



THE EVOLUTION OF INFOGRAPHICS IN PSYCHOLOGY:

*From Theoretical Diagrams to
Data-Driven Visualizations*



Marlee Salisbury
PSYC6135
April 10th, 2025



Contents

01. Evolution of Psychological Infographics

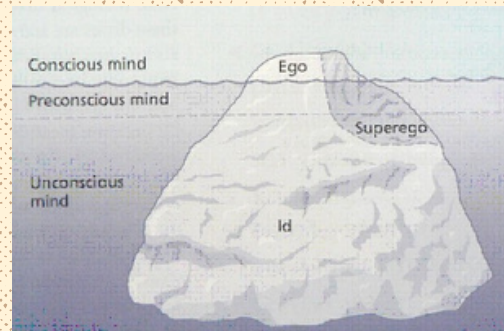
- i. Early Theoretical/Conceptual Diagrams
- ii. Empirical Graphs
- iii. Cognitive & Information Processing Models
- iv. Modern Data Visualizations

**Key figures, theories, and methods in visualizing psychological concepts*

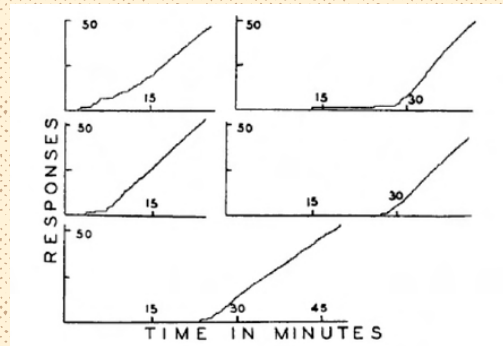
02. Future Directions in Psychological Data Visualization

TIMELINE

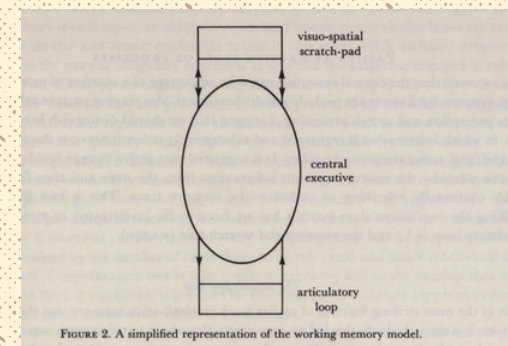
Early 1800s



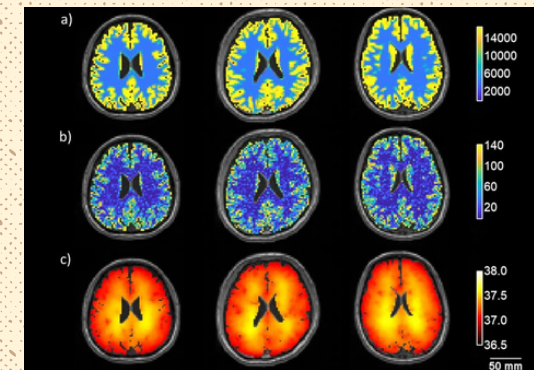
Early Conceptual & Theoretical Diagrams



Empirical Graphs



Cognitive & Information Processing Models

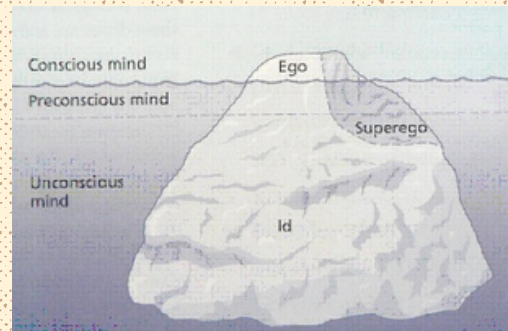


Modern Big Data Visualization

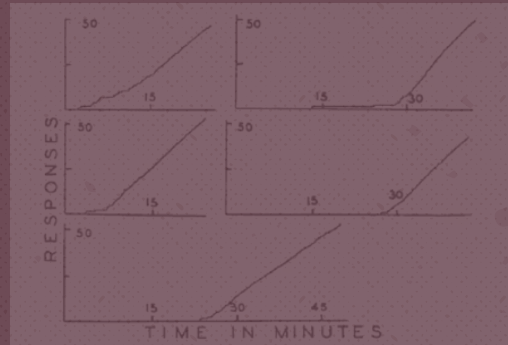
Present

TIMELINE

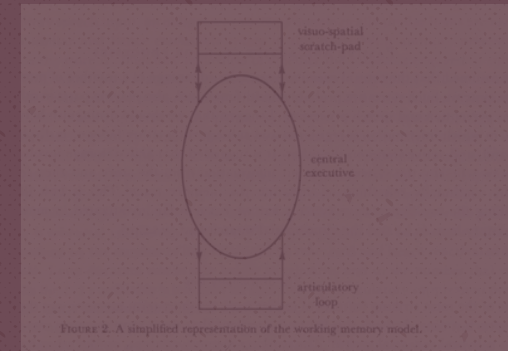
Early 1800s



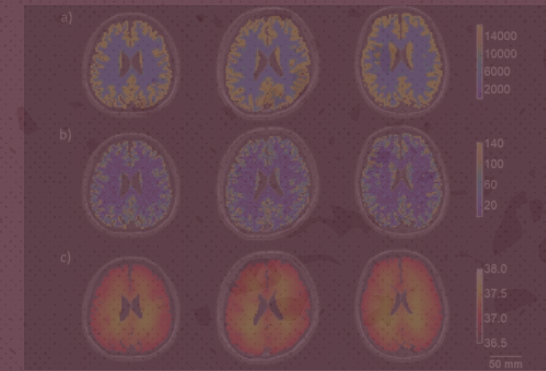
Early Conceptual &
Theoretical Diagrams



Empirical Graphs



Cognitive &
Information Processing
Models

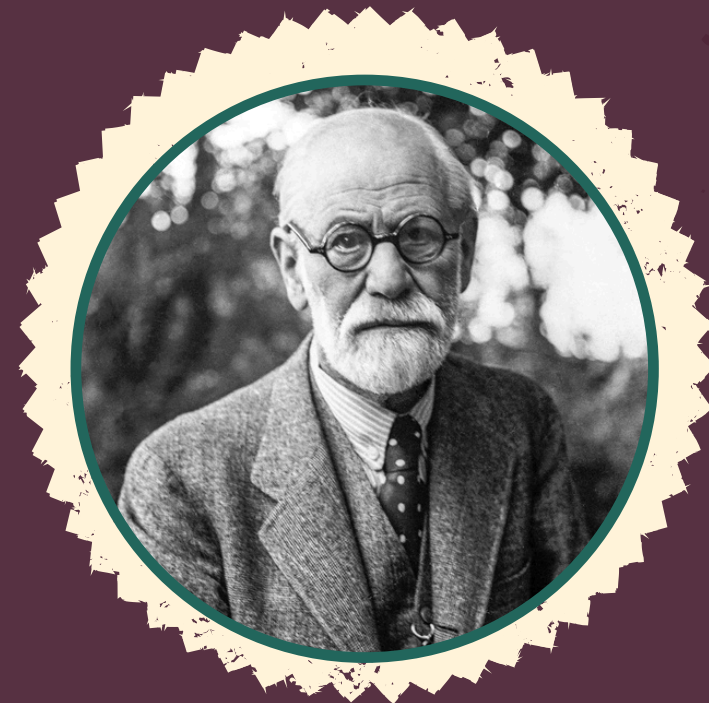


Modern Big Data
Visualization

Present

EARLY CONCEPTUAL & THEORETICAL DIAGRAMMS

Key Figures

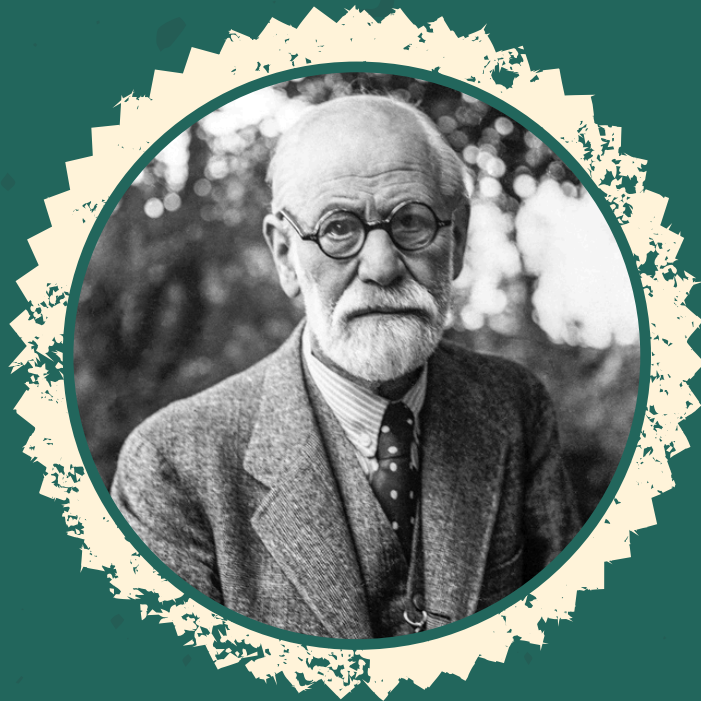


Sigmund Freud



Franz Joseph Gall





Sigmund Freud's Topographical & Iceberg Model (?)

