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# Brain-Restorative Sleep

Leonard N. Matheson, PhD

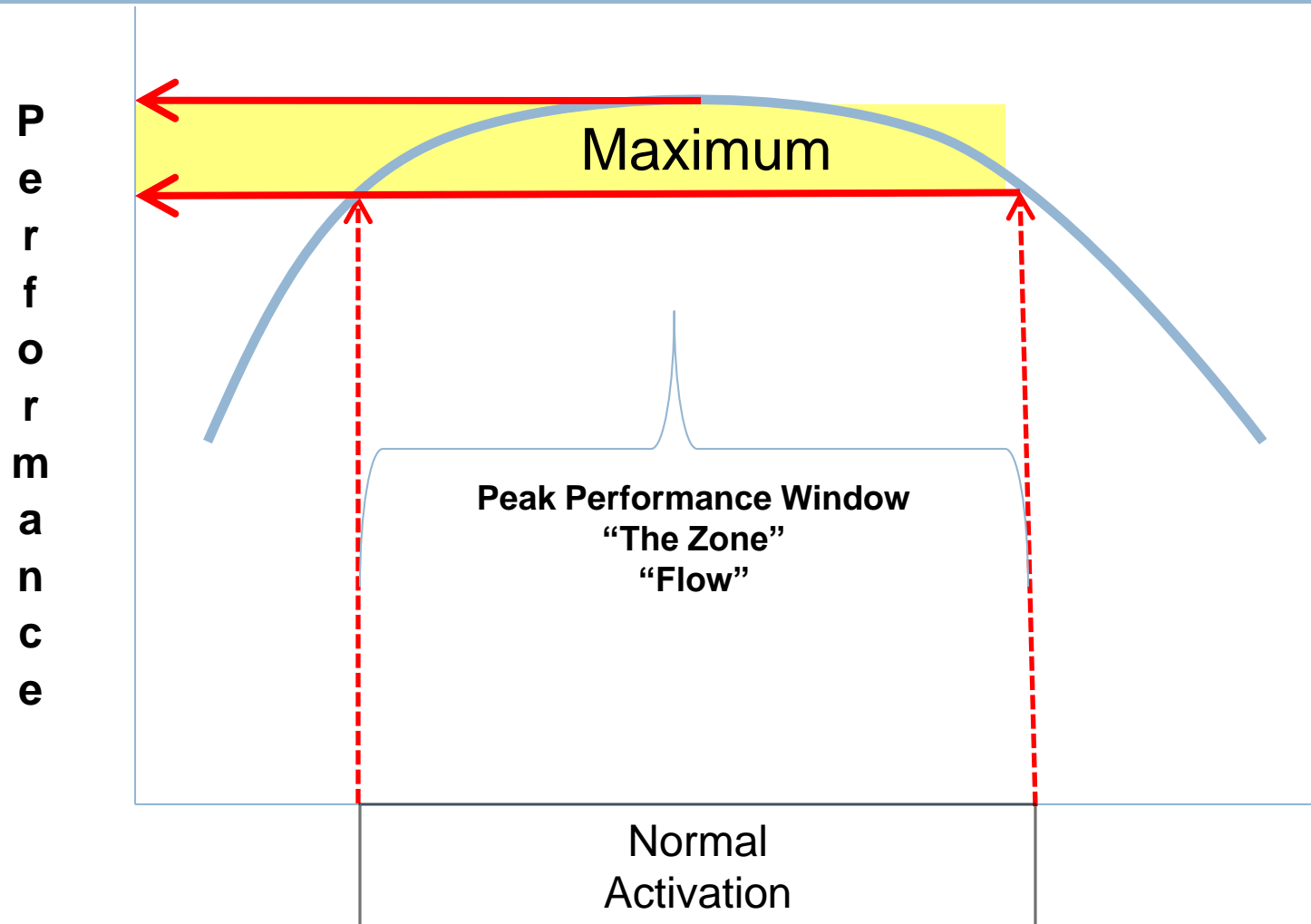
# Yerkes–Dodson Law (1908)

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- Performance is affected by arousal, with low arousal and high arousal producing lower levels of performance than moderate arousal.
- This is often illustrated graphically as a curvilinear, inverted U-shaped curve that increases and then decreases with higher levels of arousal (activation).

