Cardio-Respiratory System during Sleep : Cyclic Alternating Pattern (CAP) and Applications for Decision Support Systems.

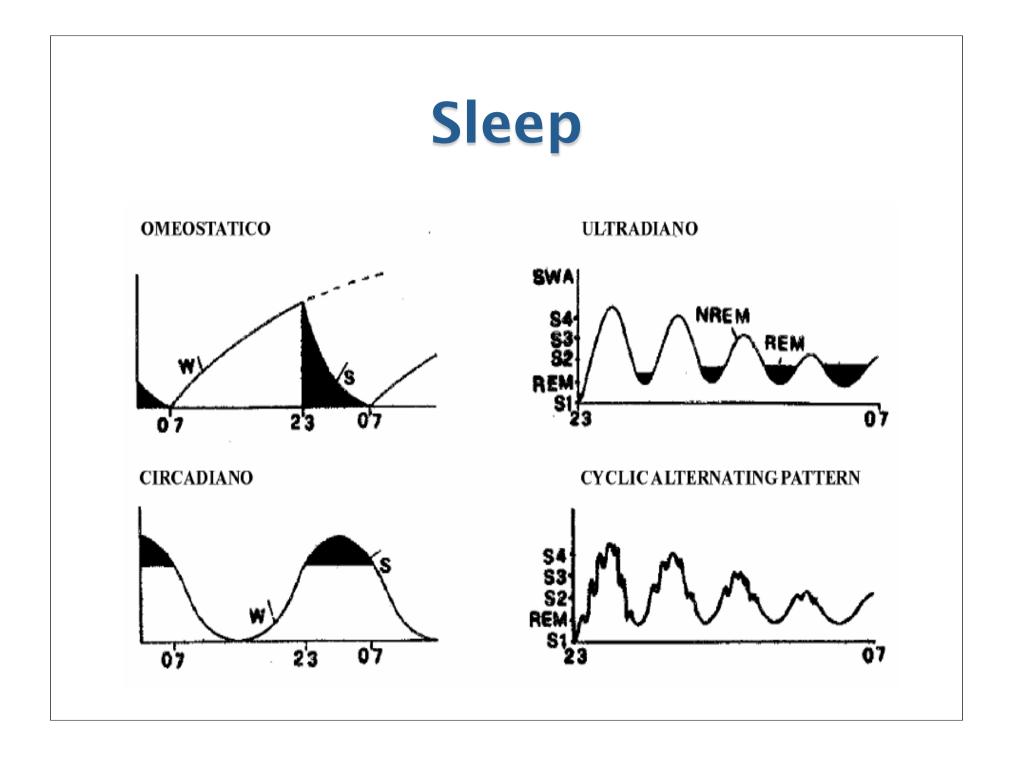


Martin Mendez

Outline

- Sleep
- Macrostructure
- Microstructure (CAP)

 Effects on Cardio-respiratory system
- DSS for Sleep Apnea



Macrostructure Awake - low voltage random - fast un Man Although 50 µV 1 ms Drowsy - 8 to 12 cps - alpha waves والما والمالة المالية المالية والمالية والمالية المراجع والمنافية والمتعالية والمنافية المحرور والمحالية والمالية والم Stage 1 - 3 to 7 cps - theta waves Theta waves Marsharman Marsharman Margaren Marsharman Stage 2 - 12 - 14 cps - sleep spindles and k-complexes K - complex Sleep spindles Mm ma Deep Sleep - 0.5 - 4 cps - delta waves > 75 µV m REM Sleep - low voltage- random, fast with sawtooth waves Sawtooth Sawtooth waves Awake mmmm REM REM 2 2

