

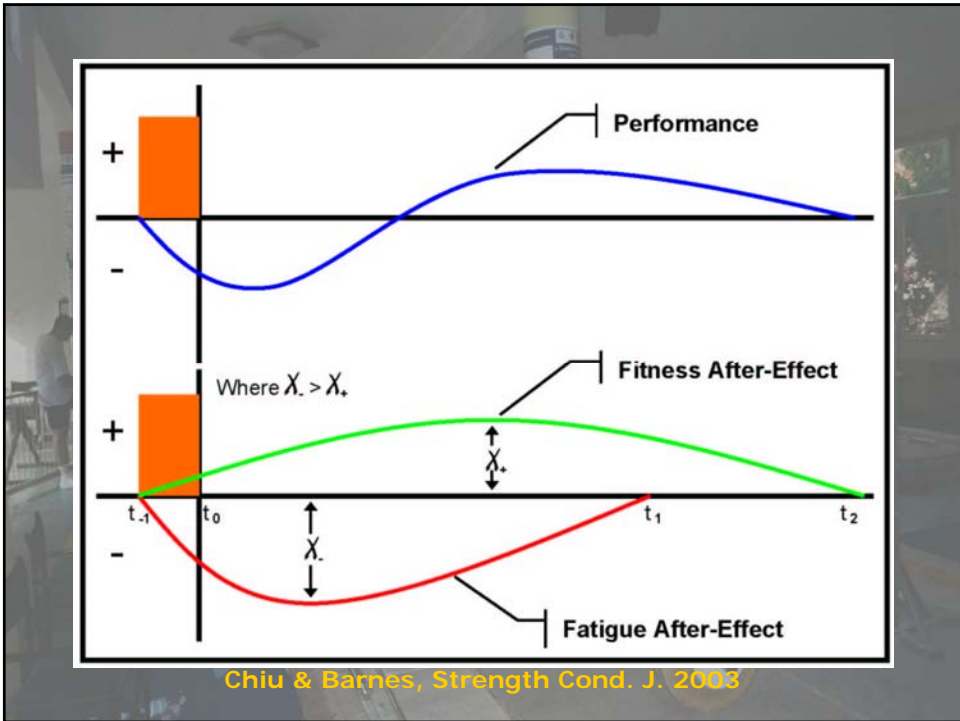
Time Series Analysis: An Application for Human Performance

¹Loren Z.F. Chiu & ²George J. Salem

¹Faculty of Physical Education & Recreation, University of Alberta

²Musculoskeletal Biomechanics Research Laboratory, University of Southern California

www.ualberta.ca/~loren1/nmrrp.htm



All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent

Time Series Analysis

- Systematic pattern
 - Trend – non-repeating pattern
 - Seasonality – repeating pattern
- “Noise” – unexpected variation to systematic pattern

Purpose

- Investigate use of time series analysis to remove noise to assess the systematic pattern during high-power resistance exercise sessions.

All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent

Participants

- Men (n=10) strength & power athletes
 - Weightlifting, track & field, volleyball, baseball

Exercise	Relative Intensity	Repetitions Per Set	Sets	Inter-Set Rest
Clean Pull	75% 1 RM Clean	5	12	3 minutes
Clean Pull	85% 1 RM Clean	3	15	3 minutes
Clean Pull	95% 1 RM Clean	1	20	3 minutes