1890-1920s

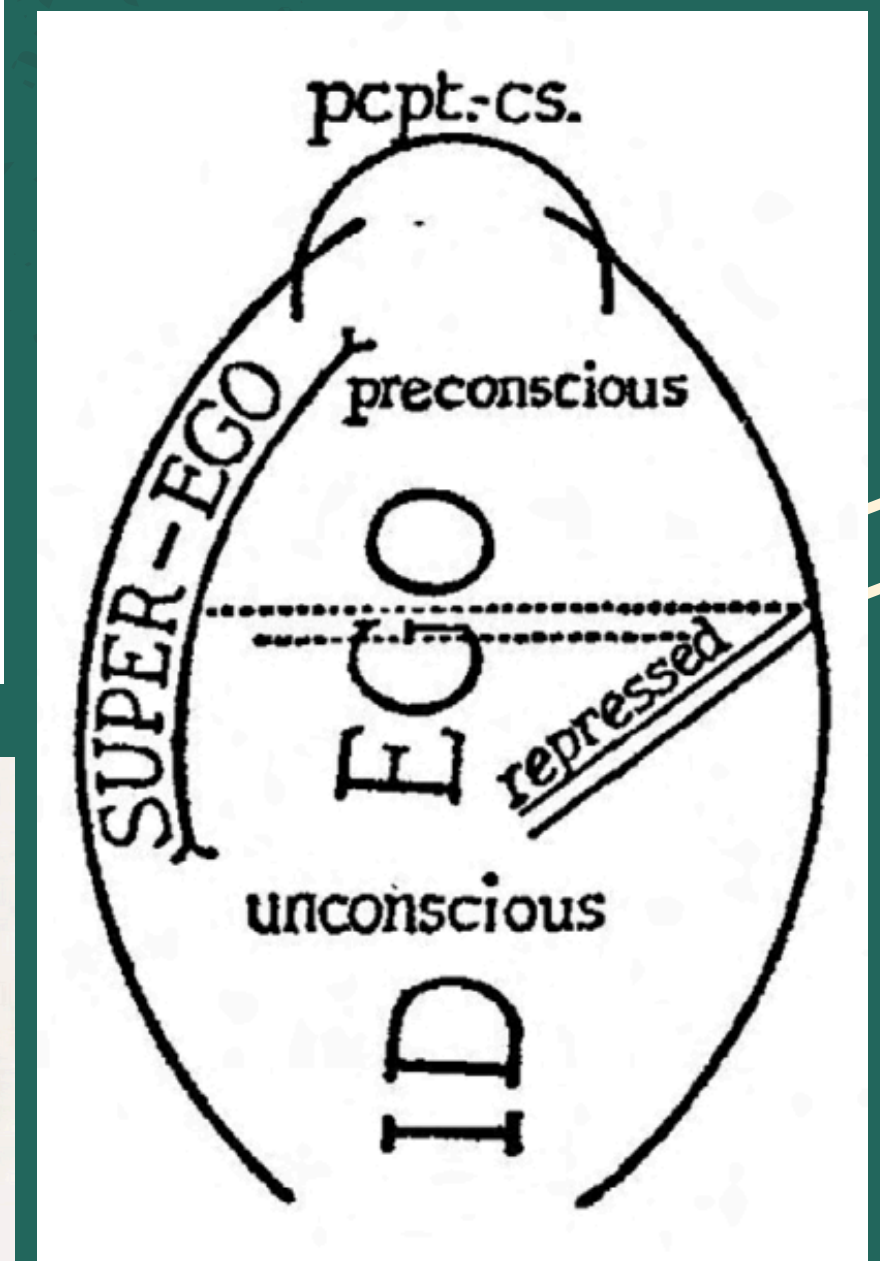
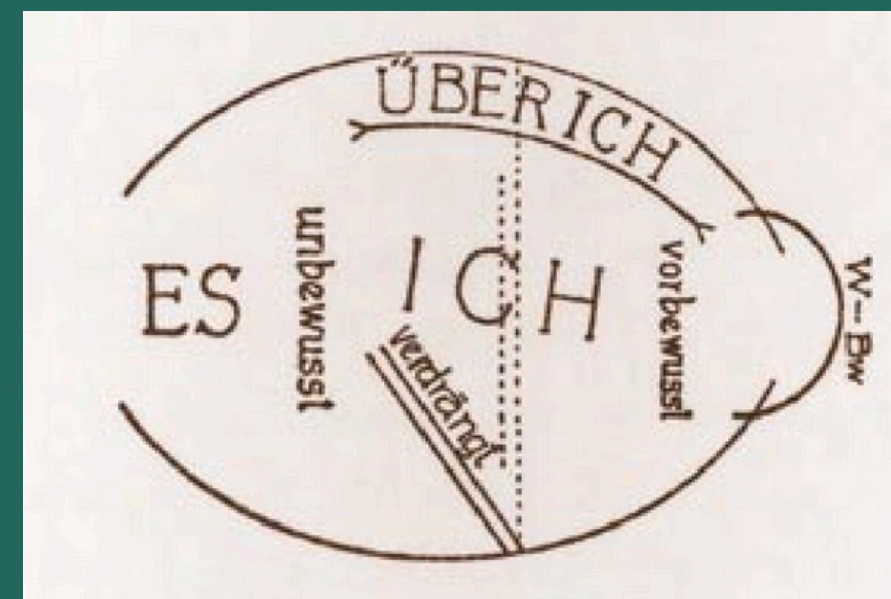
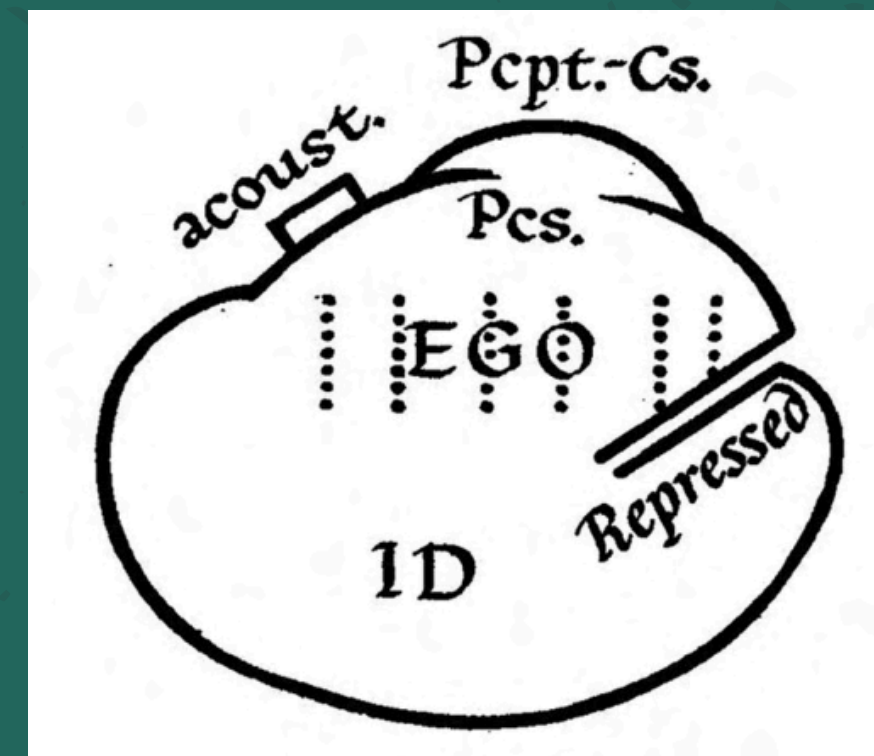
Map of human consciousness (conscious, preconscious, and unconscious), emphasizing that most mental activity occurs beneath conscious awareness