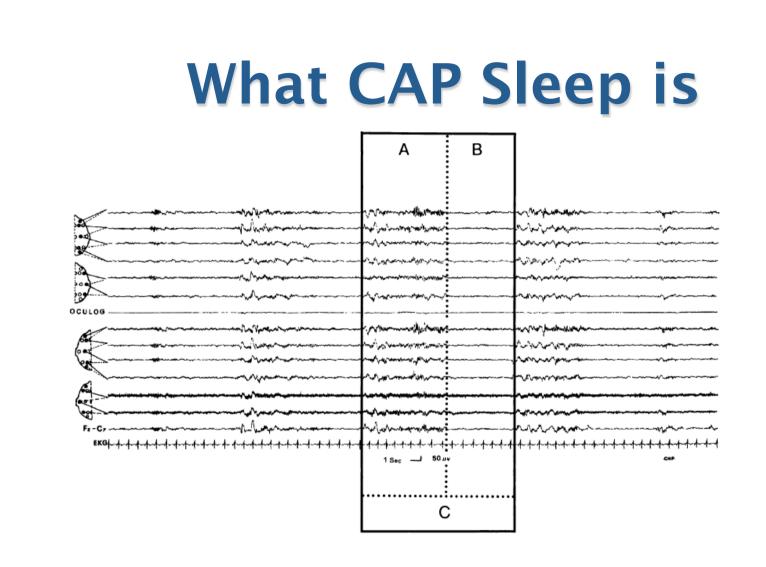


Fig. 1. An example of cyclic alternating pattern (CAP) in sleep stage 2. The box outlines a CAP cycle (C) composed of a phase A (A) and the following phase B (B). Bioplolar EEG derivations using international electrode placement; top 6 channels from top to bottom: FP_2 -F4, F4-C4, C4-P4, P4-O2, F8-T4, T4-T6; bottom 7 channels from top to bottom: FP_1 -F3, F3-C3, C3-P3, P3-C1, F7-T3, T3-T5, F2-C2; OCULOG: Oculogram; EKG: Electrocardiogram.