# Healthy Activation - Performance Curve

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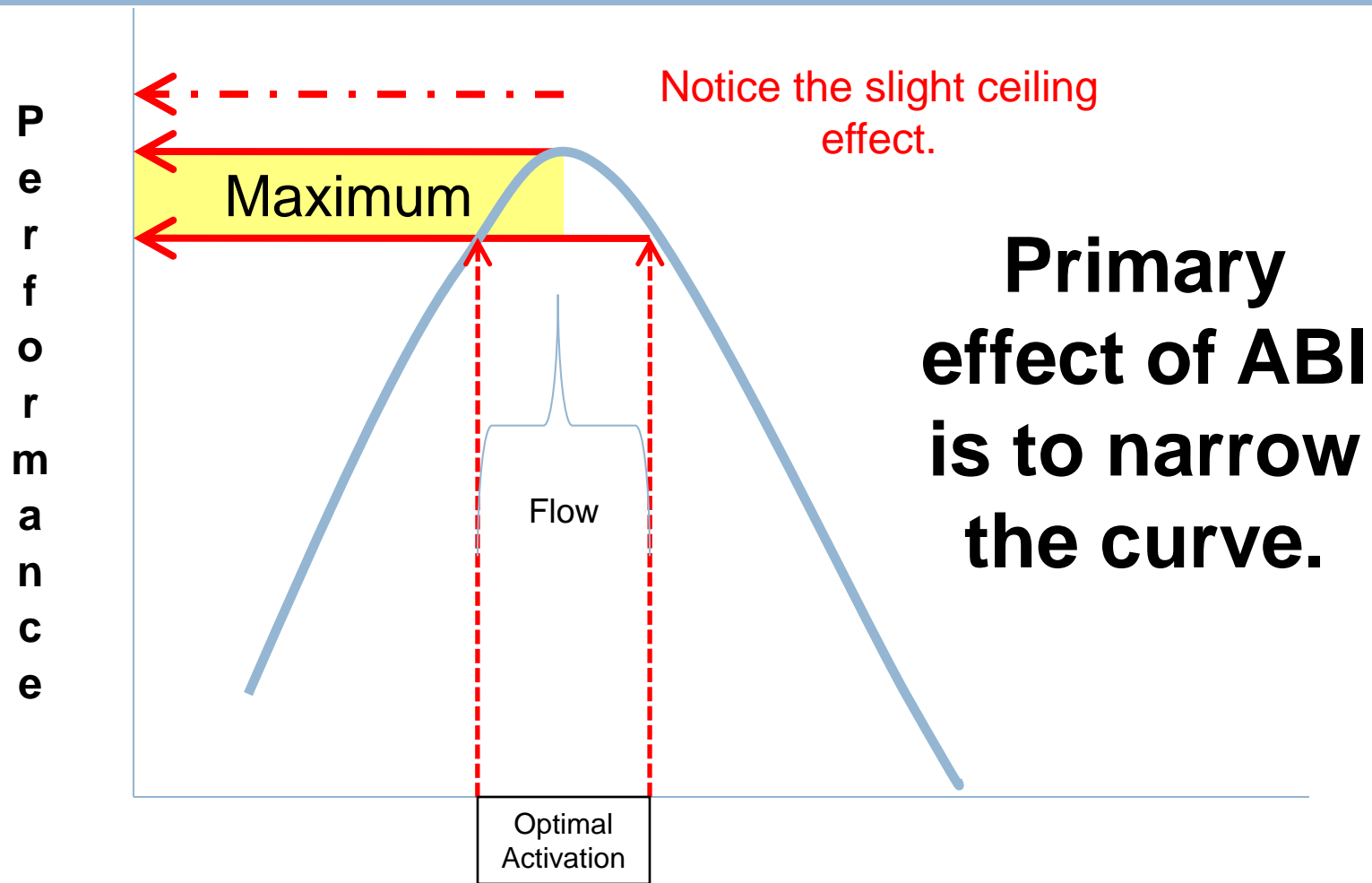
# Inverted-U & Flow

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- Flow or “The Zone”
  - ▣ Creativity and innovation
  - ▣ Complex problem-solving
  - ▣ Competitive athletic performance
    - Different sports, different athletes, consistently demonstrated.
    - Much more pronounced with complex tasks and in early learning.

