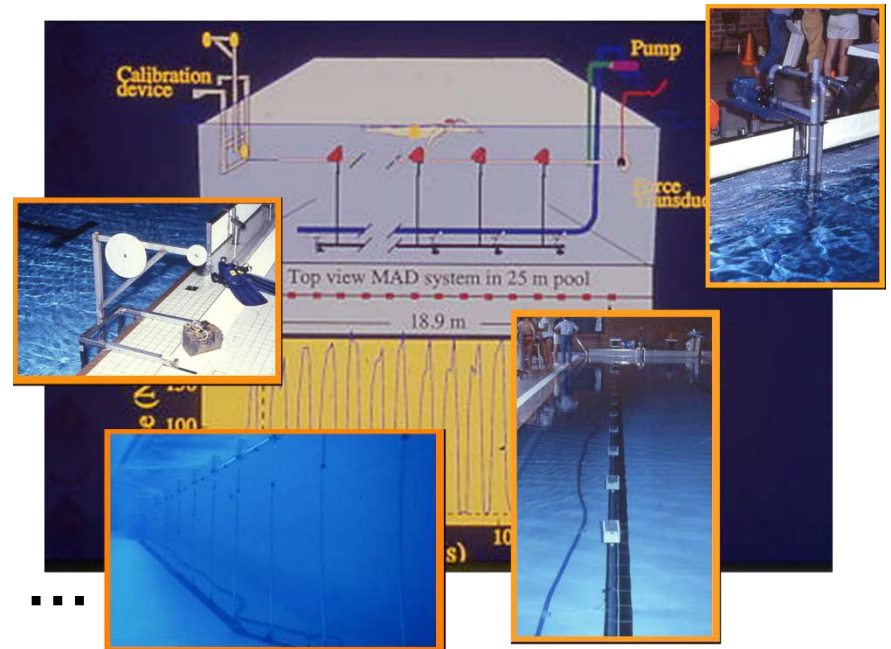
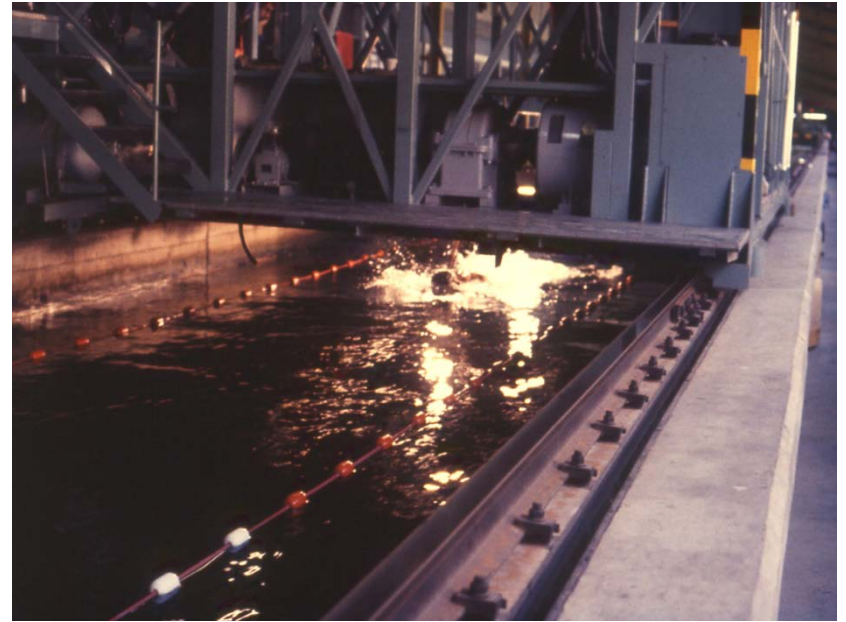
Direct force patterns

D_s Swimming Drag

$D = P$
Drag = Propulsion

D_p Passive Drag





... regardless its quantification ...

REMINDER

The boundary layer relates to friction.

The boundary layer separation relates to wave making.