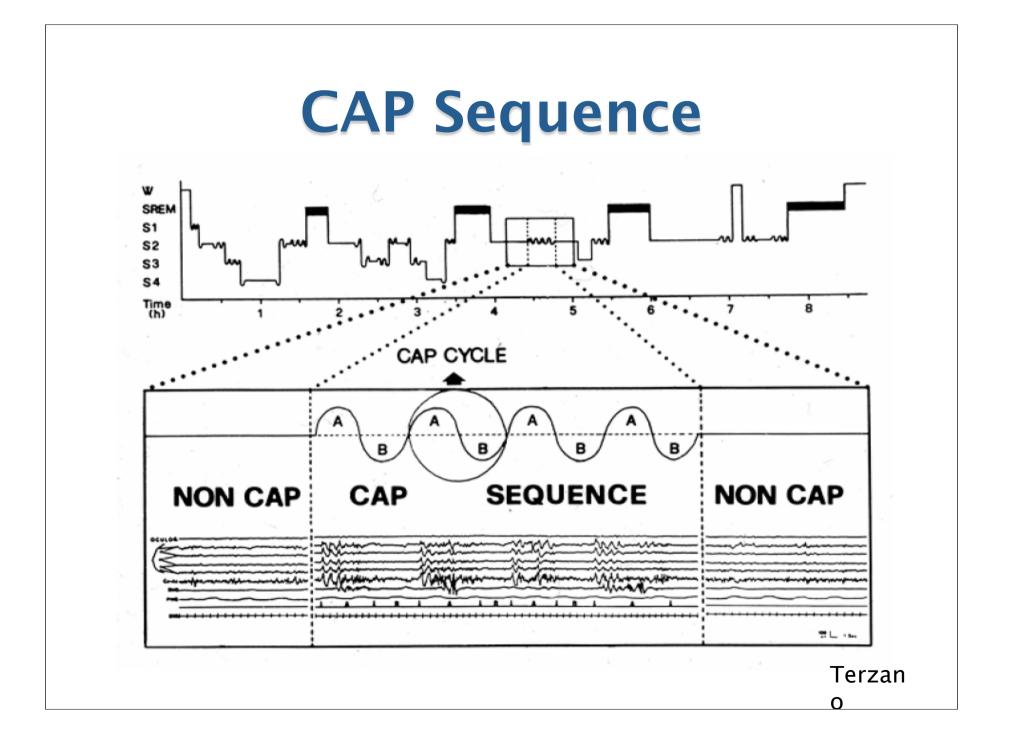
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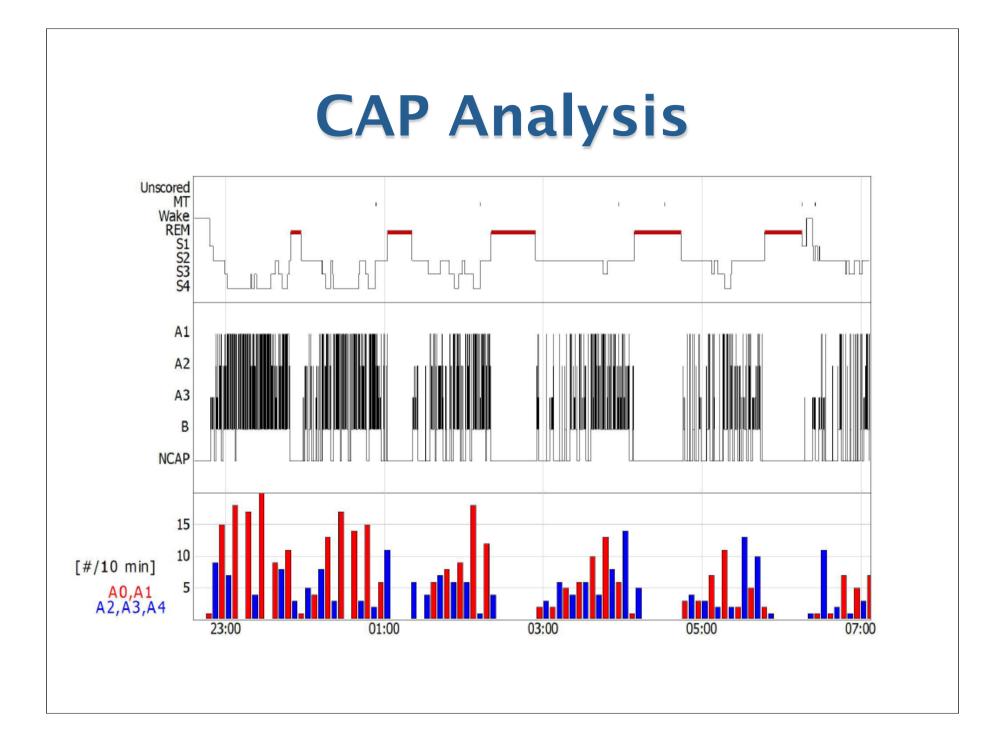
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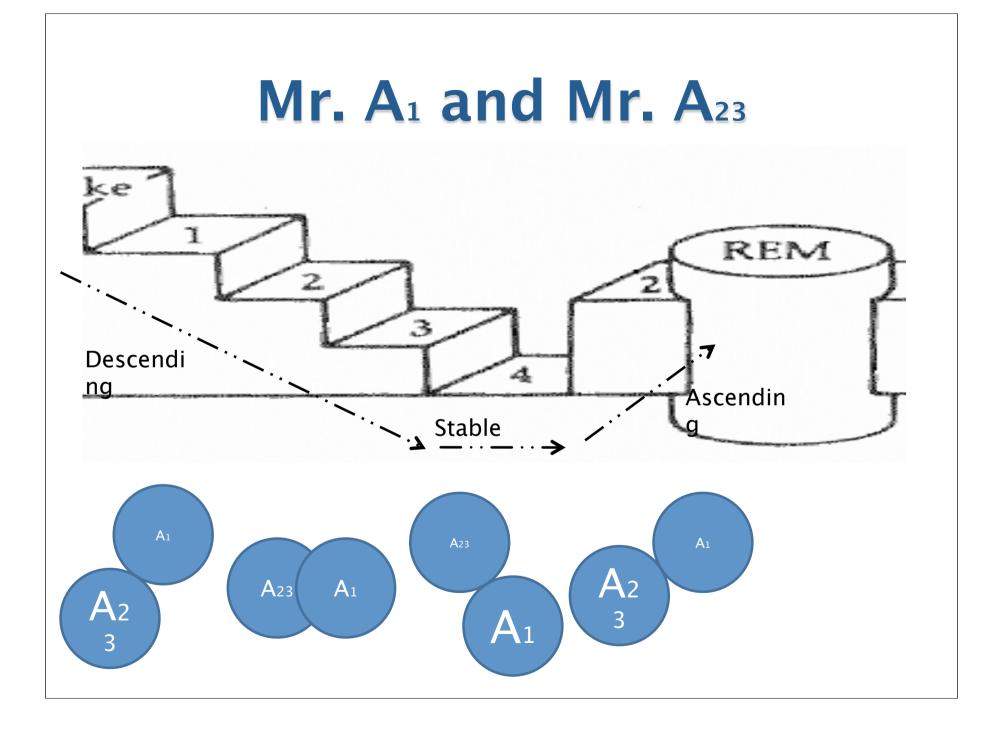
Players during CAP

