

Bass Connections 2015

Movement, Grace and Embodied Cognition



BASS
CONNECTIONS

Tact, Touch and Proprioception | Brain & Society

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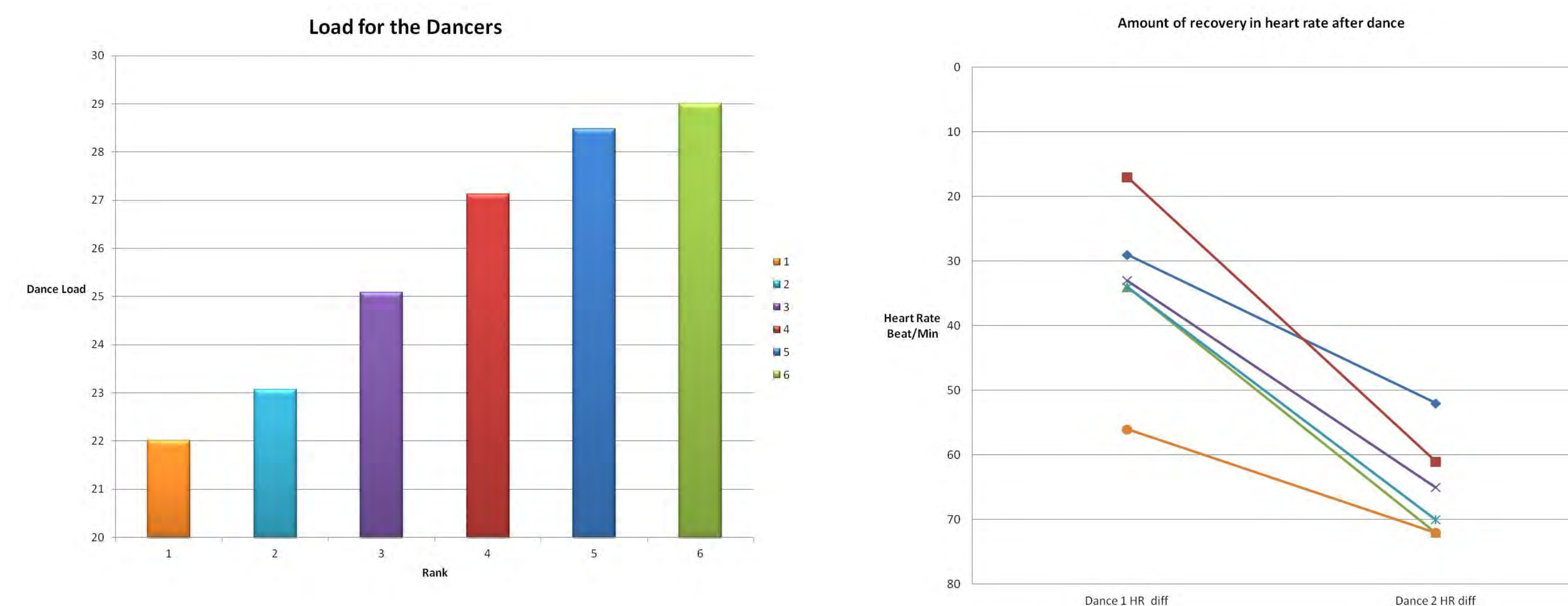
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PROJECT SUMMARY: The objective of our project was to interrogate the notion of grace through an incursion into dance, which is a form of stylized movement. Our goal was to investigate whether aspects of body movement could be quantified to reveal patterns that would correlate with perceived grace in movement, and to connect our findings with the cultural and theological notions of grace. Through our study of dance we have reached a paradigm about the notion of grace being associated with load, recovery, and efficiency relating to equilibrium and gravity.

PROJECT OBJECTIVES

- To examine body movement in the context of dance by quantifying physical variables such as acceleration and mechanical load
- To explore the relationship between the perception of grace and movement patterns that might characterize grace
- To connect cultural and theological notions of grace with biomechanical and neurobiological understandings of motor control and grace in movement.