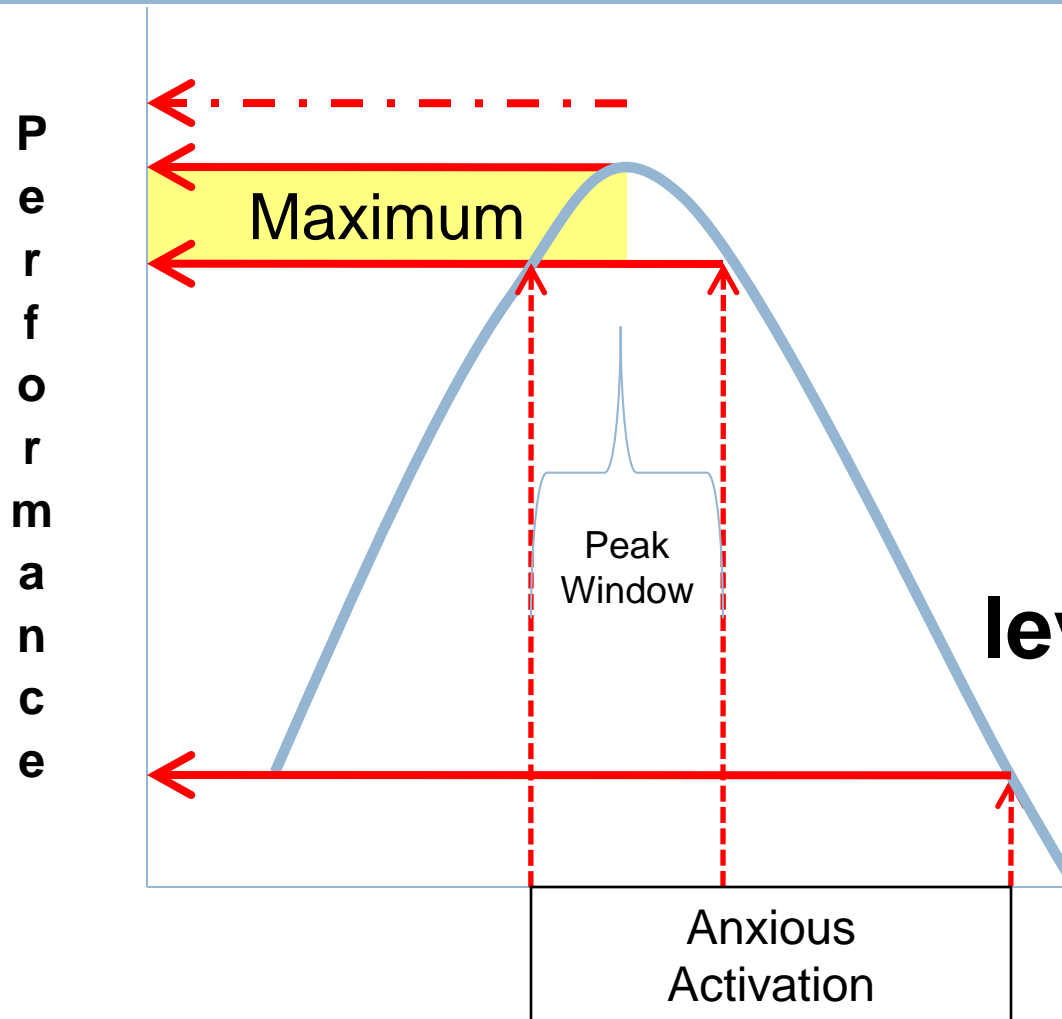
# ABI Activation - Performance Curve

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# ABI Curve & Performance Anxiety

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**As client increases activation to resume prior performance level, *overwhelm* occurs.**