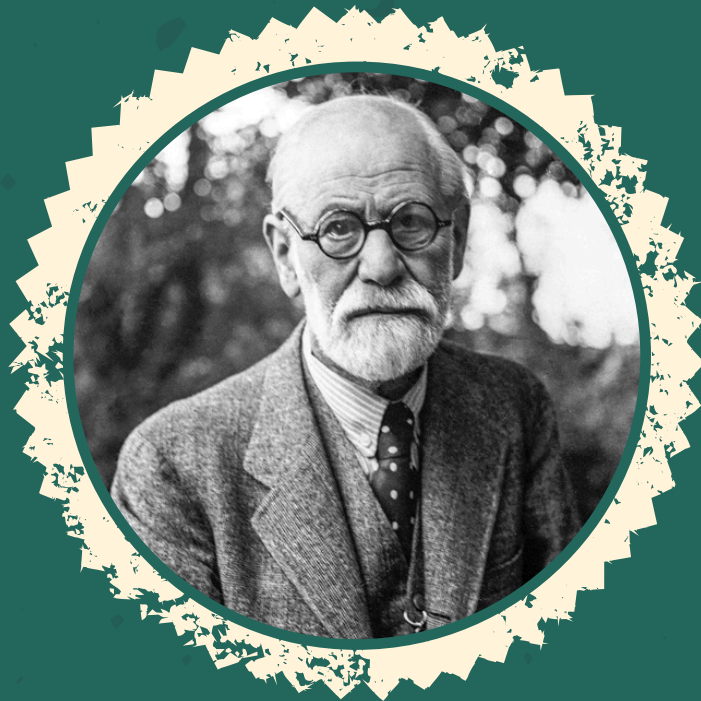
Key Insight: The unconscious mind—driven by hidden desires and repressed thoughts—plays a major role in shaping behavior, while the id, ego, and superego regulate internal conflicts

Importance: Laid foundation for psychoanalysis, dream analysis, personality theory, and therapeutic techniques. Made an abstract theory of mind visually intuitive.

(D'onogue, 2007; Gamwell & Solms, 2006)

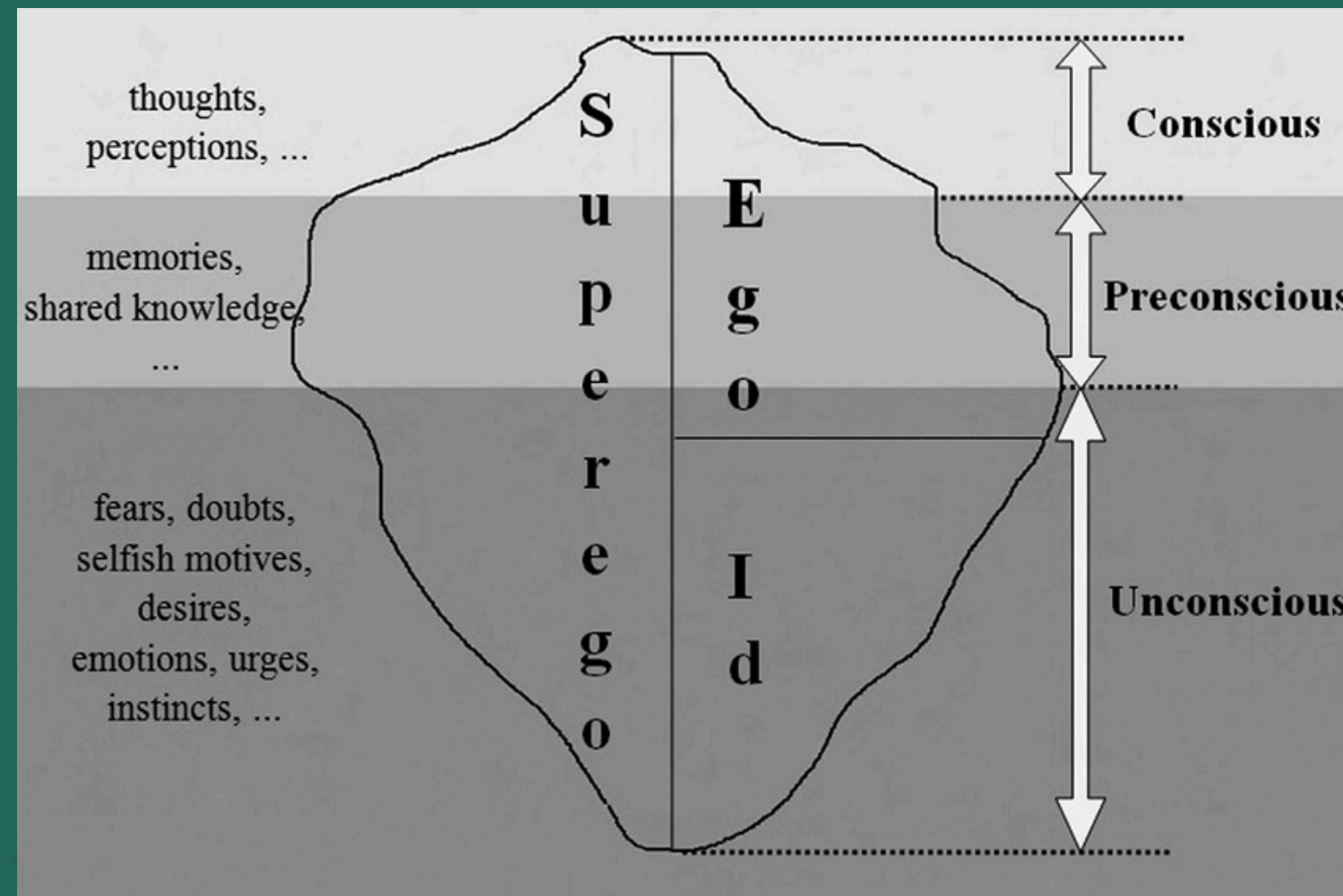
(Freud, 1923, 1964)



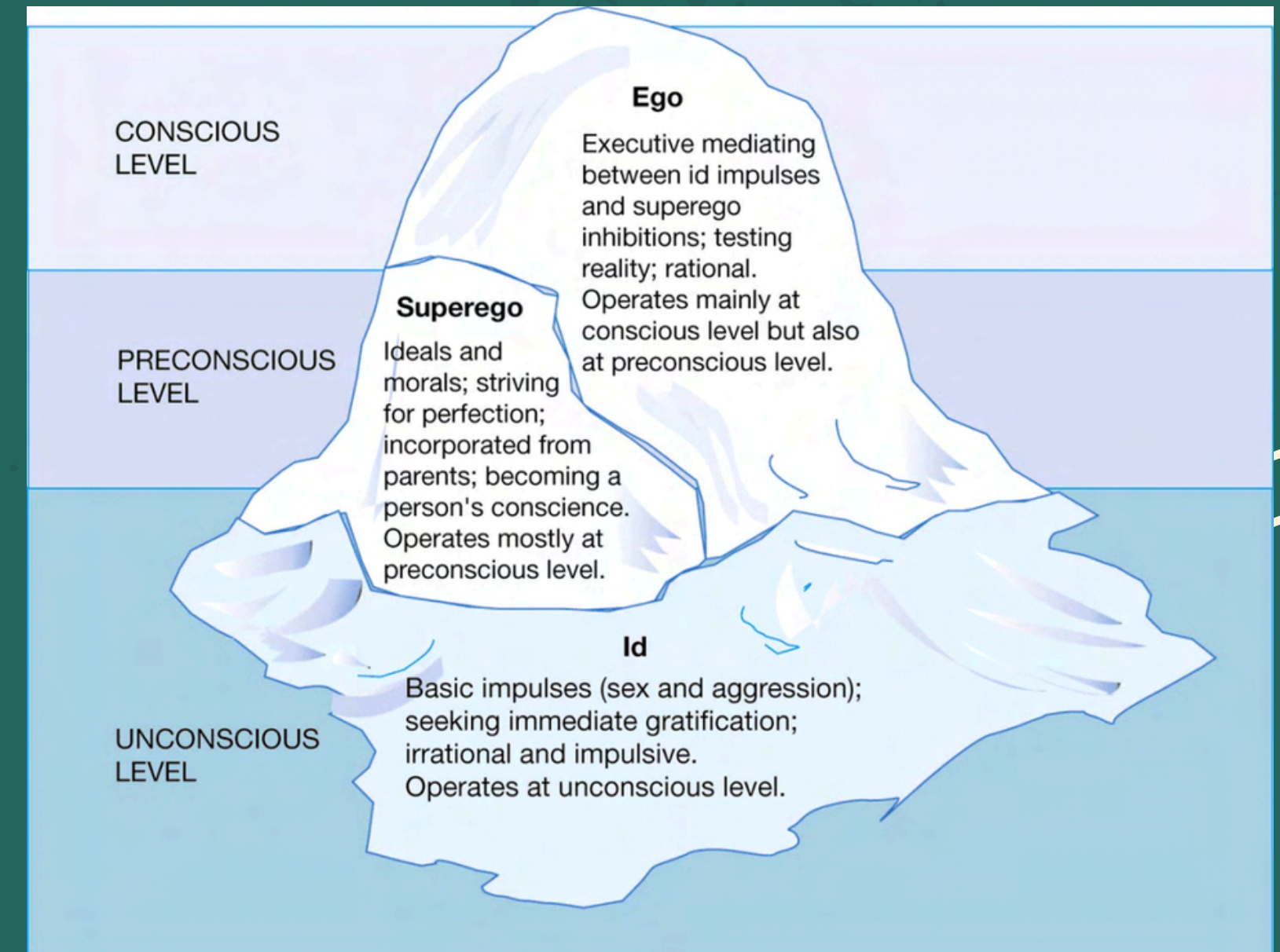


Sigmund Freud's Topographical & Iceberg Model (?)

