

# **Attention Restoration Theory: Empirical Work and Practical Applications**

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# Acknowledgement

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# Focus

**The presentation will address:**

- 1) The role of natural environments for enhancing mental functioning based on Attention Restoration Theory (ART)
- 2) The therapeutic application of ART in women treated for breast cancer

# Attention: The Cornerstone of Cognition

**“Everyone knows what attention is. It is the taking possession by the mind in a clear and vivid form of one out of what seems several simultaneously possible objects or trains of thought...”**

**The immediate effects of attention are “to make us a) perceive, b) think, c) distinguish, d) remember, better than otherwise we could... and e) it also shortens reaction time.”**

James, William (1890/1890). *The Principles of Psychology*. Cambridge, MA: Harvard University Press.

# Two Kinds of Selective Attention

## Involuntary Attention

A spontaneous, effortless inhibitory response to sensory or intellectual stimuli based on interest.

Sources: survival-related phenomena, nature, & processes such as making sense

## Voluntary or Directed Attention

The capacity to actively inhibit competing stimuli (distractions) by sustained application of inhibitory effort; susceptible to fatigue

Sources: intentions and purposes

# Functional Significance of Directed Attention

- Supports purposeful mental activity (clear perceptions, ongoing train of thought, problem-solving)
- Provides inhibitory control for key cognitive processes (perception, working memory)
- Supports higher level “executive functions” (setting goals, planning, initiating and carrying out tasks and self monitoring and regulating behavior)
- Supports effective interpersonal and social functioning

(Lezak, 1982; Kaplan, 1995; Posner, 1995)

# Common Daily Demands On Directed Attention

## Four Domains

Informational:	Distractions e.g., noise, multi-tasking, attending meetings and conferences
Affective:	Worries, concerns, loss
Behavioral:	Constraints, unreasonable expectations
Physical:	Bad weather, poor vision/hearing, pain and discomfort

(Cimprich, 1990; Jansen, 2000; Kaplan, 1995)

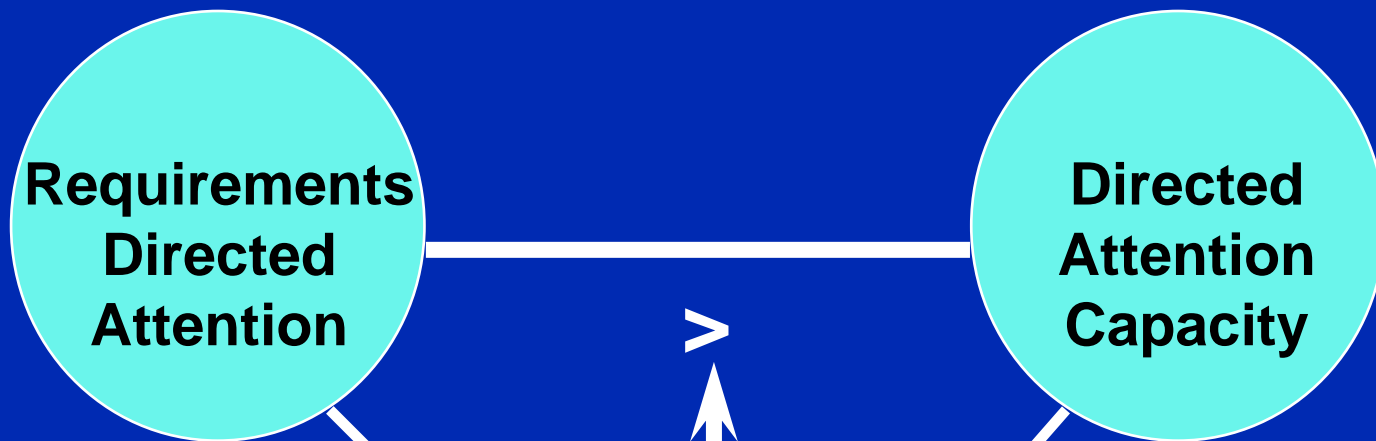
# Directed Attention Fatigue

A Syndrome that follows excessive use of directed attention:

- Distractibility
- Irritability, impatience
- Cumulative loss of effectiveness (in thinking, planning, deciding, starting and finishing tasks, monitoring)
- Measurable decline in directed attention capacity