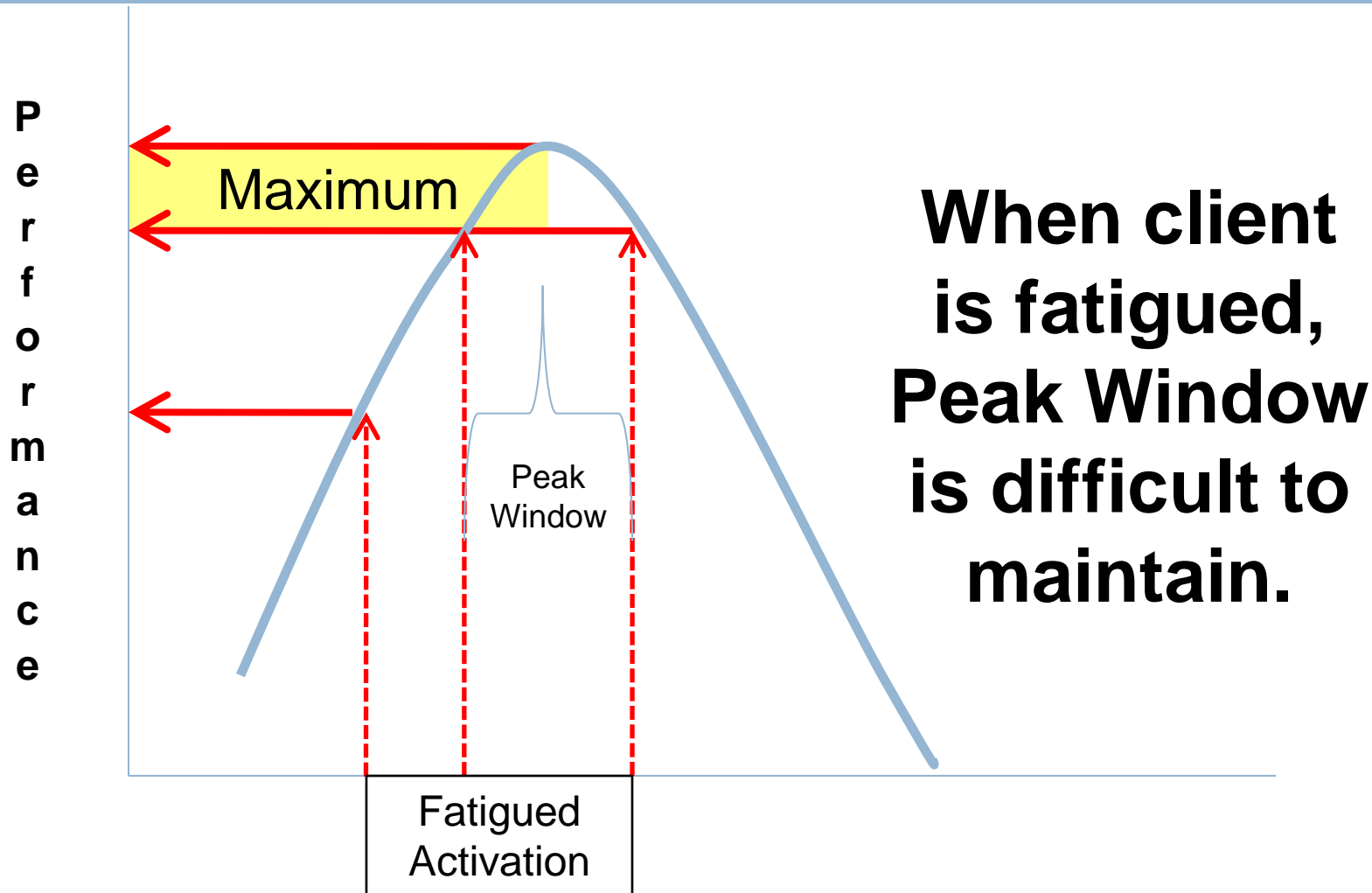
# Ceiling - Anxiety Interaction

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- Ceiling-anxiety arousal triggers a self-perpetuating cycle.
- Un-checked, this will be resolved by the client with maladaptive methods.
  - ▣ Pain medication plus marijuana or alcohol, with dependence.
  - ▣ Heroin and other opiates paired with anxiolytics ; developing tolerance & dependence.

# ABI Curve & Fatigue

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# Brain Basics of Sleep

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- High-quality sleep necessary to counteract fatigue, maintain brain health and emotional stability.
- Triggered by hypothalamus in response to complex signals; buildup of adenosine and melatonin.
- Depth of sleep affected by catecholamines, cortisol and blood sugar levels.

# Melatonin

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- Produced and secreted by the pineal gland in response to darkness to help bring about sleep.
- Its release is controlled by signals from the suprachiasmatic nucleus, next to the optic nerve that is stimulated by bright light.
- Frequently diminished with age.

# Hypothalamus

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- The hypothalamus monitors and regulates body status including temperature and food intake and blood pressure.
  - ▣ Suprachiasmatic nucleuses are tiny groups of neurons in the hypothalamus responsible for maintaining circadian rhythms.
  - ▣ Melatonin cycles here and is destroyed by bright light.

# Oxytocin

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- Hormone and neuropeptide from hypothalamus that is released by the pituitary gland in large amounts in labor, smaller amounts during breast-feeding.
- Flows in the bodies of infants, both boys and girls, stimulated by maternal love.
- Stimulates maternal behavior, trust, fidelity, and generosity.
- Counters cortisol.

# GABA & Glutamate

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- GABA (gamma amino butyric acid) is major inhibitory neurotransmitter.
- Glutamate is major excitatory neurotransmitter.
- GABA & glutamate interact.
- GABA regulates anxiety and is necessary for the growth of neural stem cells in neurogenesis.
- “Cheap GABA” in the form of alcohol, marijuana, benzodiazepines, heroin, etc. creates imbalance

# What is Brain-Restorative Sleep?

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- How much sleep do I need?
- Your brain needs deep restful sleep to maintain its health and your fitness.
- If you've had enough sleep, you will awaken spontaneously, refreshed, with your thoughts consolidated and clarity developing.
- The necessary duration is a function of sleep quality.
  - ▣ Restless, depressed, or anxious sleep is not brain-restorative.