Wave making relates to turbulence



REMINDER

Turbulence Dp < Turbulence Ds

Turbulence Dp can be quantified

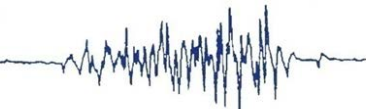
Turbulence Ds is chaotic

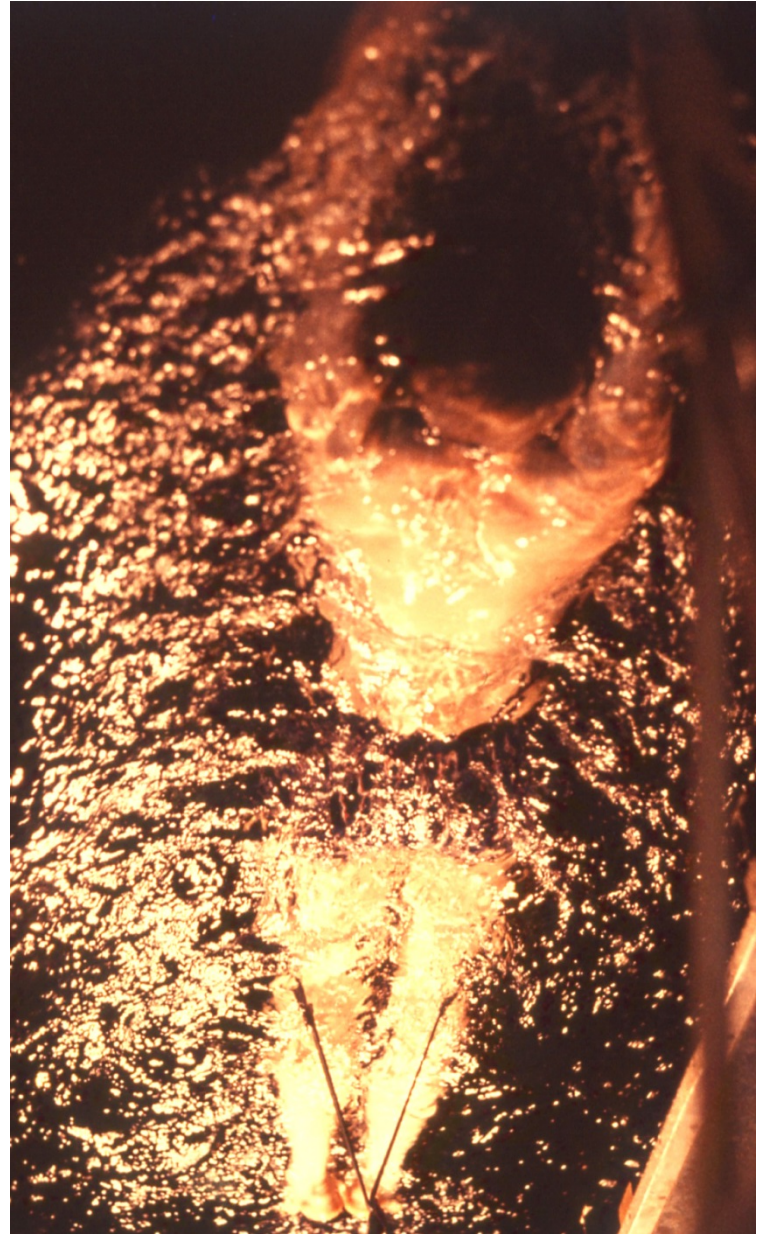
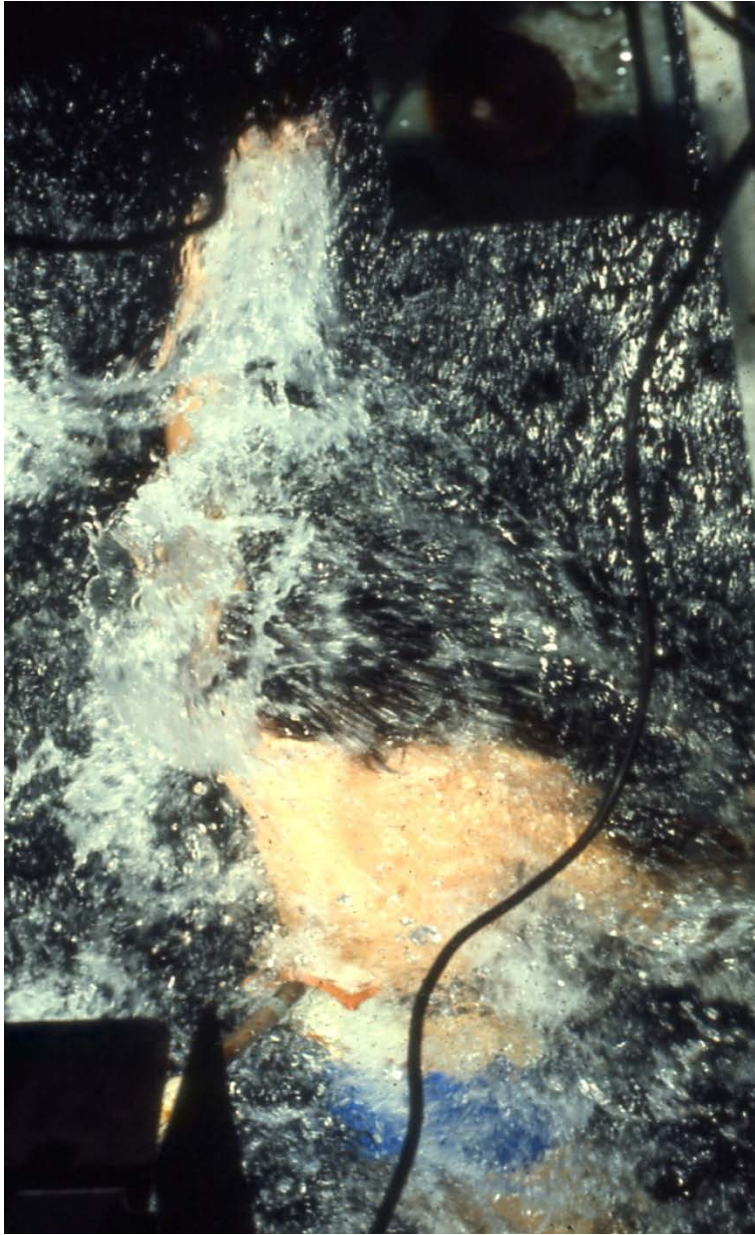