1985-1920s



(Banerjee & Pal, 2015)



(Kaufmann, 2021)

See: *Where Did Freud's Iceberg Metaphor of Mind Come From?* by Christopher Green (2019)



Franz Joseph Gall's Phrenology Map

1800 – 1940s

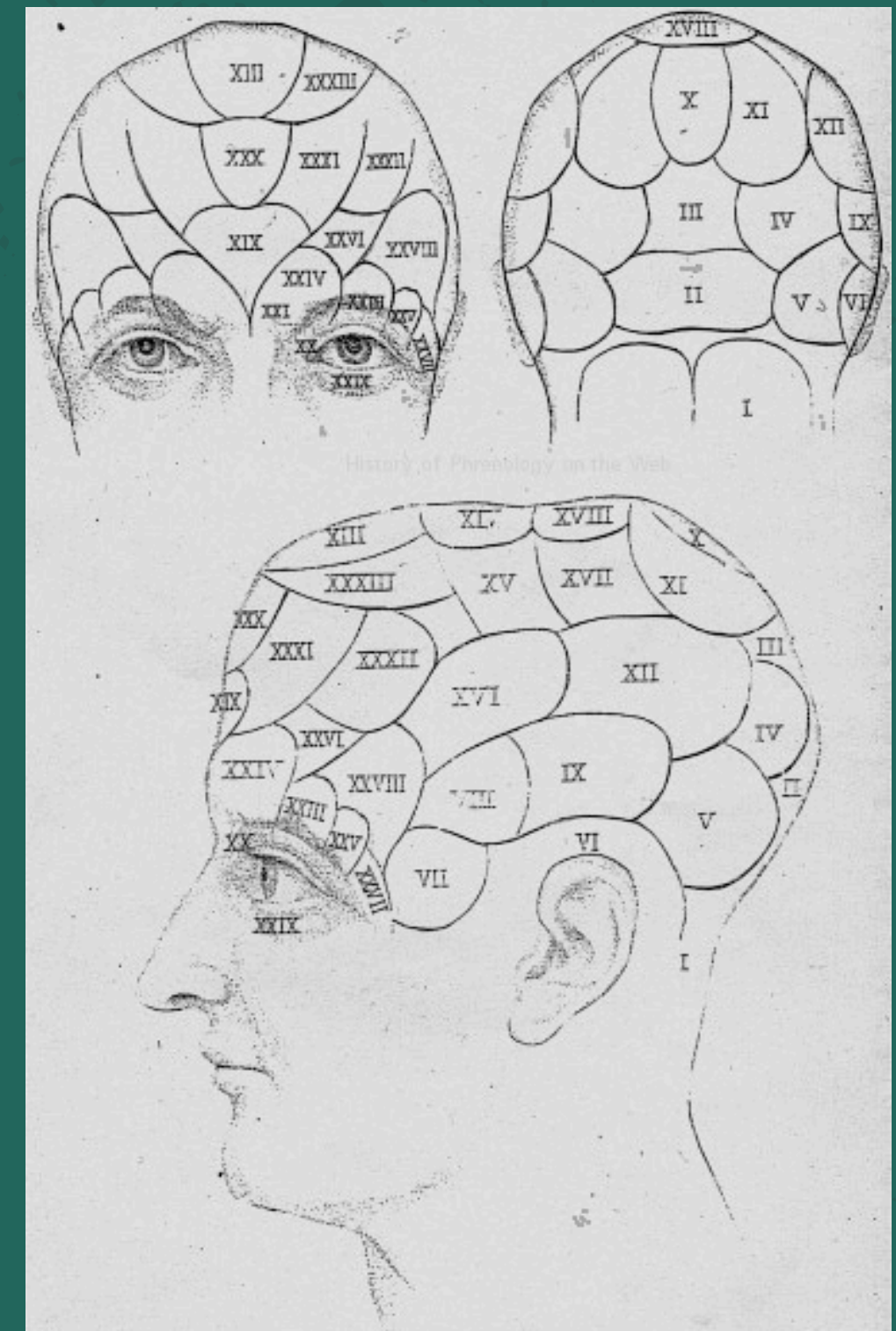
Different brain regions control specific personality traits, emotions, and abilities, which could be determined by feeling the bumps on a person's skull.

Key Insight: Mental faculties were localized in specific brain areas, laying the groundwork for later neuroscientific studies on brain function

Importance: One of the earliest attempts to visually represent the brain's organization, marking a shift toward graphical depictions of psychological concepts. These maps inspired later brain mapping, including modern fMRI brain activation maps and cognitive function diagrams.

(Simpson, 2005)

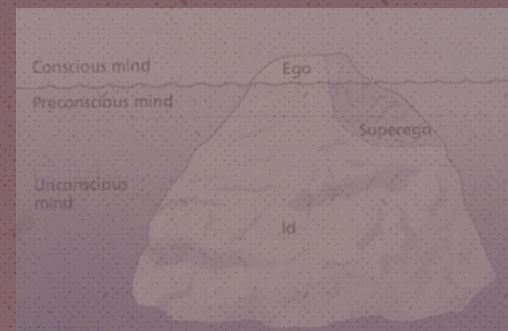
See: "The History of Phrenology on the Web" by John van Wyhe (<https://www.historyofphrenology.org.uk/>)



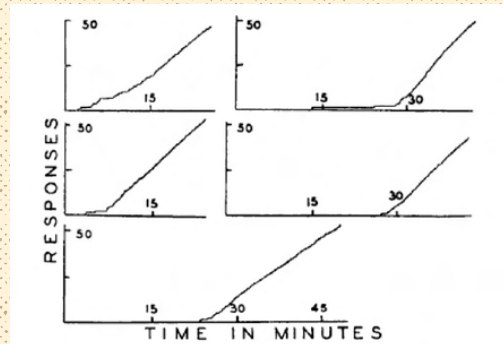
(Gall and Spurzheim, 1815)