# Conceptual Model for Attentional Fatigue & Restoration in Illness



**Requirements  
Directed  
Attention**

**Directed  
Attention  
Capacity**

**Environmental Demands  
(internal, external)**

- Informational
- Affective
- Behavioral
- Physical

Intensity, Duration

**Fatigue**

- Impaired Functioning
- Distress
- Cumulative Losses

- Supportive Environment
- Restorative Experiences
- Sleep

**Conservation,  
Restoration**

➤ = demands exceed available capacity

# Properties of an Attention- Restoring Experience

(Kaplan, S., 1995; 2001)

**Being Away**--moving away from tired cognitive brain structures that have become fatigued through overuse

**Fascination**--an effortless way of attending with involuntary attention

**Extent**--sufficient scope to sustain interaction for a period of time without boredom

**Compatibility**--fit with a person's inclinations and purposes to prevent use of mental effort

# 'Dose' of Natural Environment

- Kind and quality of the environment
- Involvement with the environment
- Frequency and duration

(S. Kaplan, 1992)

# Regular Exposure to Natural Environment Counteracts Attentional Fatigue in Healthy Adults

- Early evidence showed psychological benefits of wilderness experience (Kaplan & Talbot, 1983)
- Less intense exposures to natural environment such as a view from a window also revealed psychological benefits. (Moore, 1981; Ulrich, 1984; Verderber, 1986)
- More focused studies of effects of natural environment on cognitive functioning consistently showed improved attention and mental restoration. (Hartig, Mang, & Evans, 1991; Tennessen & Cimprich, 1995; Kaplan, 2001; Kuo & Sullivan, 2001; Kuo & Taylor, 2004; Ottosson & Grahn, 2005; Berto, 2005)

# Previous Research in Breast Cancer

- Difficulty concentrating is a ubiquitous clinical problem in persons dealing with a life-threat such as cancer.
- A loss in the capacity to focus and concentrate, or to direct attention, has been observed following breast cancer surgery.  
(Cimprich, 1990, 1993)
- Losses in attention also have been observed following diagnosis but prior to any treatment for breast cancer.  
(Cimprich, 1993, 1998; Cimprich & Ronis, 2001 2003; Cimprich, et. al, 2005)

# Working Hypothesis

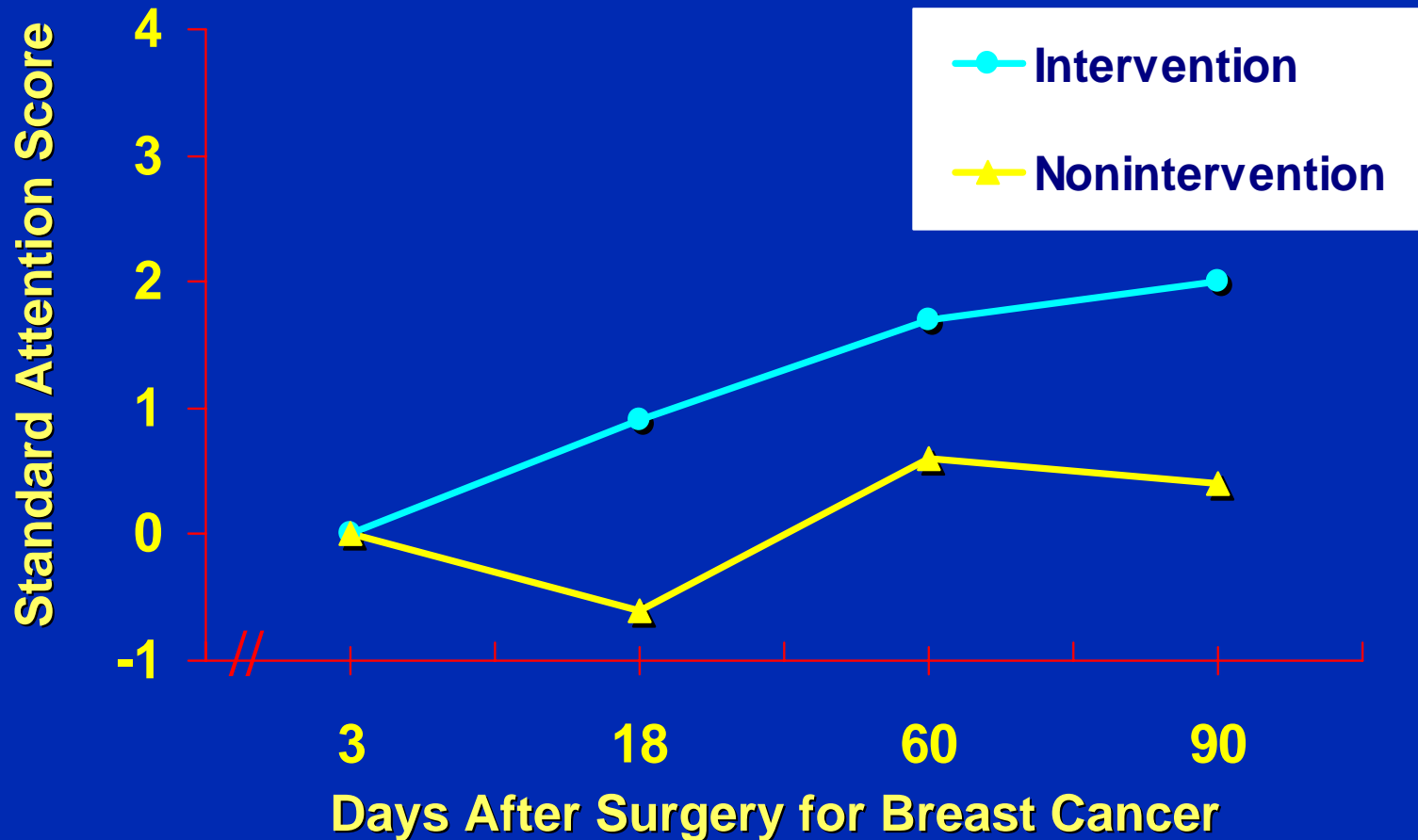
The observed losses in attention in women treated for breast cancer may be due, in part, to intense mental demands leading to fatigue of directed attention.