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REMINDER

**The connective tissue of Muscular Fasciae with its adherence to the skin facilitates function and power
(Bases of TAPING)**



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OLD AND PARTIALLY NON PUBLISHED DATA

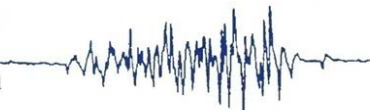
A NEW LOOK



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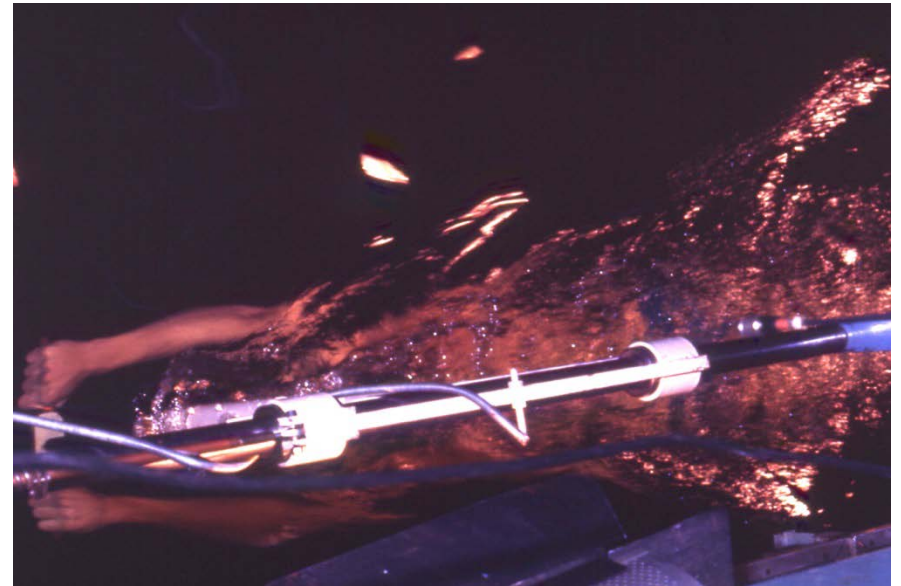
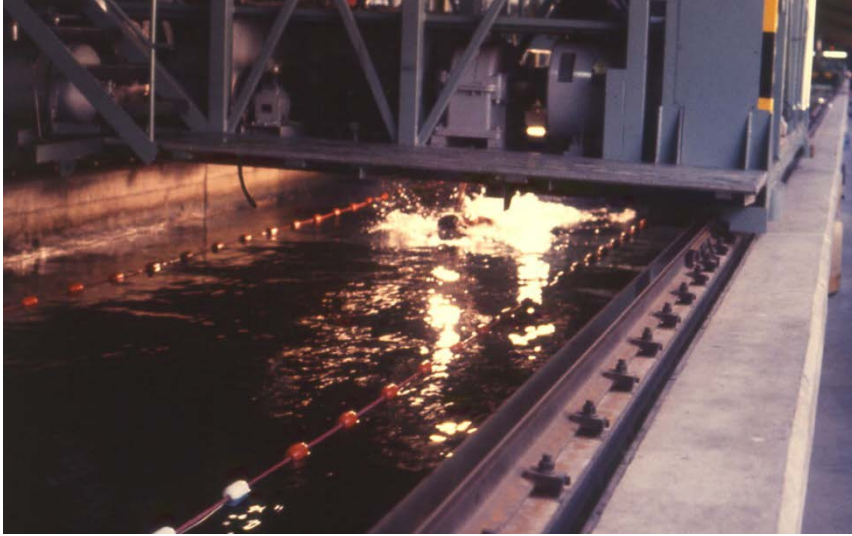
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BATHING SUITS.