TIMELINE

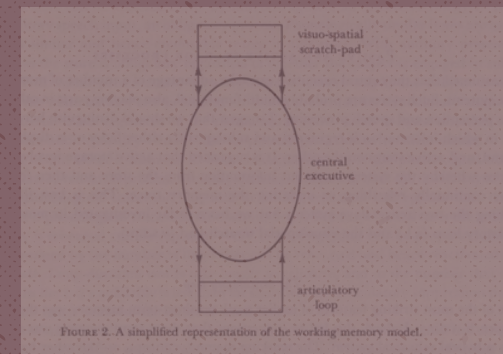
Early 1800s



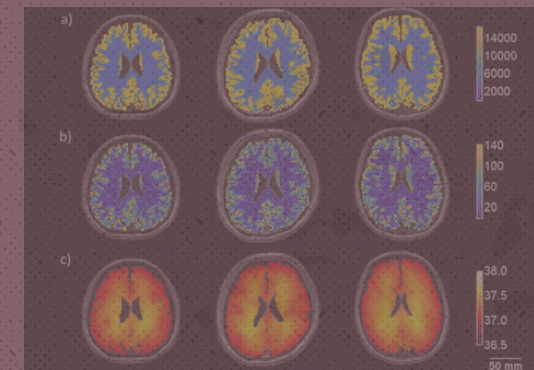
Early Conceptual &
Theoretical Diagrams



Empirical Graphs



Cognitive &
Information Processing
Models



Modern Big Data
Visualization

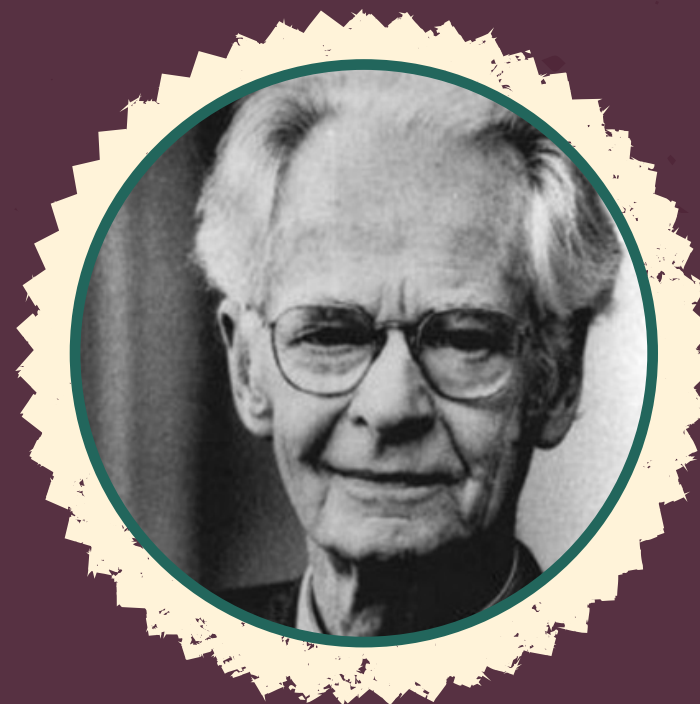
Present

THE RISE OF EMPIRICAL GRAPHS

Key Figures



Herman Ebbinghaus



B.F. Skinner





Herman Ebbinghaus' Forgetting Curve

1885-1920s

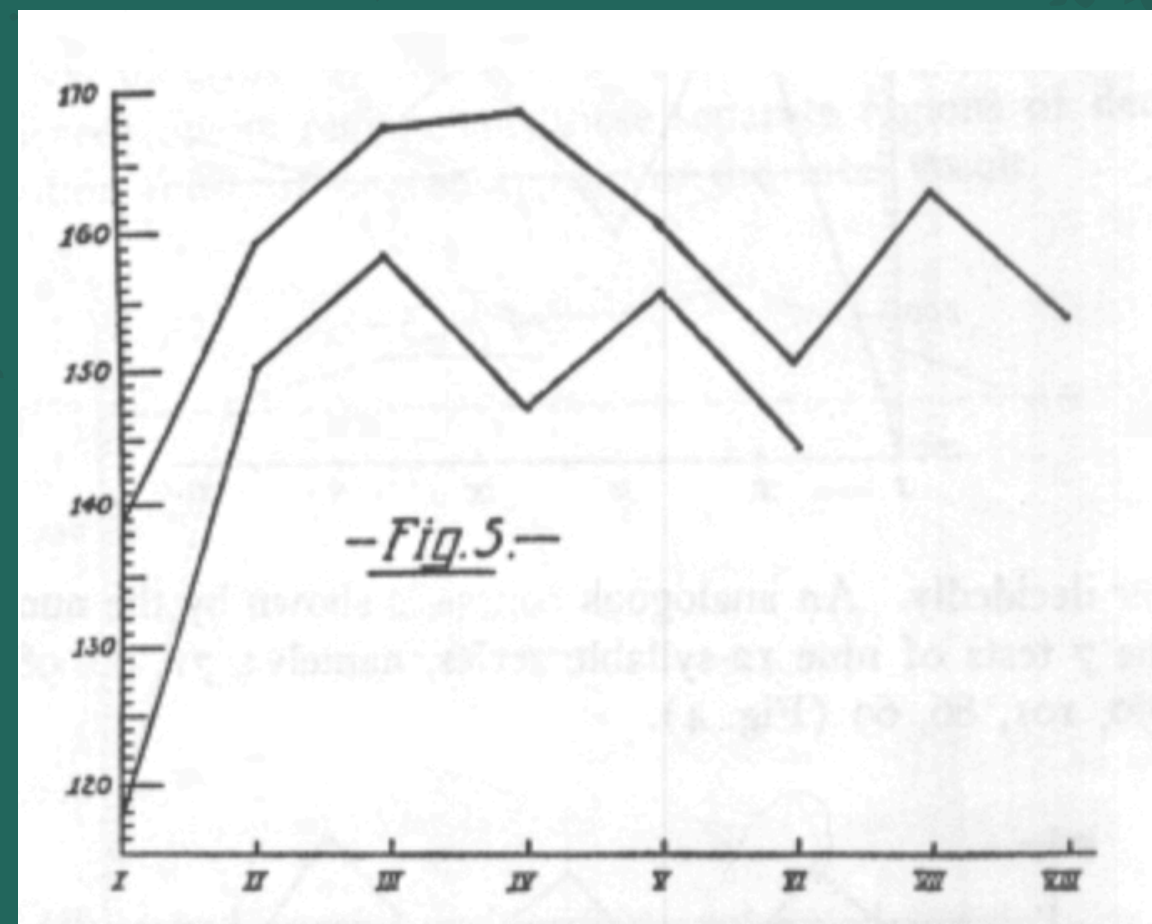
Graph of memory retention over time

Key Insight: Memory declines rapidly but stabilizes with repetition

Importance: One of the first quantitative psychological data visualizations. His use of graphs, time-series data, and empirical repetition represented a major shift toward data-driven cognitive psychology.

(Murdock, 1885)

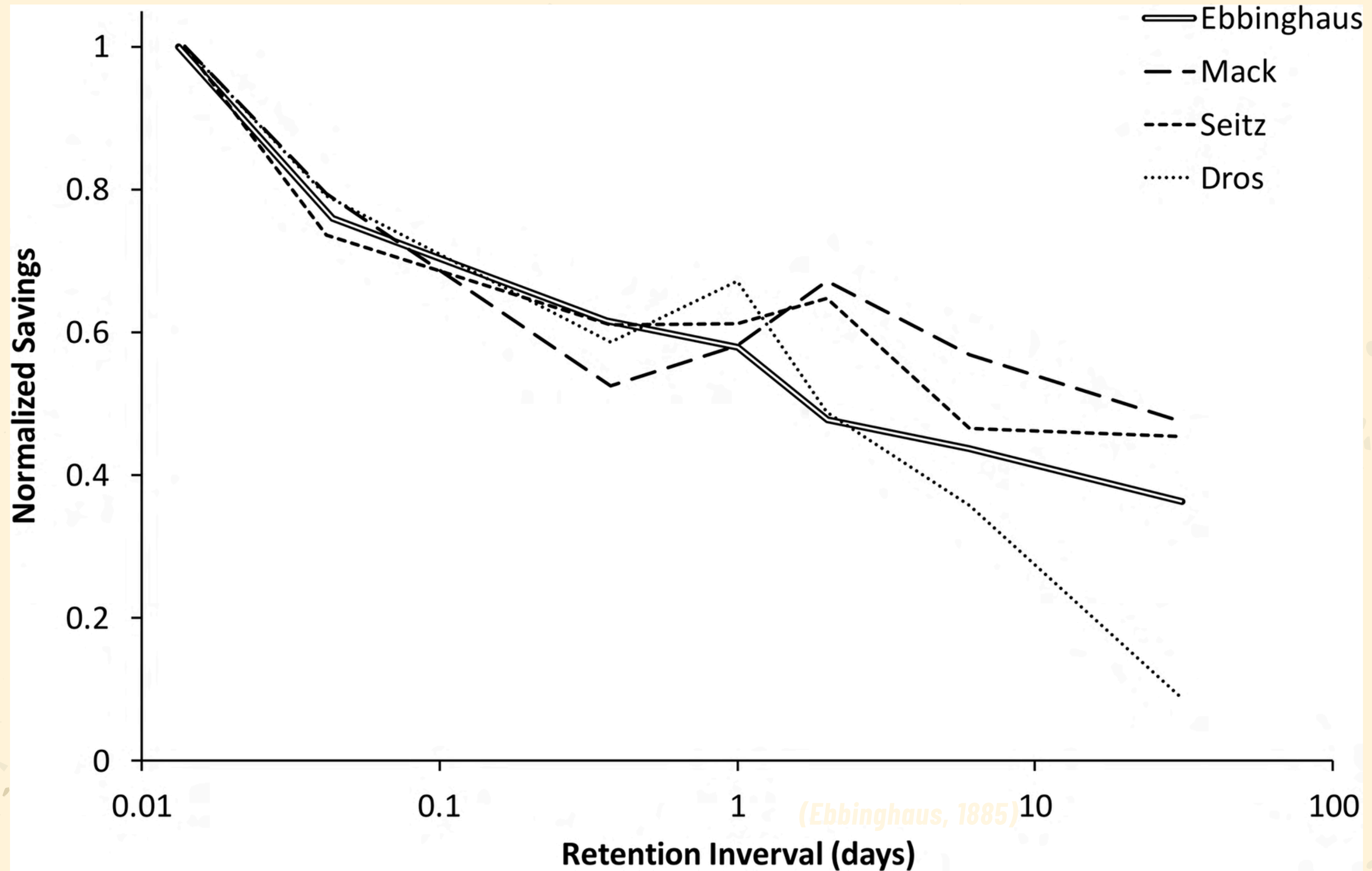
See: "Classics in the History of Psychology" by Christopher Green (psychclassics.yorku.ca)