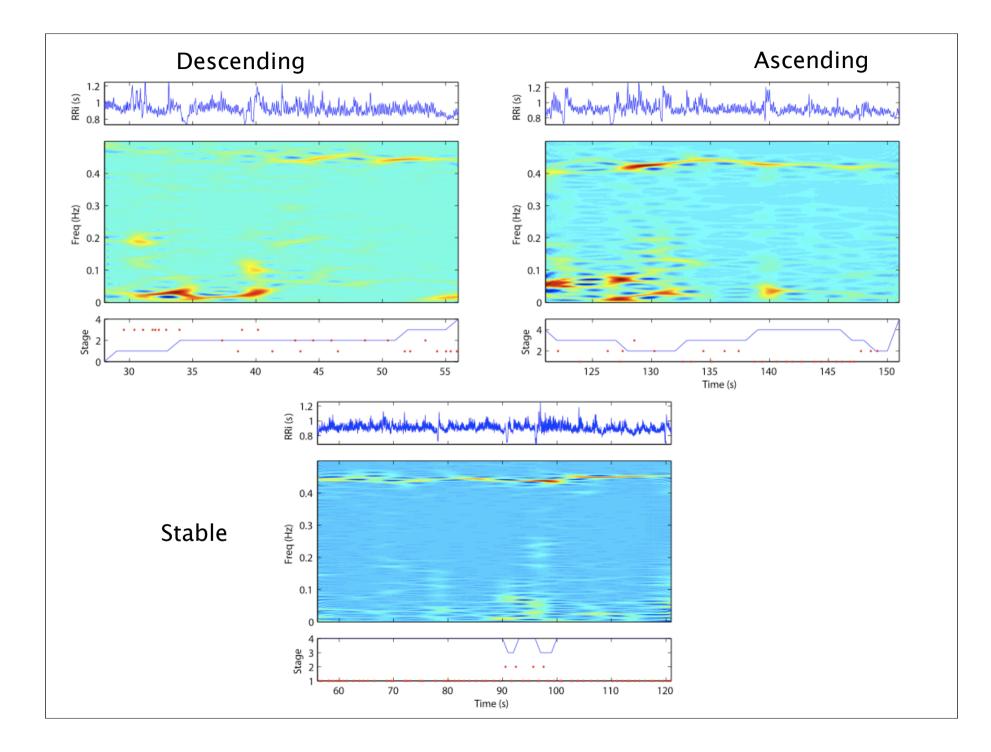
CAP is characterized by sequences of transient electrocortical events that are distinct from background EEG activity and recur at up to 1 min intervals. Mr.A1