METHODS



Dimensional and non-dimensional hydrodynamic related morphological characteristics

Sample (N)	H(cm)	W(kg)	▲ (l)	S(m ²)	X(cm ²)	H/B	B/D	H/D	H ² /S	H ² /X	H/▲
Elite (9)	183.9	72.9	67.8	1.677	766.7	4.4	2.1	8.9	2.0	44.9	4.6
Students (44)	180.9	73.8	68.4	1.665	767.4	4.4	2.0	8.9	1.9	43.9	4.5
Ecto (3)	187.9	71.5	65.9	1.657	714.9	4.4	2.3	10.0	2.1	50.0	4.5
Endo-Meso (3)	180.1	113.0	107.2	2.283	1020.1	4.2	1.7	7.2	1.4	32.0	3.8

 Perfect morphological similarity

 Different morphology P<0.01

FORM HOMOGENEITY

Elite Swimmers = PE Students

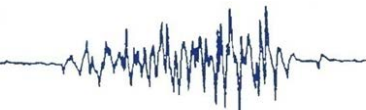
Ectomorphs \neq Endo-mesomorphs



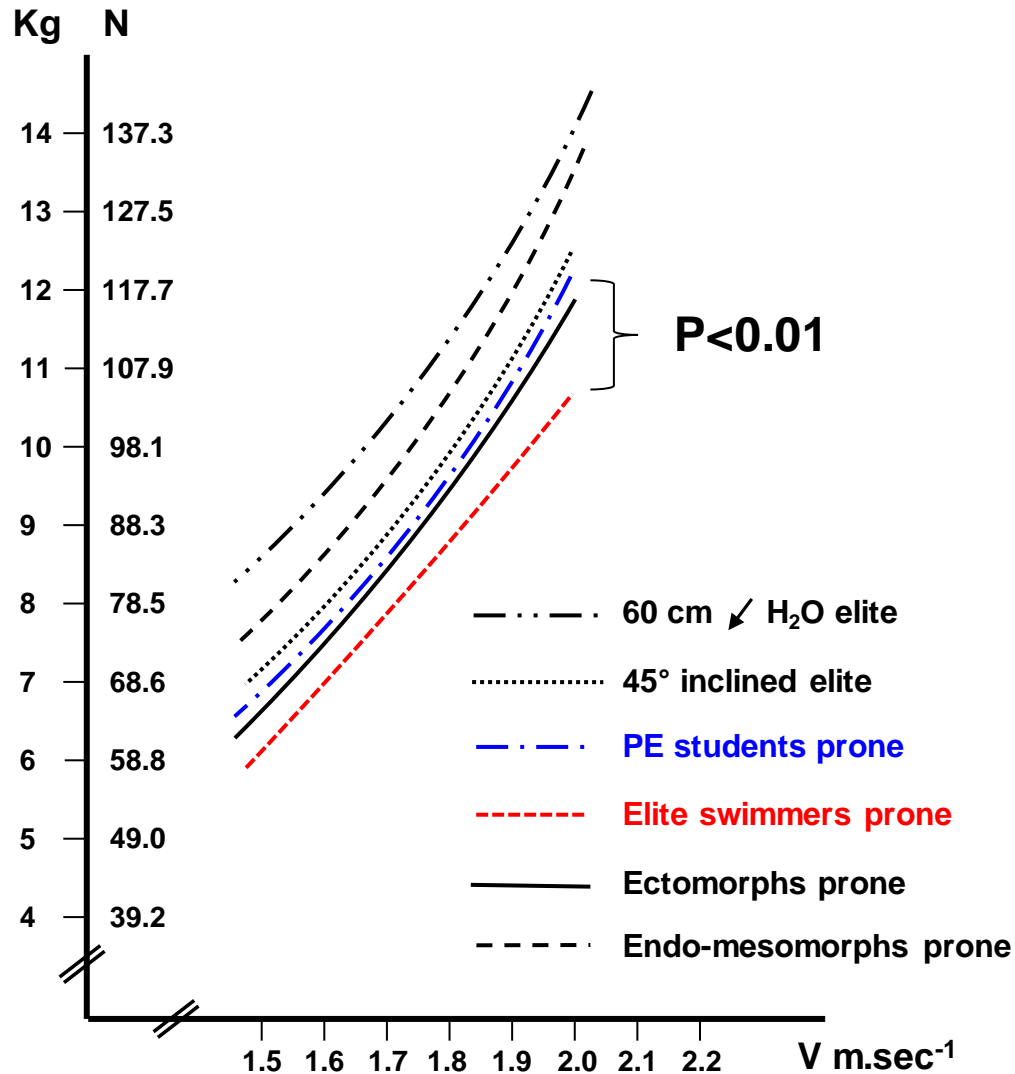
Experimental Anatomy



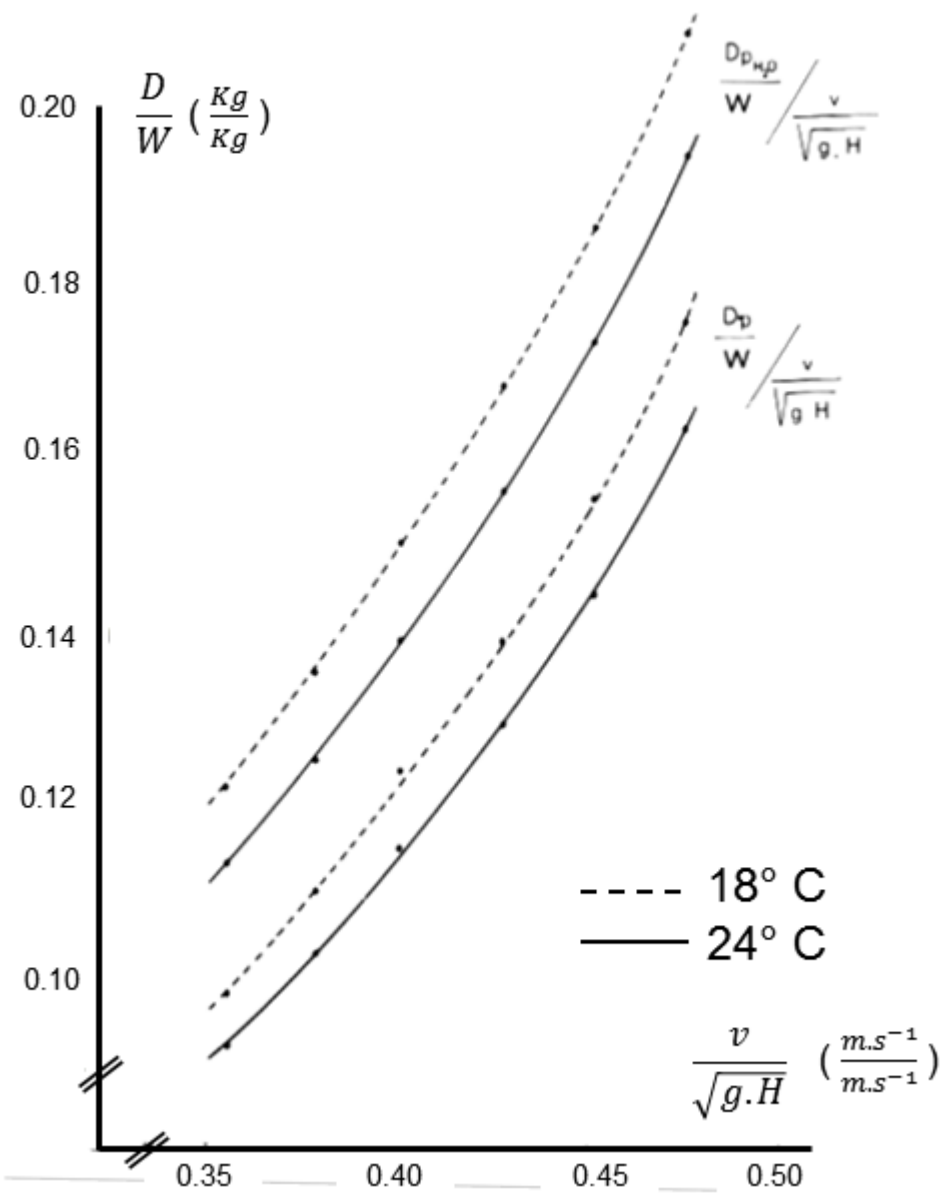
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Dp positioning and morphology