(Ebbinghaus, 1885)

$x = 8$	$x = 16$	$x = 24$
$y =$	$y =$	$y =$
1171	998	1013
1070	795	853
1204	936	854
1180	1124	908
1246	1168	1004
1113	1160	1068
1283	1189	979
1141	1186	966
1127	1164	1076
1139	1059	1033
$m = 1167$	1078	975
$w_m = \pm 14$	± 28	± 17

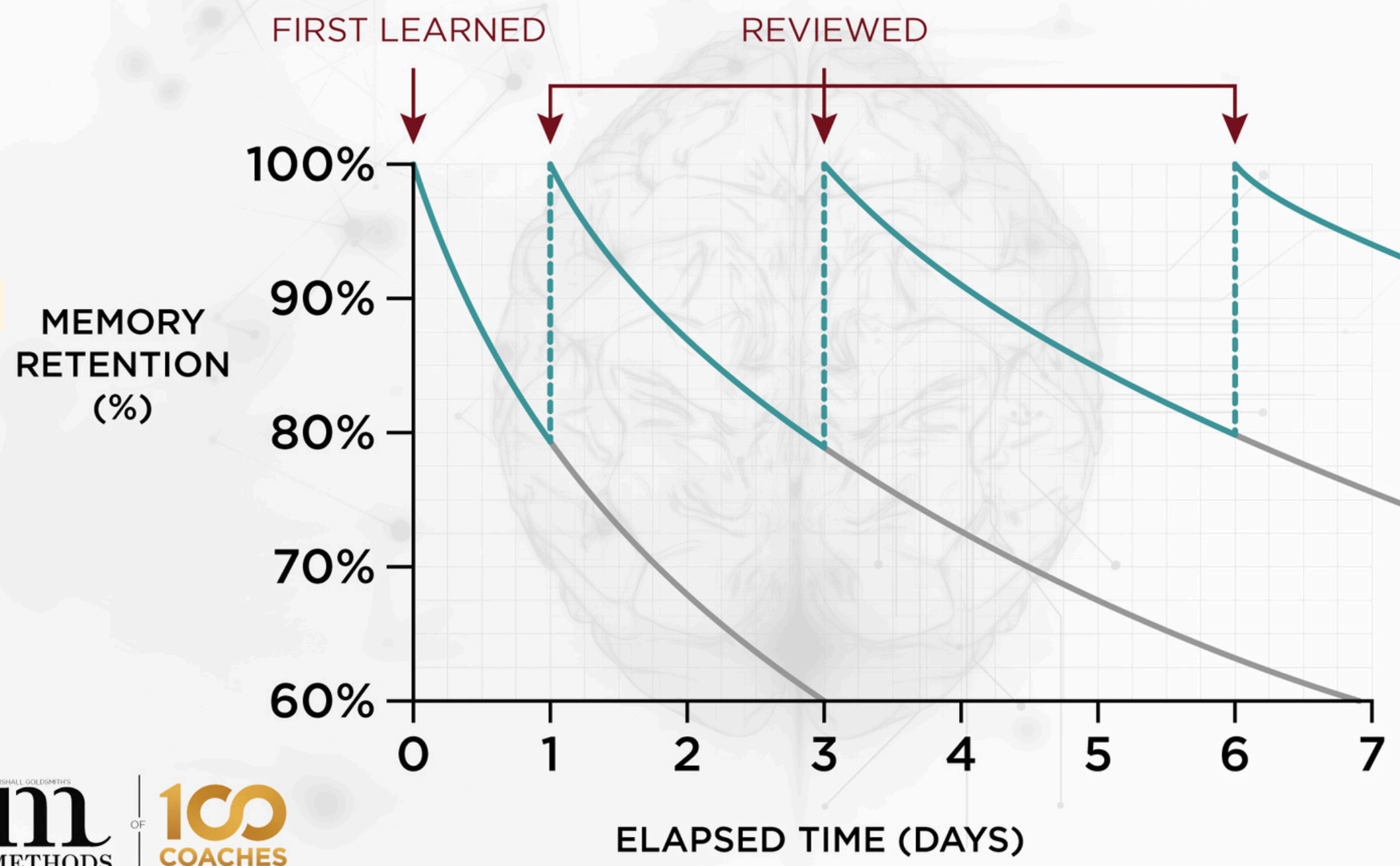
$x = 32$	$x = 42$	$x = 53$	$x = 64$
$y =$	$y =$	$y =$	$y =$
736	708	615	530
764	579	579	483
863	734	601	499
850	660	561	464
892	738	618	412
868	713	582	419
913	649	572	417
858	634	516	397
914	788	550	391
975	768	660	524
$m = 863$	697	585	454
$w_m = \pm 15$	± 14	± 9	$+ 11$



(Ebbinghaus, 1885)

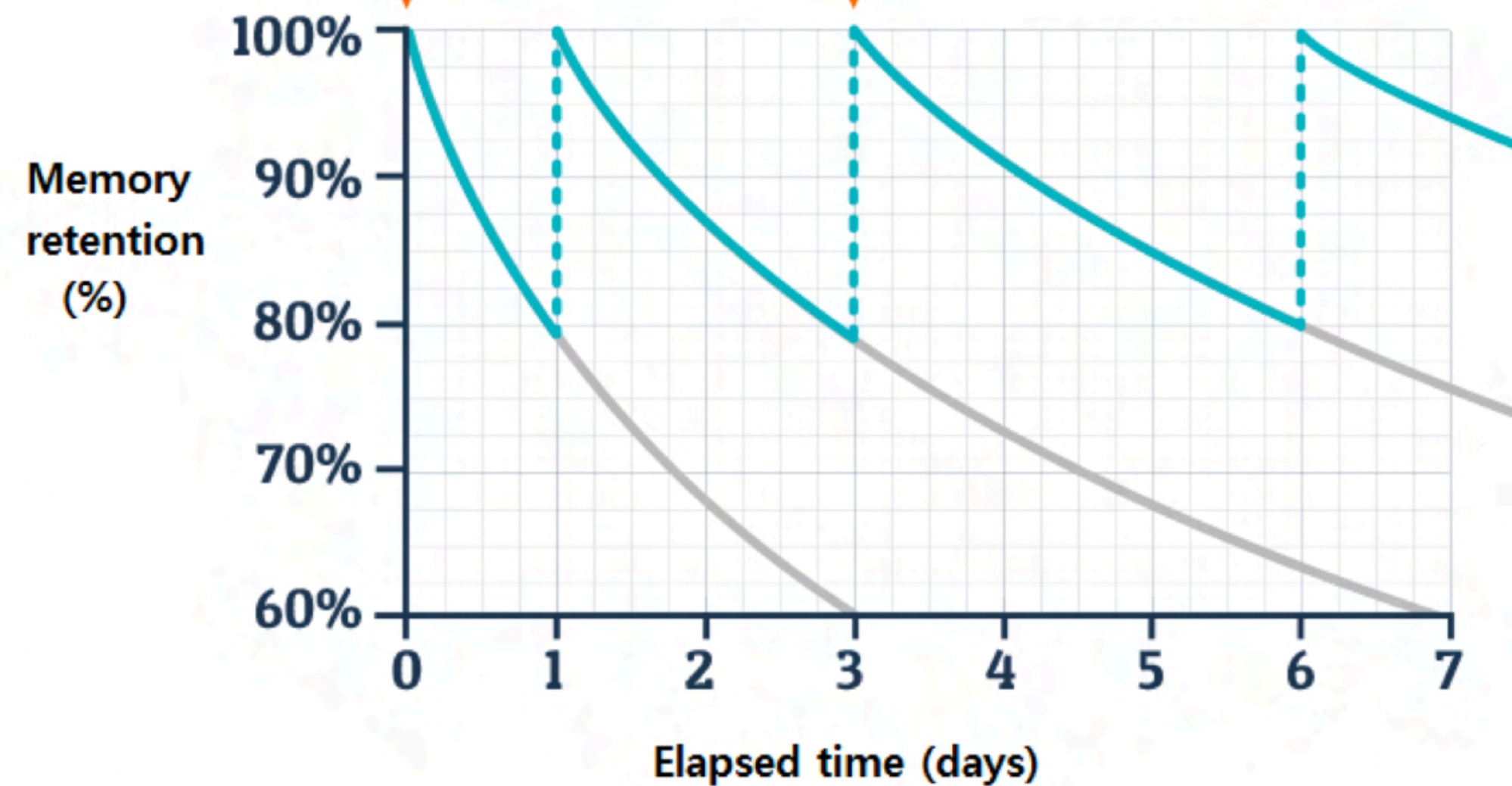
(Murre & Dros, 2015)