(Cimprich, 1990, 1992)

# Preliminary Research

- Therapeutic usefulness of the natural environment intervention was first tested in a randomized study of 32 woman after breast cancer surgery (Cimprich, 1990,1993).
- Women in the intervention group contracted for preferred activities for 20- 30 mins three times a week. Most often selected activities involved walking or sitting in a park, bird watching or tending flowers or plants.

# Attentional Fatigue & Restoration



Base: Women treated for early stage breast cancer, (N = 32), Cimprich, 1993.



# Research Objective:

To determine whether the capacity to direct attention could be maintained or improved over time by an intervention involving regular exposure to natural environment initiated post-diagnosis but prior to breast cancer treatment.

# Measures of Directed Attention

- Theoretically congruent
- Valid and sensitive to change
- Feasible for an ill population

(Cimprich, 1990, 1992, 1993, Cimprich & Ronis, 2001, 2003, Cimprich, et. al., 2005)

# Some Useful Measures

## Capacity to Direct Attention:

- Digit Span Forward and Backward  
(Wechsler, 1955)
- Trail Making A and B  
(Reitan, 1958)
- Necker Cube Pattern Control  
(Cimprich & Kaplan, 1990)

# Some Useful Measures

## Attentional Function Index\*

Self-report (16 items) on effectiveness in planning, deciding, following a train of thought, concentrating on details.

Established validity and reliability

\*Cimprich, 1990, 1992, 1993; Tennessen & Cimprich, 1995; Cimprich & Ronis, 2001.

# Restorative Environmental Intervention Protocol

1. Instruction in nature and purpose of an attention-restoring experience
2. Guidance in identifying and selecting preferred activities
3. Help in developing an action plan
4. Agreement (in writing) to do selected activities for 120 minutes per week
5. Keeping track using a log

Boosts at Times 2, 3, 4



# Summary

- Many participants showed a lowered capacity to direct attention before any treatment for breast cancer.
- Participants randomly assigned to the environmental intervention group showed sustained recovery of attention over time as compared to the nonintervention group.
- A long-term beneficial effect of the intervention on attention was observed even after controlling for effects of key covariates.

# Conclusions

- Individuals with life-threatening illness such as breast cancer are at high risk for fatigue of directed attention at times when effective mental functioning is urgently needed.
- ★ Long-term therapeutic benefits derive from early application of a Natural Environmental intervention to restore attention in women newly diagnosed with breast cancer.

# As Miss Nightingale said:

- What we [clinicians, caregivers] have to do is to put the person who is ill in the best position for healing to occur.\*
- Natural environment interventions have enormous potential for improving functioning and quality of life in cancer survivors.

\* Adapted from Baly, Monica (Ed.). (1991). *As Miss Nightingale said...*, London: Scutari Press.

