Reading on paper and screens: Empirical research

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- There is evidence that linear text reading on screen(s) is different from text reading on paper
 - Paper/screen affordances might impact cognitive and emotional aspects
- What are the effects of screen reading?
- We need to identify the best of both worlds (paper and screens)





- Human-technology interaction
 - Affordances of substrates (paper; screens)
- Multidimensional
 - Substrate; text; reader; purpose
- Multisensory and embodied
 - Tactility & haptics; body and brain



An integrative model of reading

- Ergonomic dimension (reading is physical engagement with a device; haptics)
- Attentional/perceptual dimension (allocation of attention; audiovisual processing)
- Cognitive dimension (comprehension; linguistic processing)
- Phenomenological dimension (individually meaningful activity)
- Sociocultural dimension (socially meaningful activity)





- ergonomics (haptic/tactile affordances)
- visibility (visual discrimination)
- legibility (color; typography)
- attention
- comprehension
- memory
- metacognition
- emotion/immersion/phenomenological experience





- Literary studies
- Media studies
- Book history
- Psychology
- Neuroscience
- LIS (Library and information science)
- Philosophy
- Biology
- Educational sciences
- HCI (Human-Computer Interaction)





- 72 students (10th grade) in two Norwegian schools
- Students read two 4 page long texts (one narrative, one expository) on either paper or computer screen, then answered comprehension questions on the computer
- Hypothesis: on-paper readers would perform significantly better on the comprehension assessment than on-screen readers



(Mangen, Walgermo & Brønnick, 2013)

- Results: students who read texts on paper scored significantly better on the comprehension measure than students who read the texts on the computer
- No difference between expository and narrative text
 (Mangen, Walgermo & Brønnick, 2013)



Potential explanations

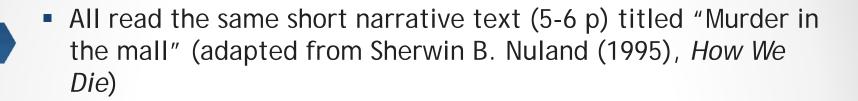
- Multitasking (shifting between windows)?
- Scrolling?
- Visual fatigue?
- Lack of fixity on screen?



Immersive reading on paper and iPad

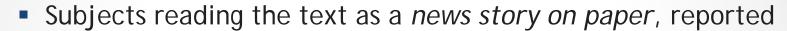
- Does it matter to our emotional engagement if we read a sad story on paper or on an iPad?
- 2 x 2 between-subjects design
 - medium (booklet; iPad)
 - genre instructions (fiction; nonfiction)
- Participants (n = 145; 73% women) read a 5-page narrative and completed a series of online questionnaires





 Letter-sized pages stapled in the upper left corner, and iPad w/Kindle app





- Highest level of empathy with the characters in the story
- Highest level of transportation into the story (forgetting about the «here-and-now» of the situation)
- Highest level of clarity and consistency in the storytelling
- Highest level of medium/interface transparency (i.e., reporting that the medium - paper - was not interfering with their immersive experience)



(Mangen & Kuiken, submitted)

Paper or screen? Potentially mediating factors

- Text-related (e.g., length; complexity; genre; layout/structure)
- Reader-related (e.g., age; gender; novice vs expert; special needs)
- Substrate (e.g., audiovisual features; haptic/tactile feedback)
- Purpose of reading (e.g., study; leisure; contemplation; light entertainment; news)



Thank you for your attention

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