EBBINGHAUS FORGETTING CURVE

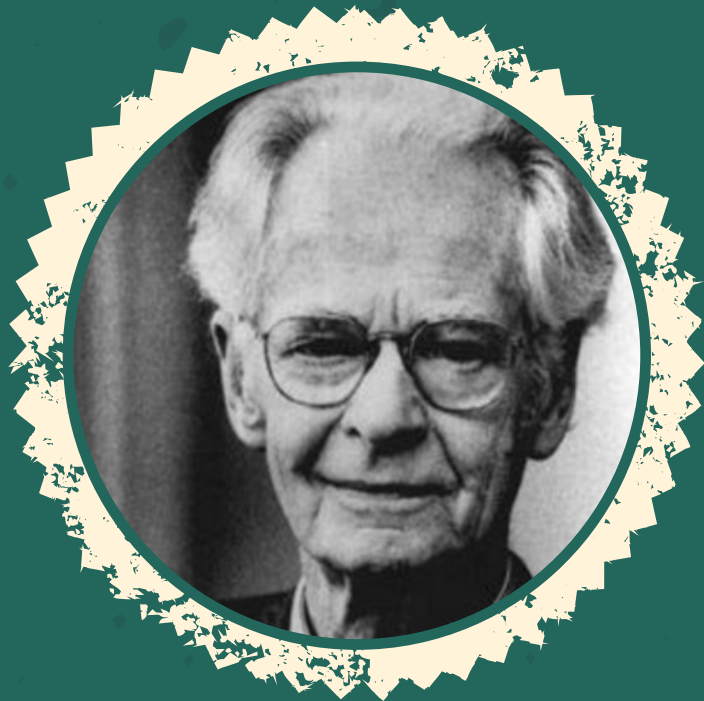


The Power of Review

Adapted Cornell
Notes method



(Chun & Heo, 2018)



B.F. Skinner's Behaviour Graphs

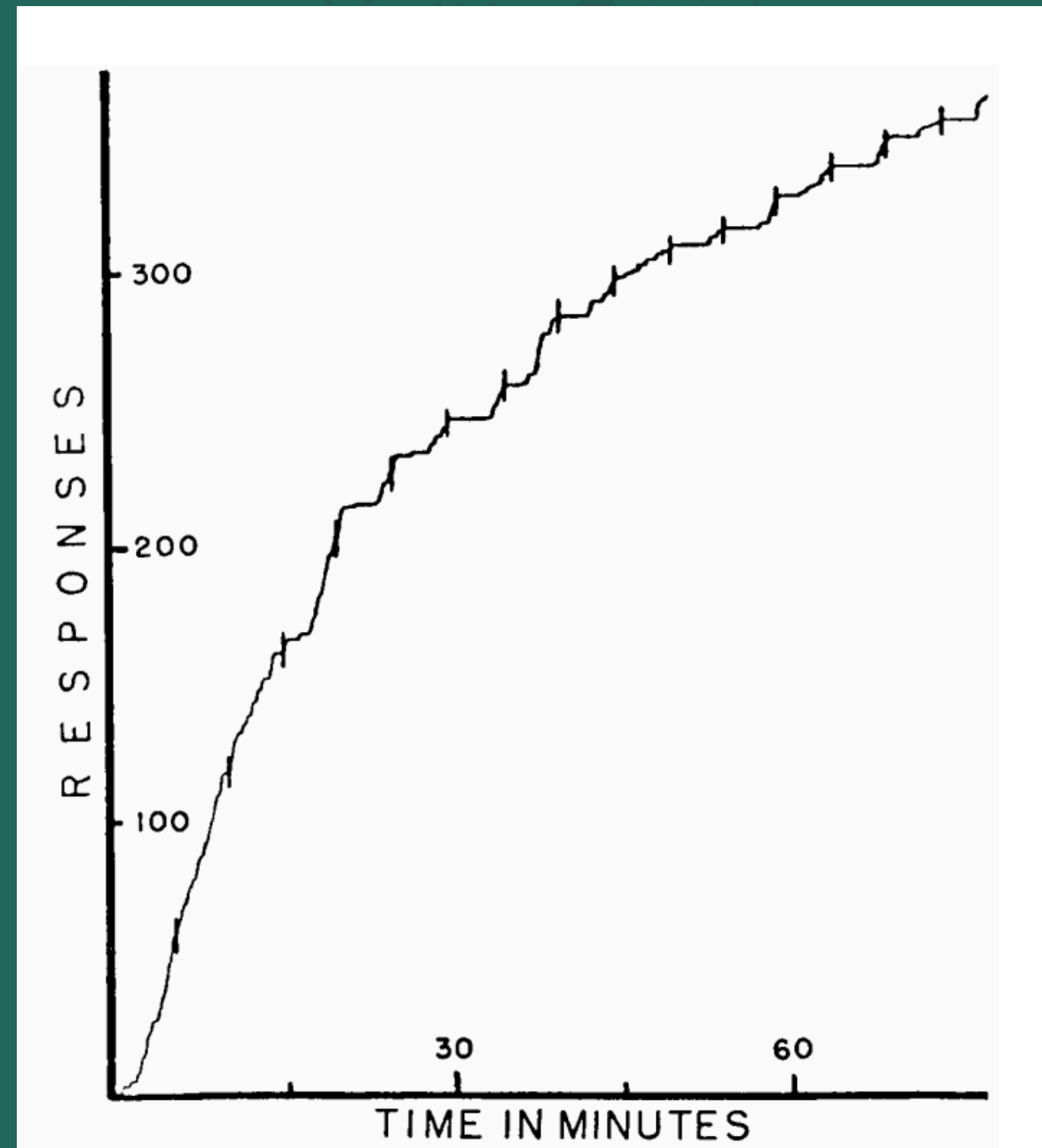
1938

Cumulative response graphs from operant conditioning studies showing how often an organism responds over time under different reinforcement schedules. (e.g., fixed vs. variable rewards)

Key Insight: Behavior is shaped by its consequences, and different reinforcement schedules produce distinct, predictable patterns of behavior.

Importance: Among the first real-time behavior visualizations, shifting psychology toward measurable and observable behavior. Led to modern behaviour tracking.

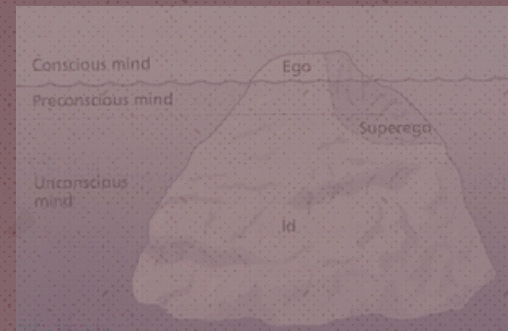
(Best, Smith, & Stubbs, 2001; Kubina et al., 2015)



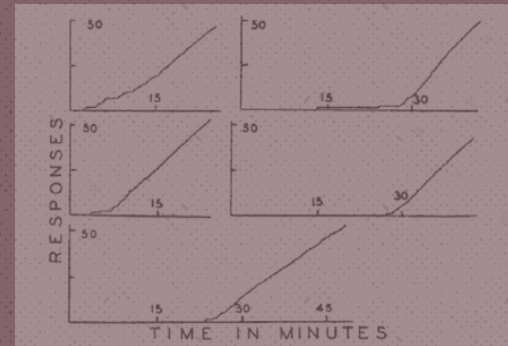
(Skinner, 1938)