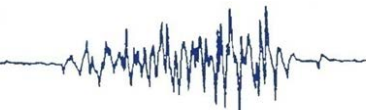


Non-dimensional temperature differences

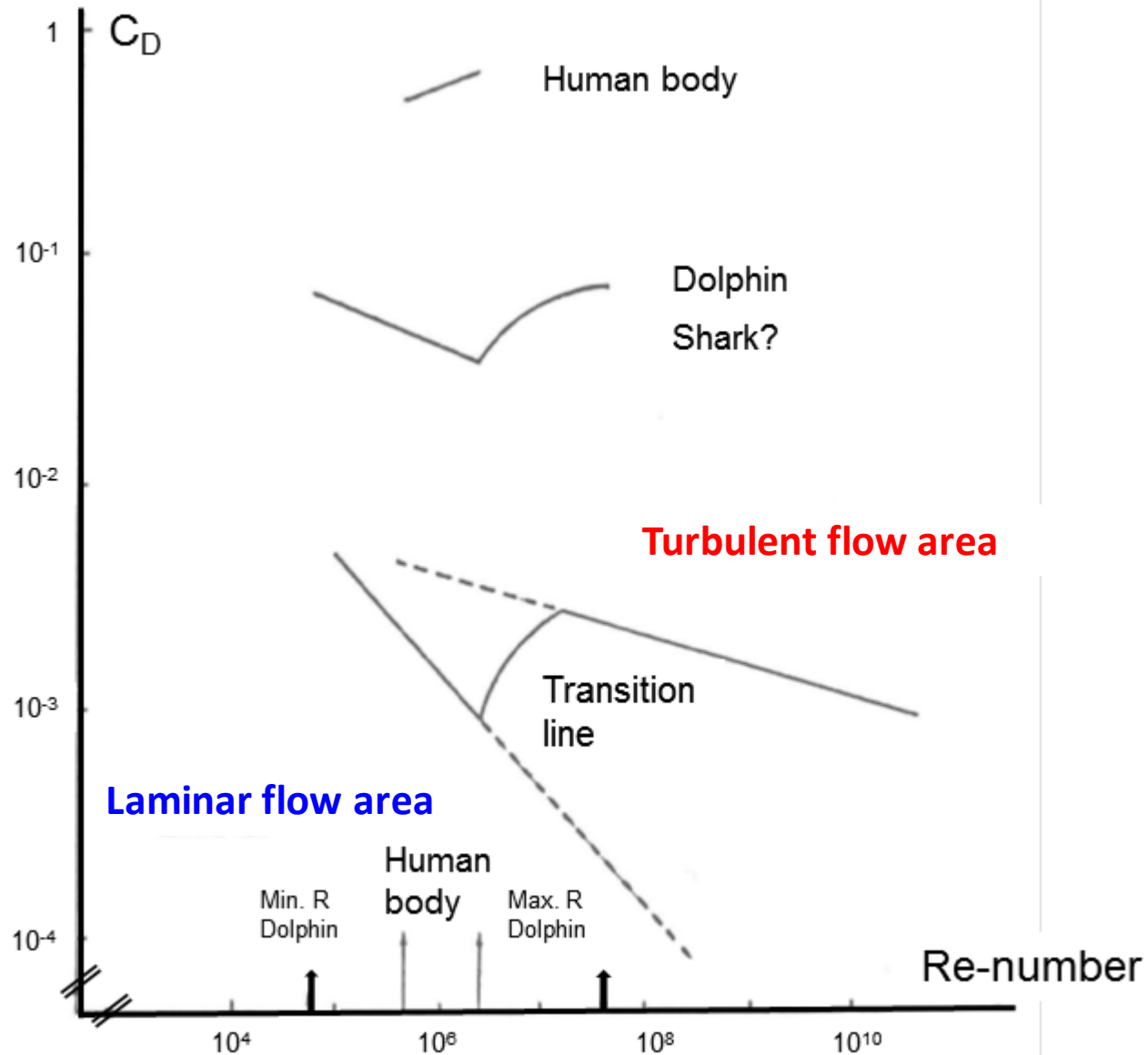


**Body alignment,
Water temperature,
↑ ↓ H₂O,
Transient body positions**

**are far more discriminating than
morphology except for
extreme body types**



FINAL REMINDER



Why have we accepted the Drag Decrease Version of the High tech Swimsuit manufacturers ???

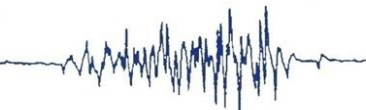
Because the quantity of records made it easy to believe anything.