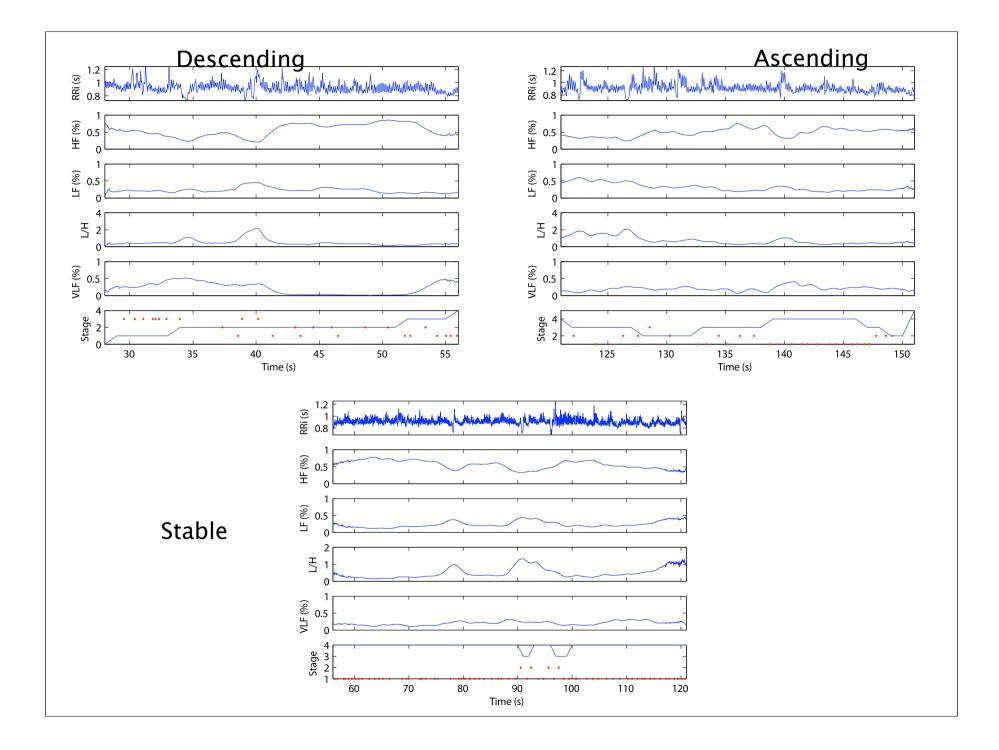
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F	ig. 17. Phase A subtypes. The dotted spots indicate the fast low-ampli	itude portion of the phase A. EEG derivation as in Fig. 2.	
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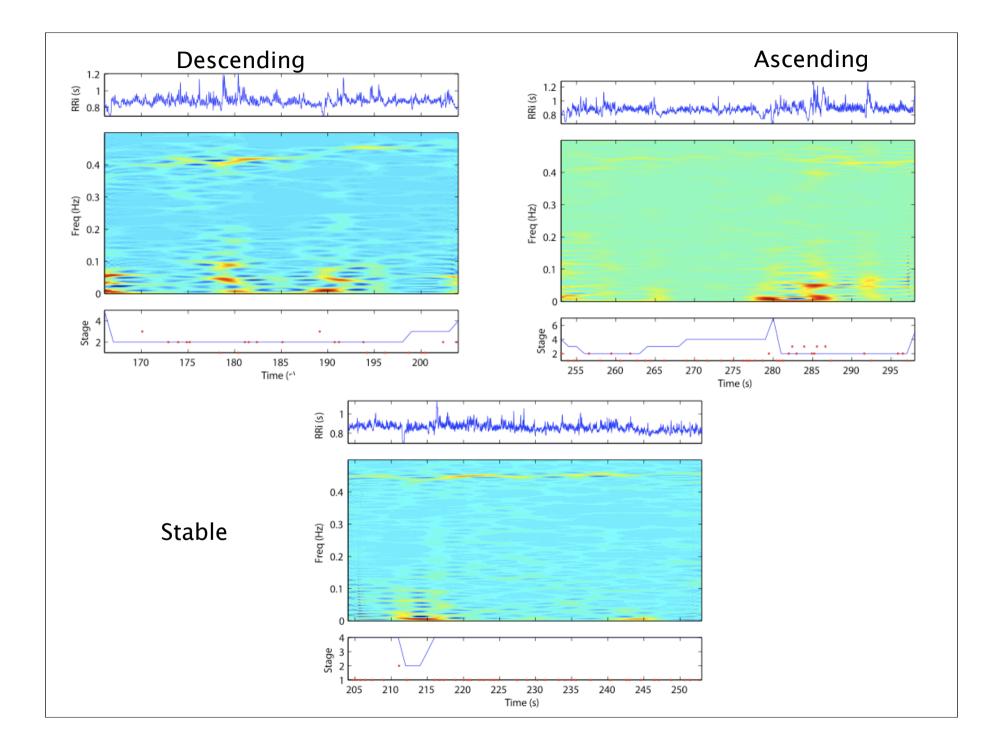


