THE READING BRAIN IN A DIGITAL WORLD

MARYANNE WOLF

UCLA GRADUATE SCHOOL OF EDUCATION & INFORMATION STUDIES
Literacy is a basic human right.

Across all learners, all ages, all backgrounds.
THE WORK:
Connecting Research with Education and Vice Versa

- Gene
- Classrooms
- Cognitive Behaviors
- Brain Areas
- Neural Circuits
- Cell / Neuron
The Reading Brain Circuit in a Digital World
Influences:

• *Letters to a Young Poet*
  Rainer Maria Rilke

• *Six Memos for the Next Millennium*
  Italo Calvino
“In an age when ... fantastically speedy, widespread media are triumphing, and running the risk of flattening all communication onto a single, homogeneous surface... (we need) a rhythm of time that passes with no other aim than to let feelings and thoughts settle down, mature, and shed all impatience or ephemeral contingency.”

- Italo Calvino, 1986
“Iron sharpens iron.”
Thomas Aquinas

“...reading, that fertile miracle of communication effected in solitude. We feel quite truly that our wisdom begins where that of the author leaves off.”
Marcel Proust
Great transitions in Communication

1. Non-language to Oral Language
2. Oral Language to Written Language
3. Written Language to Digital Culture
• Literacy changes the brain, which changes the individual, which changes society, which changes the future of the species.

• This has all begun to change.
“We transgress not because we try to build the new, but because we do not allow ourselves to consider what it disrupts or diminishes.”
- Sherry Turkle, *Alone Together*
A Matter of Cognitive Choice
The human brain was never born to read. Each reader creates a new, plastic reading circuit from older cognitive and linguistic structures.
Principles of ‘Plasticity Within Limits’ for Reading Brain

1. Ability to form whole new connected circuits
2. Ability to recycle and repurpose areas
3. Depends on environment/characteristics (e.g., writing and medium)
Brain can rearrange itself in multiple ways to read, depending on writing system and medium.

Bolger, Perfetti, & Schneider

PLASTICITY: Multiple Circuits Possible
From Basic Decoding Circuits to Elaborated “Deep Reading” Circuits
Deep Reading. Is it Endangered?

At the heart of reading, 100 to 200 milliseconds allows us
“time to think our own new thoughts.”
Deep Reading

- Background Knowledge
- Perspective Taking/Empathy
- Critical Analysis
- Novel Thought
- Inference,
- Deduction/Induction,
- Analogical Thinking
- Imagery
- Insight & Reflection

Going beyond the wisdom of the author.
Deep Reading: Background Knowledge

“Reading is cumulative and proceeds with geometric progression: each new reading builds upon what the read has read before.”

Alberto Manguel
A History of Reading
“Here is the Golden Key. It is the capacity to pass over to others and come back to ourselves. We all have the capacity, but we do not all discover it, come to use it, learn to pass over.”

*John S. Dunne*
Conversation between Barack Obama and Novelist Marilynne Robinson

“

The trend towards seeing those different as ‘sinister other’ is the greatest danger to continuing our democracy.

”
Our deep reading brain favors Miss Marple.
Deep Reading Brain Circuit and St. Thomas Aquinas
The Deep Reading Brain

....requires both milliseconds during the reading act and years of formation.

It is never a given.
“Every medium has its costs and weaknesses; every medium develops some cognitive skills at the expense of others...the Internet may develop impressive visual intelligence, the cost seems to be to deep processing: mindful knowledge acquisition, inductive analysis, critical thinking, imagination and reflection.”

- Patricia Greenfield, 2009
“The real question is whether the affordances of reading on screen lead us to a new normal, one in which length and complexity ... and memory and especially concentration are proving more challenging.”

Baron, 2015
EVIDENCE

1. Information increases along with skimming, browsing, keyword spotting; F or Z pattern of reading.

2. Less time on concentrated reading; more distractions (27/hr)

3. Decreased sustained attention and memory.

(Liu, 2005, 2009, 2014)

(Baron, 2014)
Digital Chain Hypothesis

- How MUCH we read
- HOW we read
- WHAT we read
- What is WRITTEN
- WHY we read...
Paradoxical Effects of Glut of Information

Increased use of reduced, less dense, unadjudicated information

Less exposure to alternative perspectives
Implications for Reader

• If reading largely changes to adapt to digital characteristics:

  we will reduce **deep reading**
  with less time
  to grasp **complexity**, 
  to understand another’s **feelings**, 
  to perceive **beauty**, and 
  to appreciate our **cultural heritage**, 