Measurements

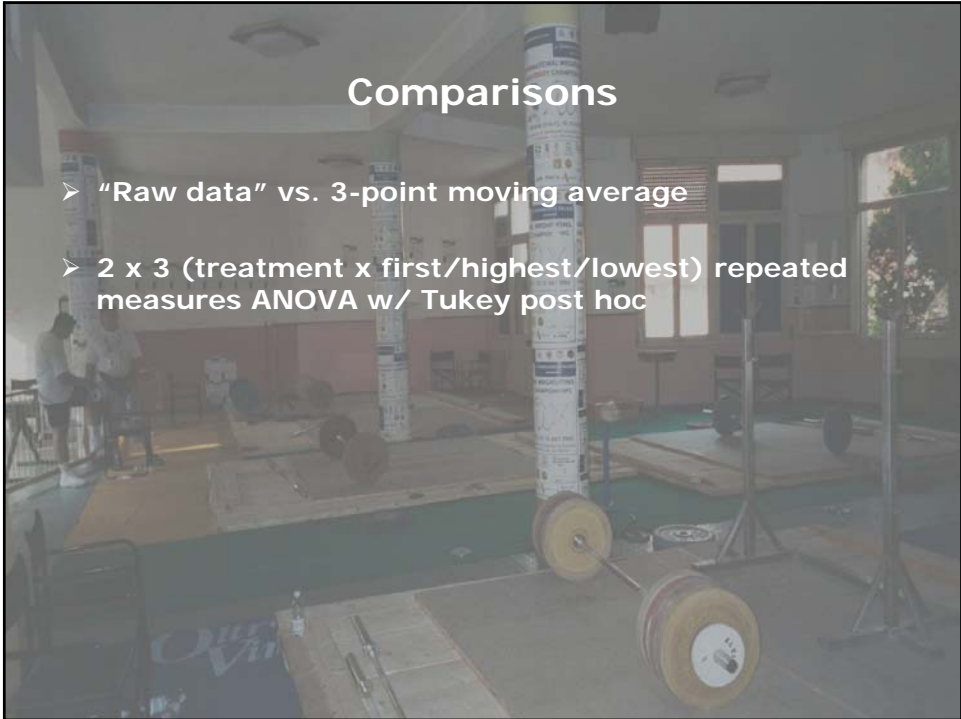


All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent



Data Treatment

- 3-point moving average
 - Set 2 = Average [Set 1; Set 2; Set 3]
 - Set 3 = Average [Set 2; Set 3; Set 4]
 - Etc.