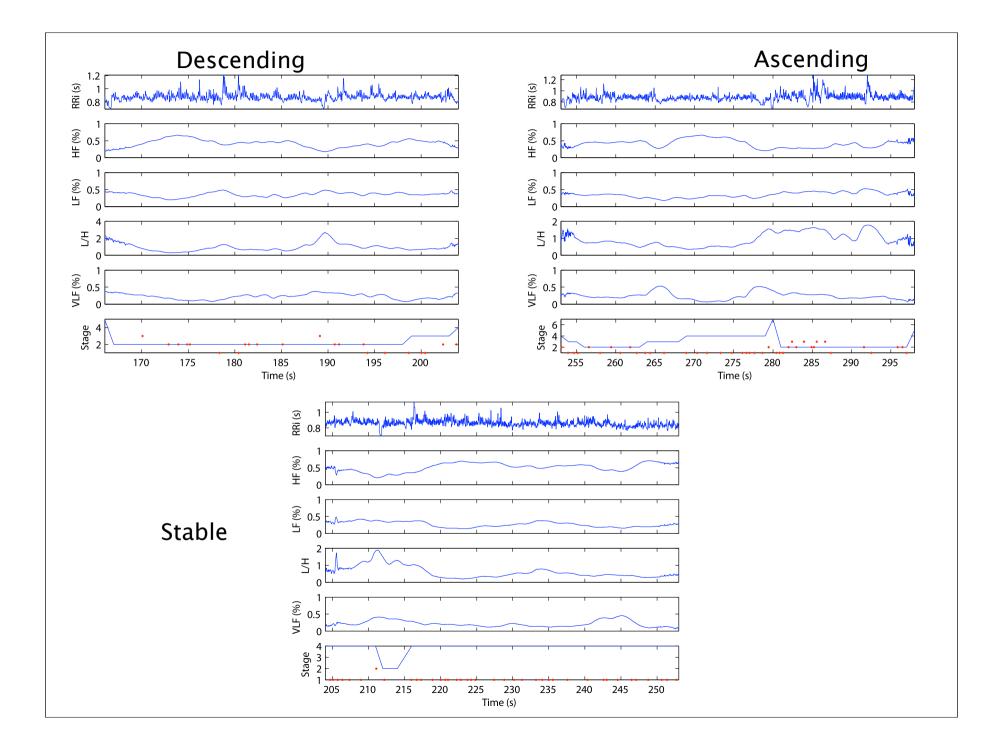




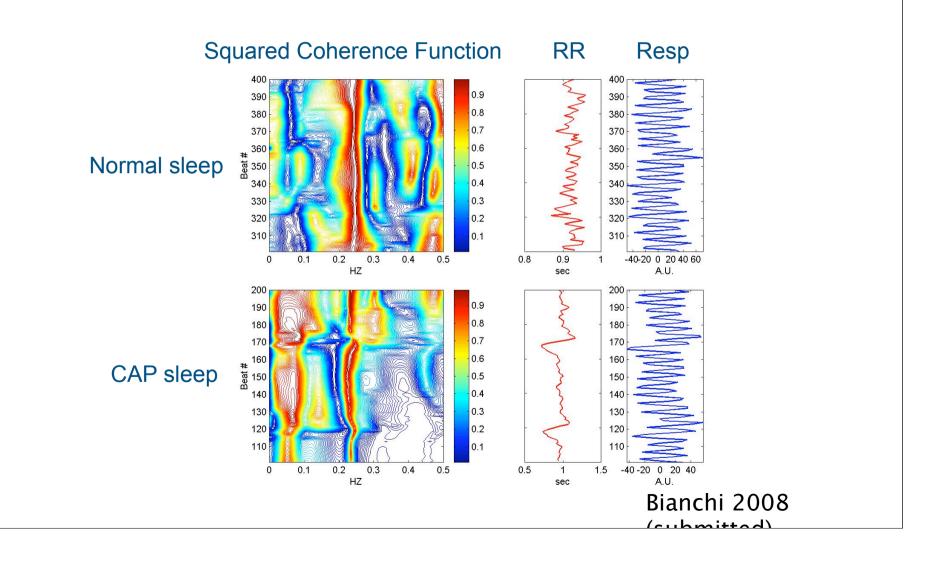




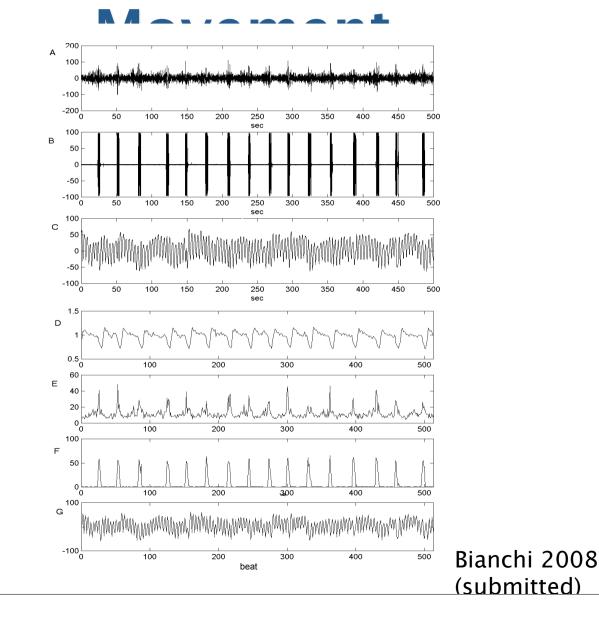




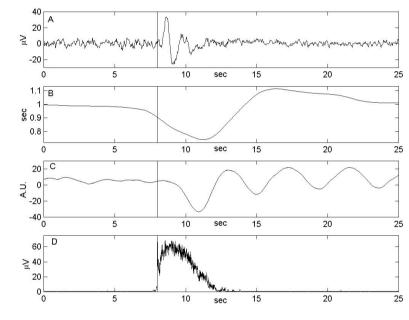
Cardio-Respiratory Coupling during CAP

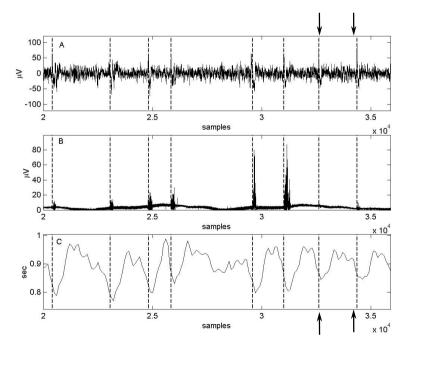