# Neural Consolidation During Sleep

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- During sleep, the day's information is **consolidated**:
  - ▣ Thalamus blocks input from the senses.
  - ▣ Pons paralyzes the musculoskeletal system during REM.
    - Rapid Eye Movement every 90 minutes.
  - ▣ Hippocampus converts a small portion into long-term memories.
  - ▣ Cerebral cortex creates your story.

# Brain-Restorative Sleep

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## □ Daytime Ritual

- Set expected bedtime early enough that “current normal” awakening is after 6+ hours.
- Exercise regularly.
- Avoid naps or take a brief nap early.
- Limit caffeine and ingest none within 6 hours before bedtime.
- Make sure bedroom is quiet, dark, relaxing, and cool but not cold.
- Make sure bed is comfortable and use it only for sleeping and sex. If reading in bed, make it brief and relaxing.



# Brain-Restorative Sleep

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## □ **Pre-Bed Ritual**

- High-protein foods, sweets or cheap carbohydrates or alcohol no later than two hours before bed.
- Cortisol-countering aerobic exercise; 30-minute walk with relaxing music, relaxing massage > sleep or sex.
- Increase body temperature in warm shower or bath one-hour before bedtime, cool off 30 mins. before bed.
- Avoid all electronic cognitive input unless it is restful.
- Begin to turn off lights and darken home.

# Brain-Restorative Sleep

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## □ **Bedtime Ritual**

- Give self permission to sleep till necessary to arise.
- Set an alarm.
- Engaging multimodal prayers of gratitude and thanksgiving and surrender.
- Personal Prayer Relaxation or Personal Mantra Relaxation.
- If male is in bed with a woman, trigger oxytocin in both by touching lovingly without sexual intent. If received as such, female brain triggers oxytocin.

# Brain-Restorative Sleep

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## □ **Nighttime Ritual**

- If awakening with worries, use bathroom without bright lights; preserve melatonin & don't trigger epinephrine or cortisol.
  - Catecholamines wash-out quickly.
- If awakening to read, use very low light in a comfortable chair, not in bed.
- Use the bedtime ritual to return to deep restful sleep.
- If not asleep in ten minutes, get up and get into day with reasonable expectations.

# FEAR

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- Alcoholics Anonymous has aggregated tremendous wisdom about anxiety dysfunction:
  - ▣ **False Events Appearing Real**
  - ▣ **Future Events Appearing Real**
  
- Anxiety *always* has a future component.
- Anxiety is diminished by both adaptive and maladaptive strategies to avoid future-thinking.

# Mindful Awareness

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- Ancient practice in many cultures.
- The non-elaborative, non-judgmental, moment-by-moment awareness of every thought, feeling, or sensation that arises in the attentional field. Each is acknowledged and accepted and ***not*** acted-upon.
- Mindfulness-Based Stress Reduction (MBSR)
  - Increased gray matter in regions involved in learning and memory processes and emotion regulation.

# Personal Prayer/Mantra Relaxation

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- Joseph Wolpe
- Arnold Lazarus
- Herbert Benson
- Stephen Porges
- All the major faith traditions & philosophies.
- Parasympathetic nervous system underpinnings have now been identified.
- Vagal nervous system harmony is integral to anxiety modulation, relaxation and sleep.

# Personal Prayer/Mantra Relaxation

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- Word or phrase that recalls an experience connoting safety, comfort, tranquility and transcendence.
- Link word or phrase to exhalation to trigger respiratory sinus arrhythmia (RSA).
  - ▣ Helped by exercise and physical fitness.
- Enhance the memory, engaging all sensory channels.
- Invoke prayer/mantra to evoke elaborated memory.
- Prior to stressful events and immediately before

# Resources

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Free MP3: “Personal Mantra  
Relaxation”

[www.epicrehab.com](http://www.epicrehab.com)

Free MP3: “Personal Prayer  
Relaxation”

Free pdf: “Brain-Restorative Sleep”

[www.goalinginstitute.com](http://www.goalinginstitute.com)



# Thank you!

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Discussion and follow-up questions.

**Hold the date:**

February 6, 2013

*Jana Cason, DHS, OTR/L*

“Our Future in Telehealth”