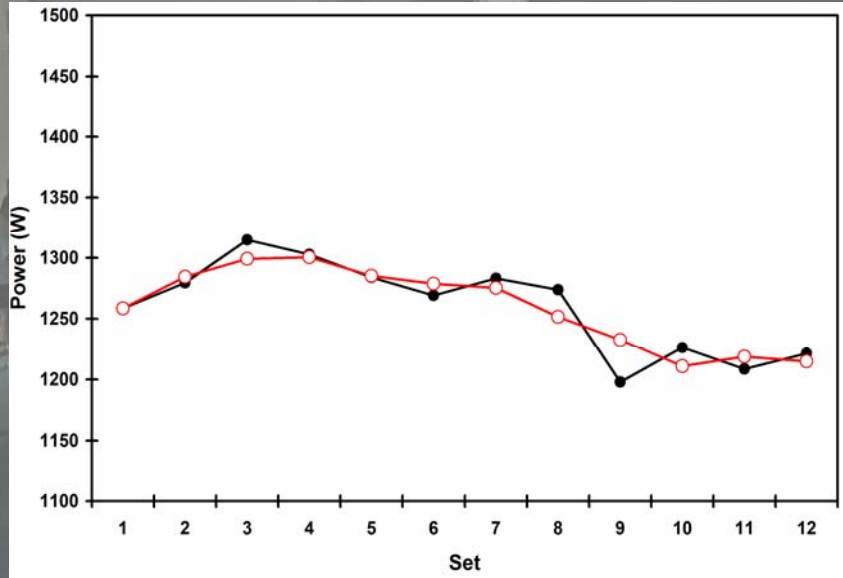


Comparisons

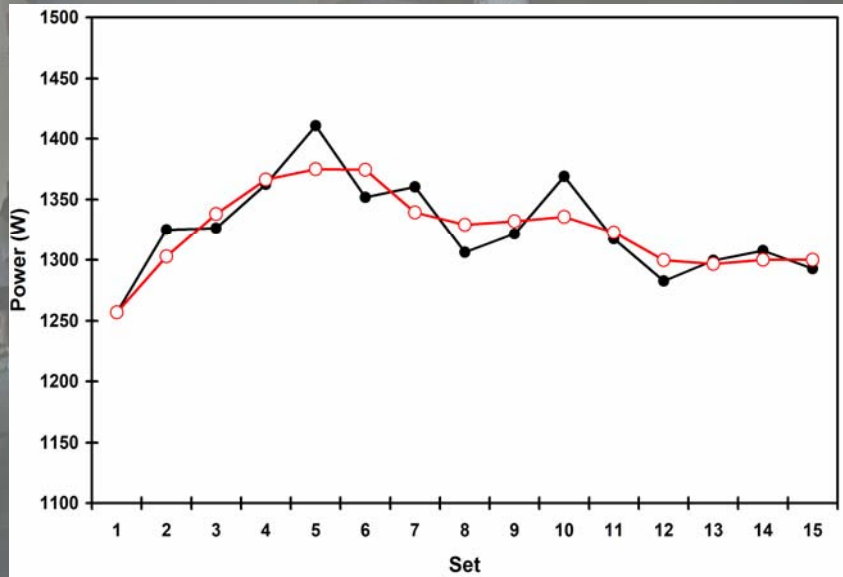
- "Raw data" vs. 3-point moving average
- 2 x 3 (treatment x first/highest/lowest) repeated measures ANOVA w/ Tukey post hoc

All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent

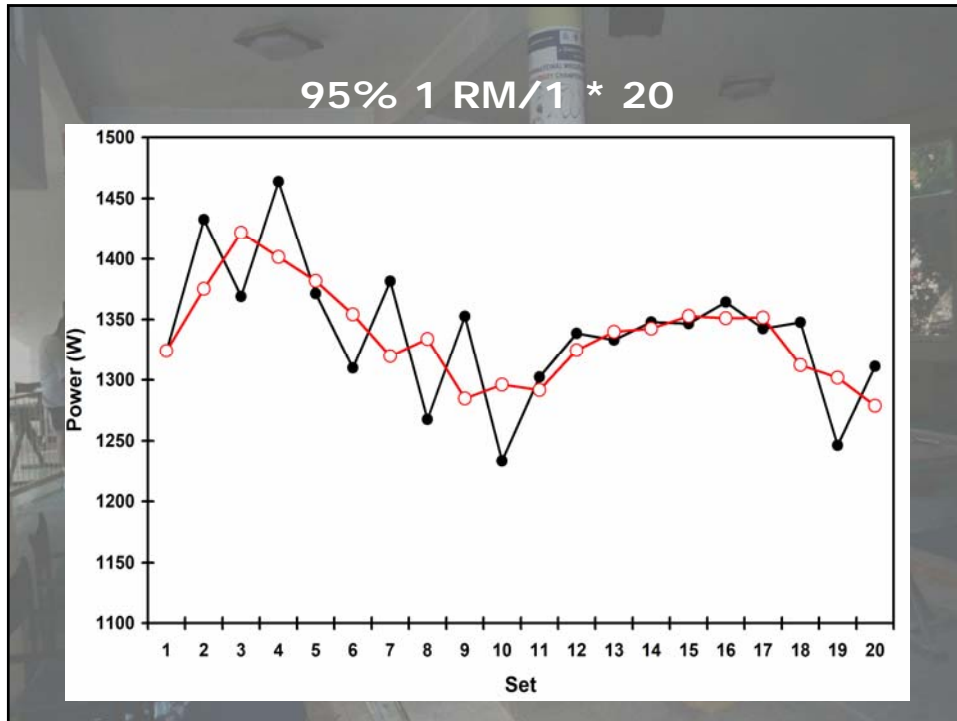
75% 1 RM/5 * 12



85% 1 RM/3 * 15



All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent



Discussion

- Attenuation of peaks
- Mechanisms for "noise"
 - Psychological factors
 - Performance variability
 - Physiologic variability

All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent

Practical & Future Applications

- Training session – acute responses
 - Micromanagement of training load
- Short & long-term training
 - Investigate utility of time series analysis applied to short- and long-term training records



All images and graphs are the copyrighted property of Loren Chiu and cannot be used or reproduced without prior written consent