CAP and Periodic Leg



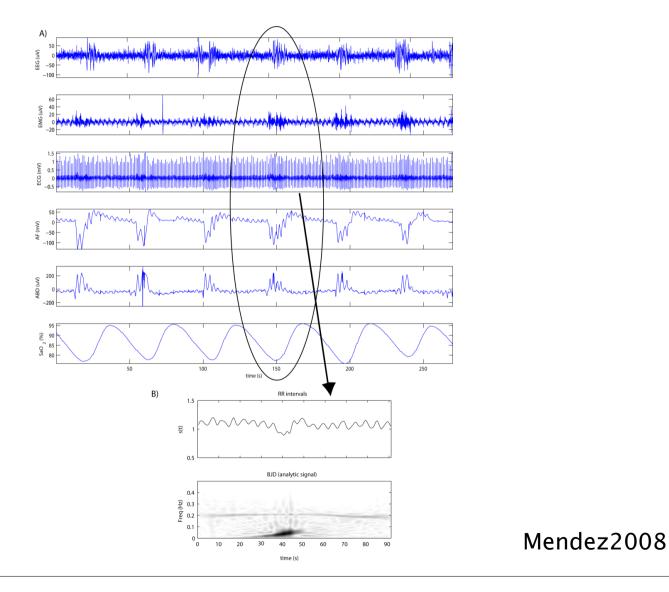
CAP and Periodic Leg Movement



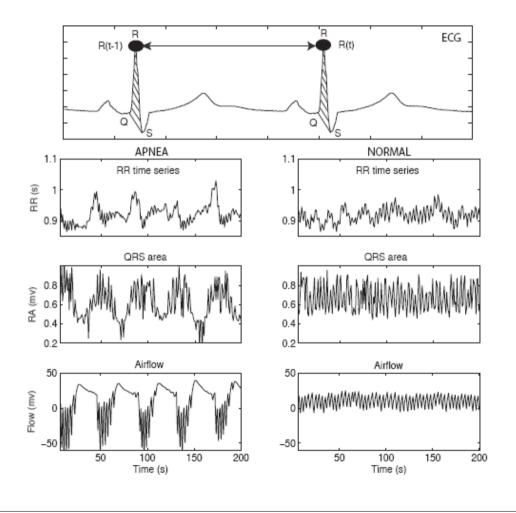


Bianchi 2008 (submitted)

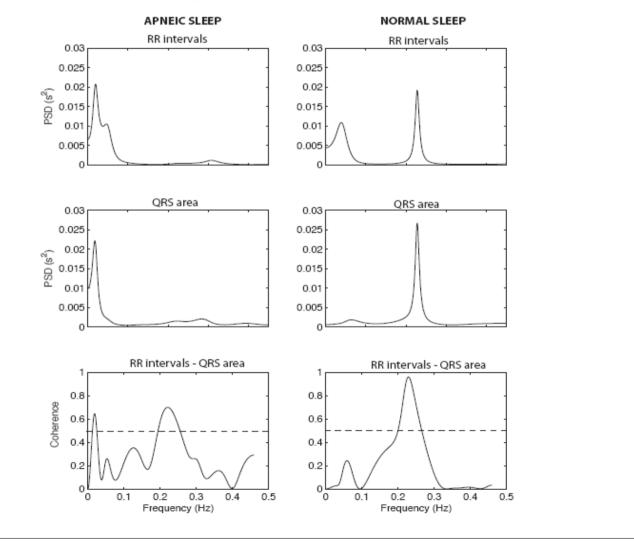
Sleep, CAP and Apnea