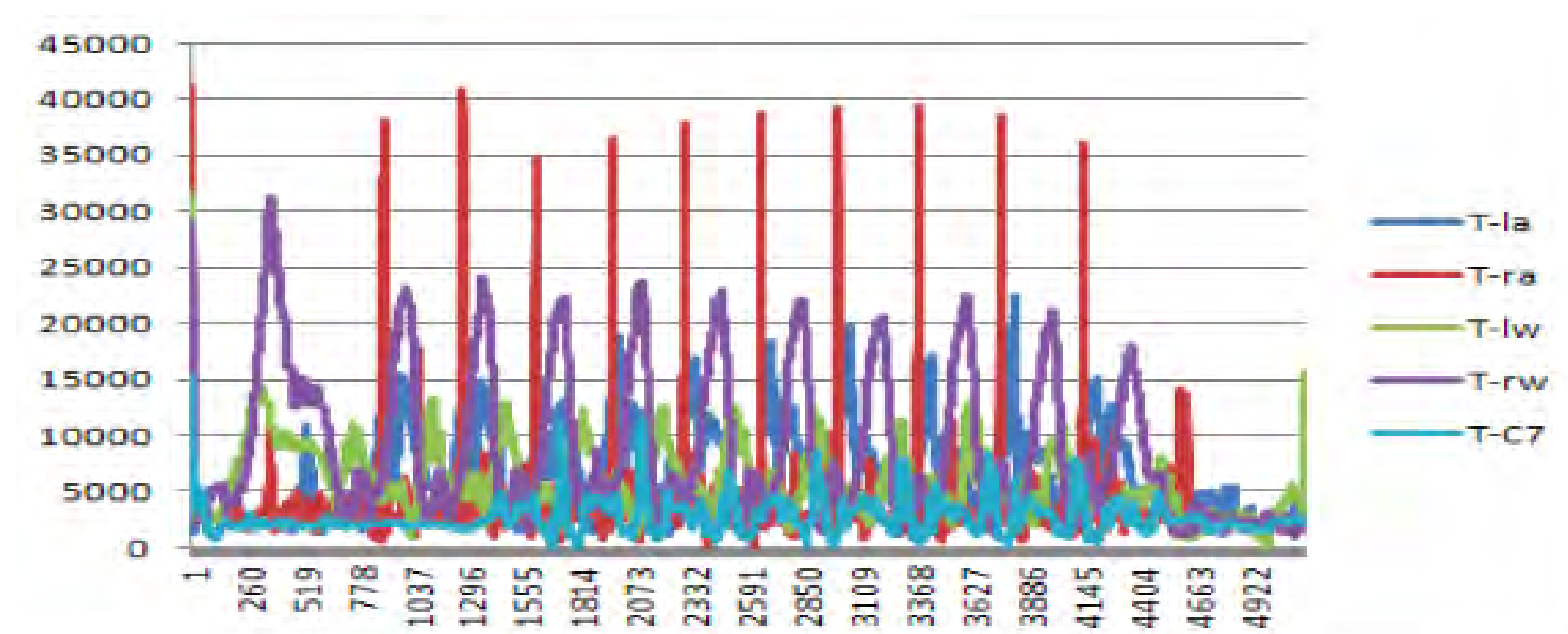


Load and ability to recover from load is represented in these two graphs

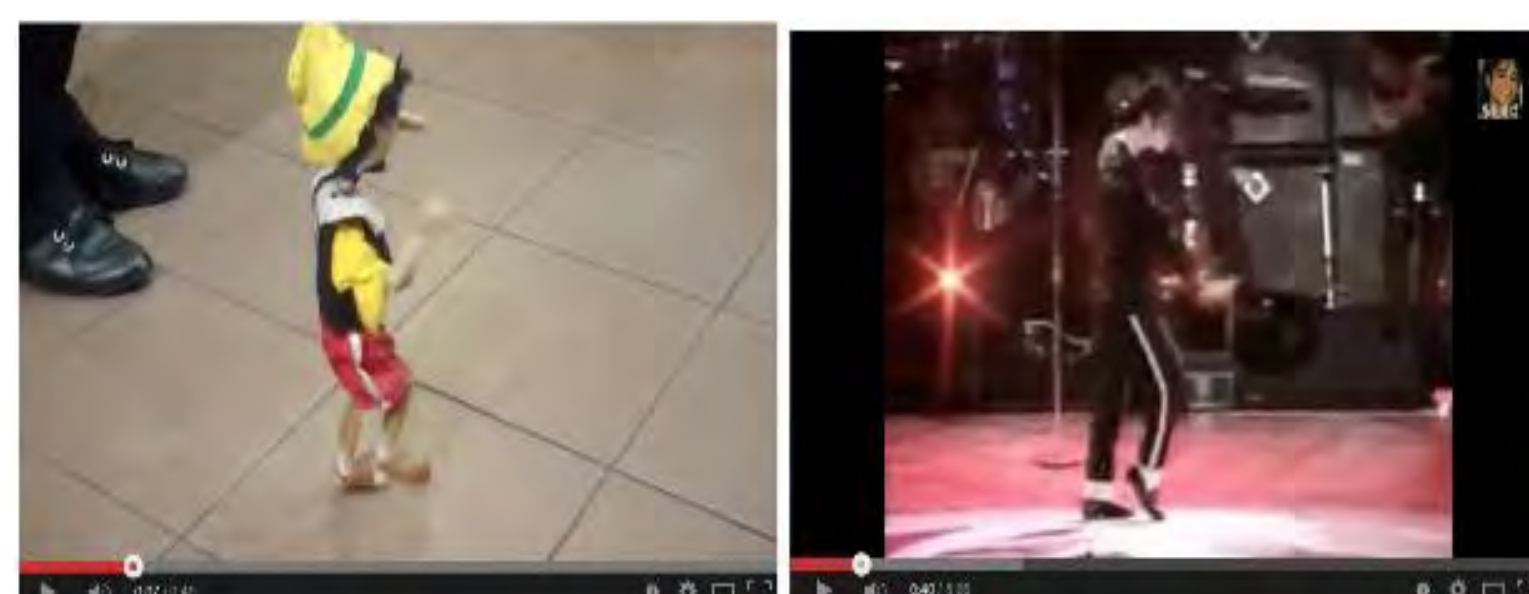
METHODOLOGY

Over the course of the past year, we have collected two forms of data in order to analyze grace in body movement:

- The first set of data was gathered through the use of accelerometers in order to quantify acceleration patterns in motor movement. A total of five accelerometers were each taped onto a dancer's left and right wrists, left and right ankles and at the C7 position (7th vertebrae position) at the back of the neck. 400 frames of data points in 3-dimensional space (in the x, y and z axes) were collected per second for each of 4 dancers.
- The second set of data was collected through a device, attached to a catapult vest on the dancers. Measurements of heart rate, actual load and perceived load on the body during and after dance offered a subsequent look into the efficiency of recovery in dancers after movement.



Accelerometer data of movement patterns in a series of fouetté turns



Who is more graceful? Ask us about Kleist!

CONCLUSIONS

- From the first set of data, it can be observed that each attempt to accelerate the body into movement is necessarily countered by the downward pull of gravity. Consistent movement patterns require exquisite motor control, and this translates into stability and a more efficient return to equilibrium.
- From the second set of data, we found a negative correlation between the magnitude of the load and how quickly a dancer recovers after performance. Interestingly, the dancer who experienced the highest load, exhibited the fastest rate of recovery after dance. This is a signature of a person who moves efficiently.
- We posit that the ability to recover to equilibrium with more efficiency after exertion is a characteristic of graceful movement.

INSIGHTS

- Using the paradigm we described above, cultural texts broaching the topic of grace can be reconsidered
 - Kleist's "On The Marionette Theater" recounts the story of a boy who ceases to be able to replicate a pose he struck without much thought, when he becomes conscious of his movements. Could it be that a higher load, cognitive in this example, would be a constraint to grace?
- Graceful movement is perceived when dancers are able to mask their struggle against gravity in measurable ways

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