Implications for society

• If critical analysis and empathy atrophy…
  - less attention to others’ viewpoints;
  - more susceptibility to false information and demagoguery;
  - less understanding of cultural legacies:

all of which threatens a **democratic society**.
Implications for the Next Generation
Evidence from Infancy to Five: Early Language

iPad is the New Pacifier

Hirsh-Pasek et al. 2014
Zuckerman & Radesky, 2017
Effects of Parents Reading to Young

John Hutton et al, Cincinnati Hospital for Children

- Semantic Processing (Understanding)
- Visual Imagery
- Controlled for household income

Left Hemisphere
“Goldilocks” Effect in Mediums

Parent Book Reading > Audio Book > Animated Story

John Hutton

1. Adapted from S. Dehaene, “Reading the Brain,” 2010.
Evidence in Young: Attention Changes

Continuous partial attention and multi-tasking

Requires high levels of stimulation

Low-level threshold for boredom

Bathed in fight/flight hormones

More attention issues
Evidence in Young Adult Readers from Norway, Israel, and Europe’s E-Read Network

Changes in attention

Comprehension of text and sequencing of details better in print than on digital screens

Mangen & van der Weel, 2016
Guernsey & Levine, 2016
Baron, 2015; Katzir, 2018;
Barzillai, Thomson & Mangen, 2018
Changes in Empathy

40% decline in youth over 20 years, with most in last 10 years.

Sarah Konrath, 2011
Sherry Turkle, 2015
“Don’t Throw Away Your Printed Books: Meta-analysis Print and Digital Media On Comprehension”

54 Studies
171,055 Participants

Print better than Digital (p<.001)
• Across genres
• Across timed conditions
• Increasing over the years 2000-2017

Delgado, Vargas, Ackerman, and Salmeron; *Educational Research Review* (in press)
"Just open it and read it. You don't need a password."

It's called a book...not sure where the batteries go.

Displacement Theory
Read Print Daily
60% (1970s)
16% (2016)

82% today use social media

“Economy of Attention”: Less long form, more quick media

Twenge, Martin, Spitzberg,
Psychology of Popular Media Culture
Large Developmental Questions

Will changes in attention and the immediacy of external platforms of knowledge threaten the formation of INTERNALIZED background knowledge in young digital readers?
If background knowledge and attention are threatened, will inference and critical analysis decline, with young readers more susceptible to false information and less able to handle sophisticated text?
Preserve and Expand
Proposal for a ‘Biliterate Brain’

• Parallel Paths for Print and Digital Modes
• Early Childhood Emphases on Print for Reading
• Early Emphases on Digital Mediums for Coding and Programming
• Development of Deep Reading Skills with Print
• Explicit Teaching of Deep Reading Skills with Screens
Vygotsky’s Model of Thought and Language
Biliterate Brain

Deep Reading on Print

Explicit Deep Reading On Digital Media
Ensuring the formation of deep reading across any medium is our best LEGACY AND INOCULATION against false information, demagoguery, and indifference to “other”.

GOAL: Deep Reading across Mediums
“A culture can be judged by how it pursues three lives: the life of activity and productivity, the life of enjoyment, the life of contemplation.”

Aristotle
“Among the three lives...we have a life of action and a life of enjoyment, but for the most part we are lacking a life of contemplation...there are dire consequences of this.”

John S. Dunne (2012)
“To read, we need a certain kind of silence...that seems increasingly elusive in our over-networked society...and it is not contemplation we desire but an odd sort of distraction...masquerading as being in the know. In such a landscape, knowledge can’t help but fall prey to illusion...that speed can lead us to illumination, that it is more important to react than to think deeply.

Reading is an act of contemplation...an act of resistance in a landscape of distraction. It returns us to a reckoning with time.”

David Ulin
The discernment of truth...and wisdom...
depends on the allocation of time we give
to the processes underlying them in our reading brain.

“Use it of Lose it” must in our Hinge Moment
be changed to “Choose it”.
“It would be catastrophic to become a nation of technically competent people who have lost the ability to think critically, to examine themselves, and to respect the humanity and diversity of others. And unless we support these endeavors, it is in such a nation that we may well live. It is therefore urgent now to support curricular efforts aimed at producing citizens who can take charge of the own reasoning, who can see the different and foreign not as a threat to be resisted but as an invitation to...expand their own minds and capacity for citizenship.”

Martha Nussbaum
This time...this hinge moment...let us choose with all our intelligence.