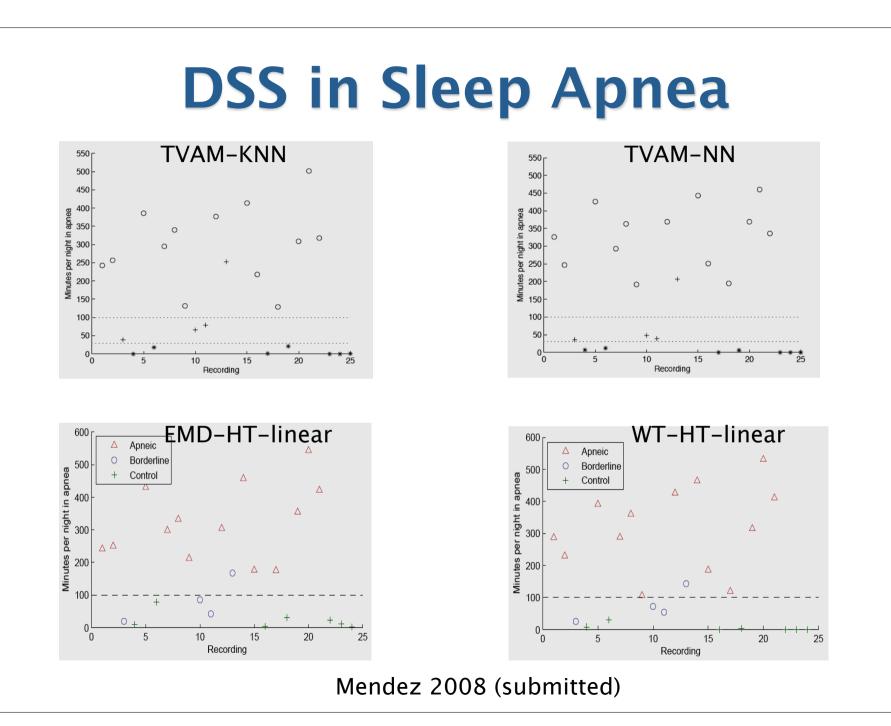


Cardio-Respiratory Coupling during Sleep Apnea



Cardio-Respiratory Coupling during Sleep Apnea





Thanks

The best model of a cat is another cat..., specially the same cat.

Arturo Rosenblueth