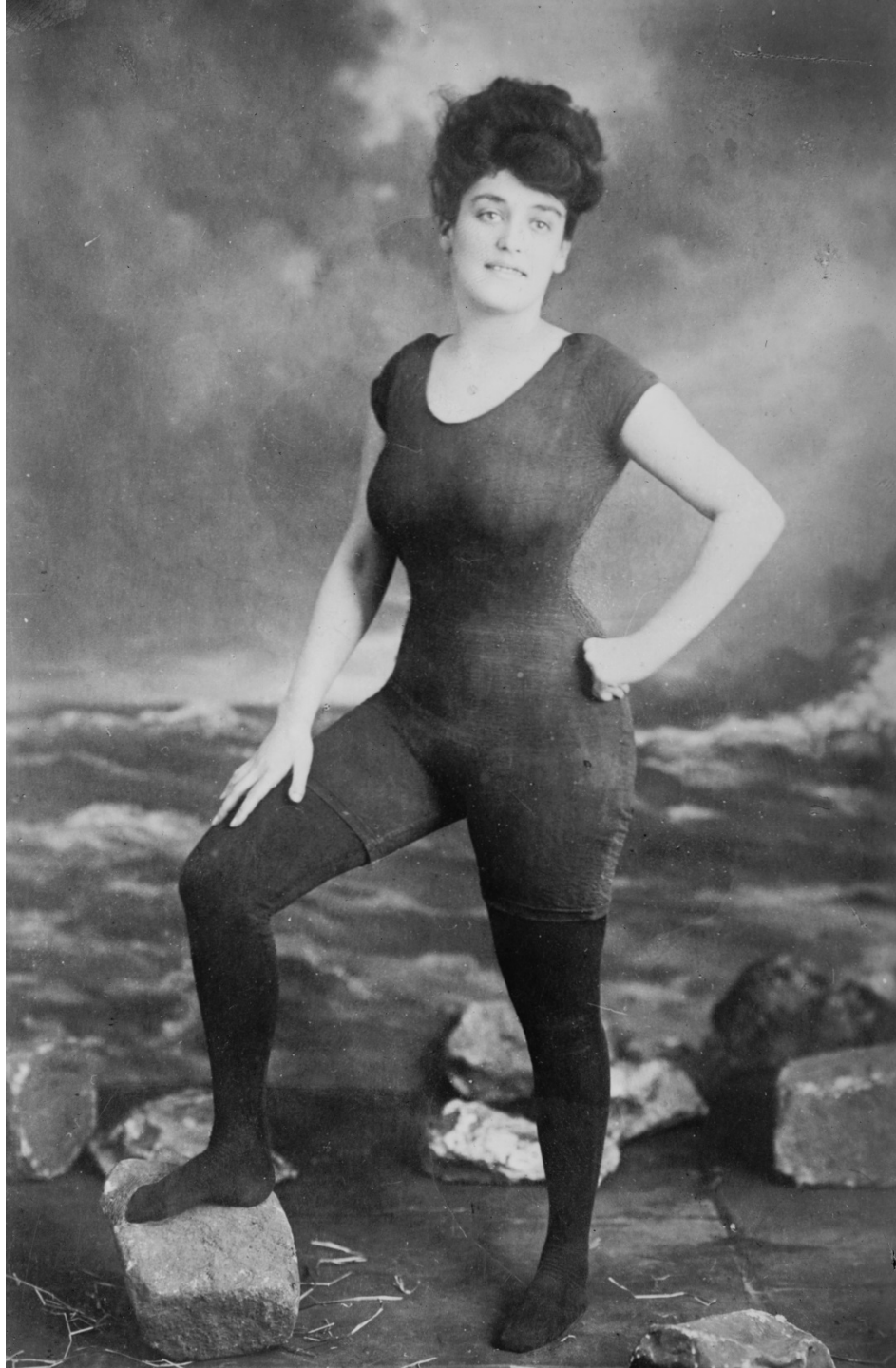


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The proprioception of the Swimmers gave the most plausible explanation of the effect of High Tech Swimwear

Quote Phelps: “... you get a feeling of strength – a psychological superman cape”

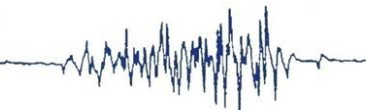
Quote several athletes: “... It feels like a second skin”



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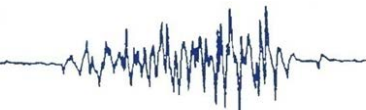
THE FASCIA THEORY



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THE FINAL EXPLANATION MAY BE ANATOMICAL NOT HYDRODYNAMICAL

- **Human Fascia is responsible for the cohesiveness and function allowing for the myokinetic chains of motion ... enforced by the skin to enhance power (Huijing and Baan, 2003)**
- **The High Tech Swimsuit enforces both the fascia and skin functions and improves (indeed) compression, stability and muscular efficiency**

OVERALL CONCLUSION

The High-Tech swimsuit advantages **cannot** be explained by hydrodynamics (**turbulent chaos - continuous body deformation**)

Water temperature, positioning, technique are more discriminating than morphology

The High-Tech full body swimsuit enforces both the skin and fasciae suggesting an improved myokinetic force transmission.



EPILOGUE

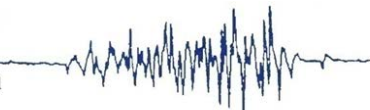
(Rome 24 July 2009)



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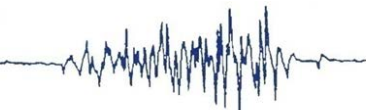
FINA decides to ban the High Tech suits that have been linked to “doping on a hanger” (quote New York Times)



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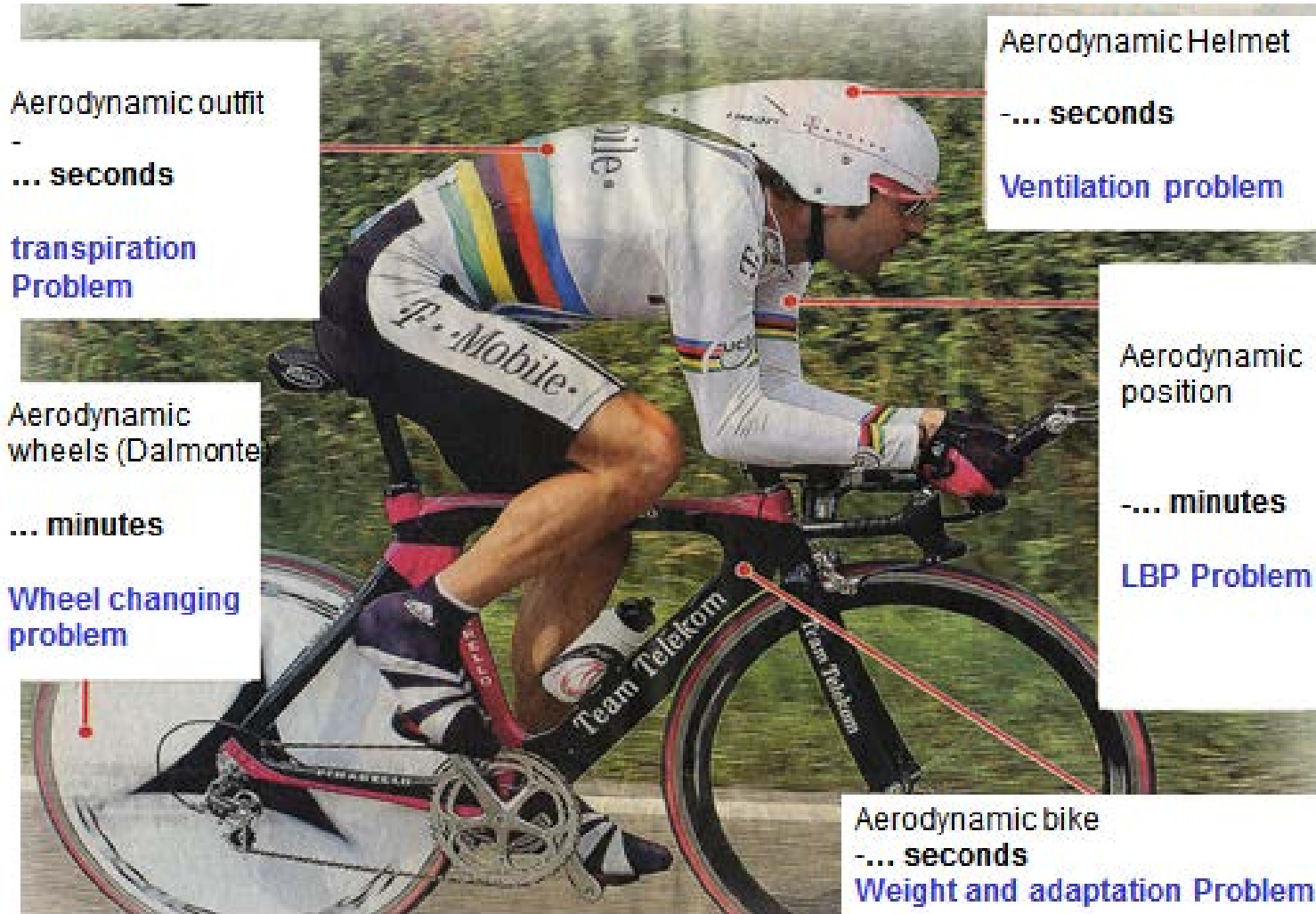
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The swimsuit controversy spread beyond issues of performance into the territory of morality (and emotion)



Why different appreciation in different sports



CLOSURE

Nor the High-Tech swimwear, nor the aerodynamics hardware in cycling do overrule the individuals training and performance effort.

**Dubious argument?
or discriminating morality ?**



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