TIMELINE

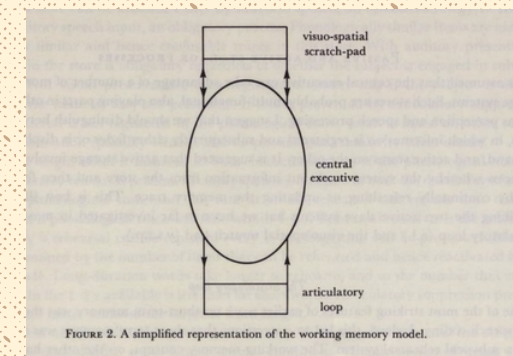
Early 1800s



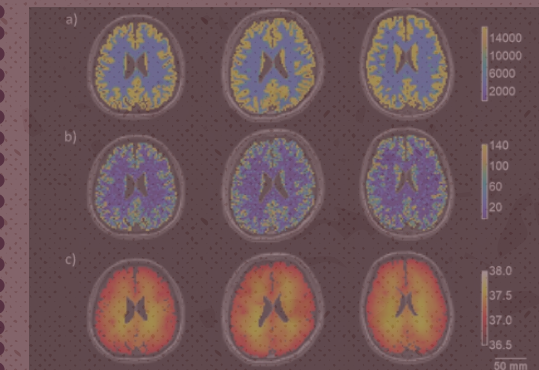
Early Conceptual &
Theoretical Diagrams



Empirical Graphs



Cognitive &
Information Processing
Models



Modern Big Data
Visualization

Present

COGNITIVE PSYCHOLOGY & INFORMATION PROCESSING MODELS

Key Figures



George Armitage Miller

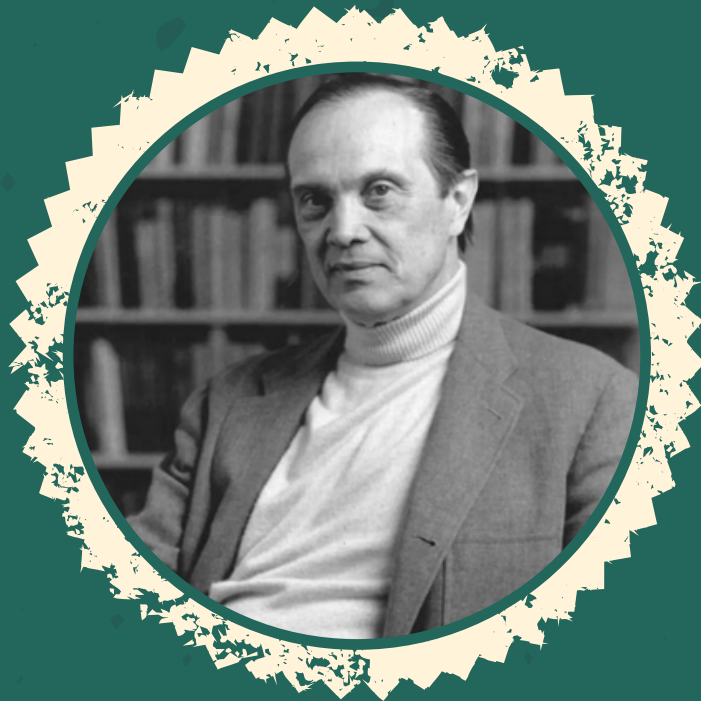


Alan Baddeley



Graham Hitch





Miller's Memory Capacity Graph

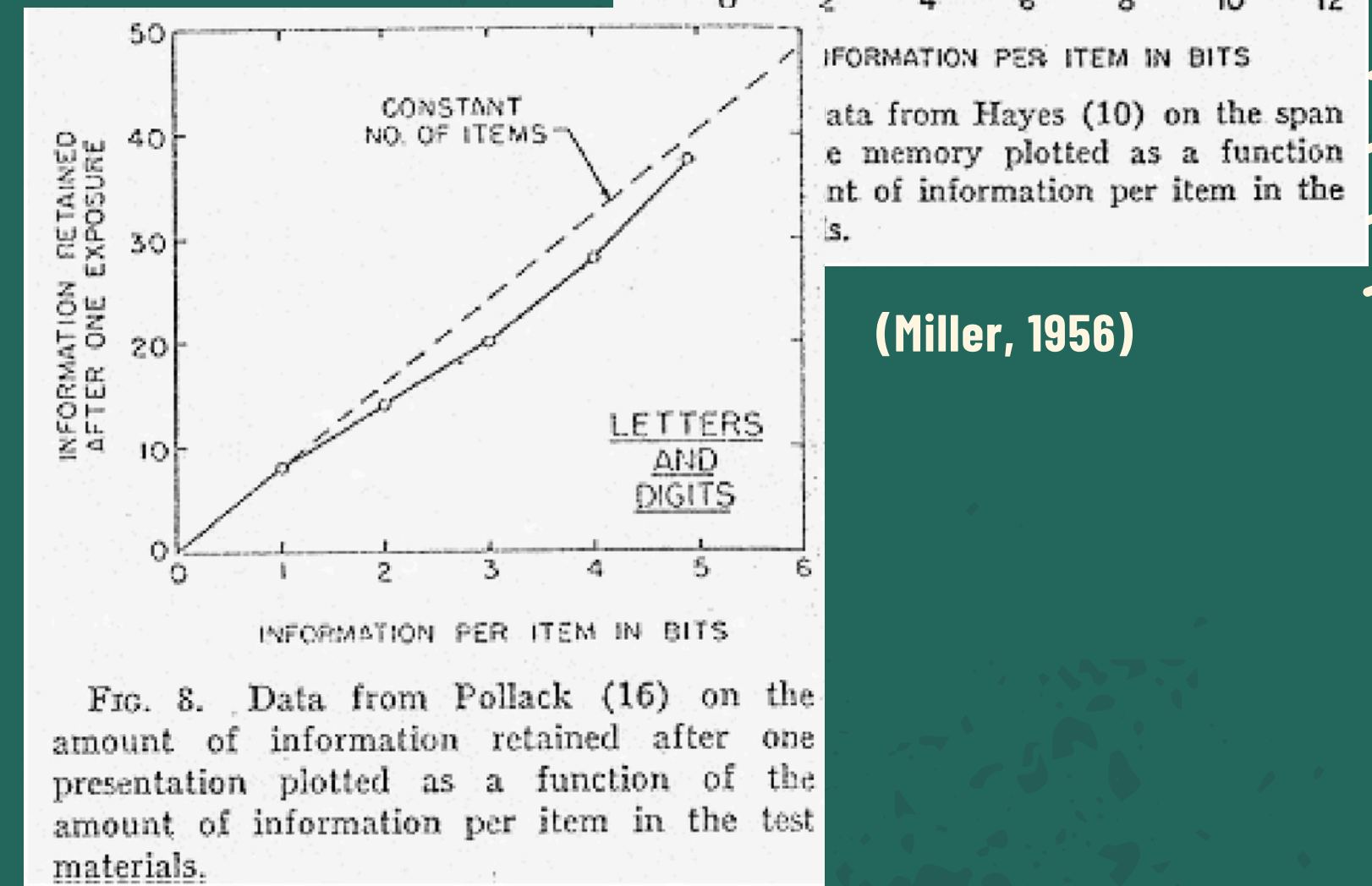
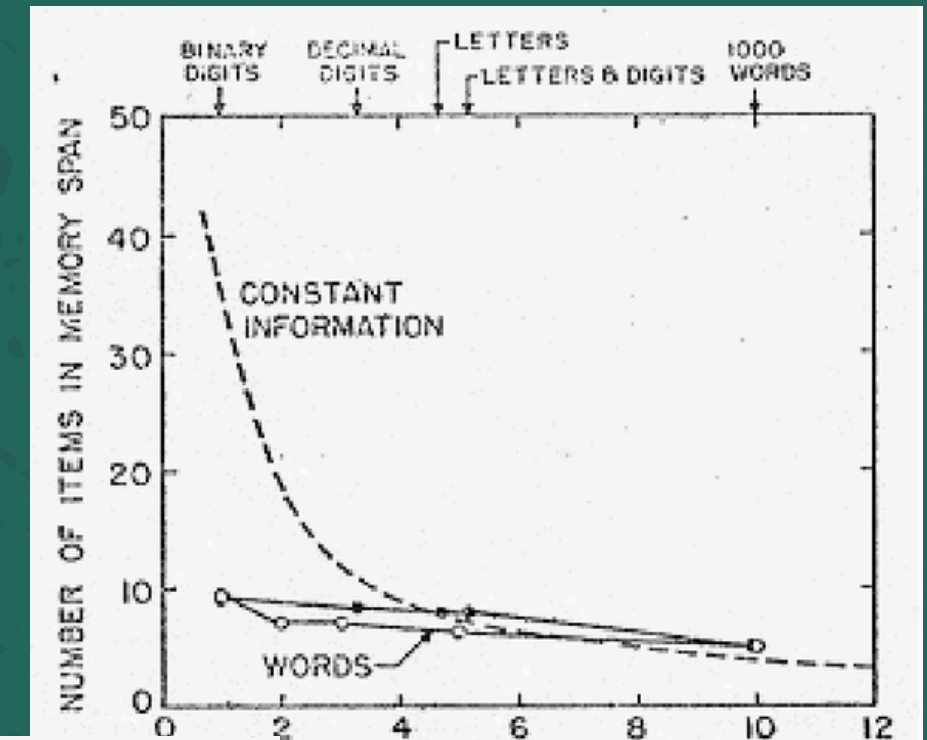
1956

"The magical number seven, plus or minus two"

Key Insight: Human short-term memory has a finite capacity, which affects how we process, store, and recall information—especially in tasks involving attention, learning, and decision-making

Importance: Cornerstone of cognitive psychology (memory & information processing) and paved way for more data-driven visualizations in cognitive science (e.g., models of WM)

(Miller, 2003)



(Miller, 1956)

The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information[\[1\]](#)

1956

George A. Miller (1956)
Harvard University

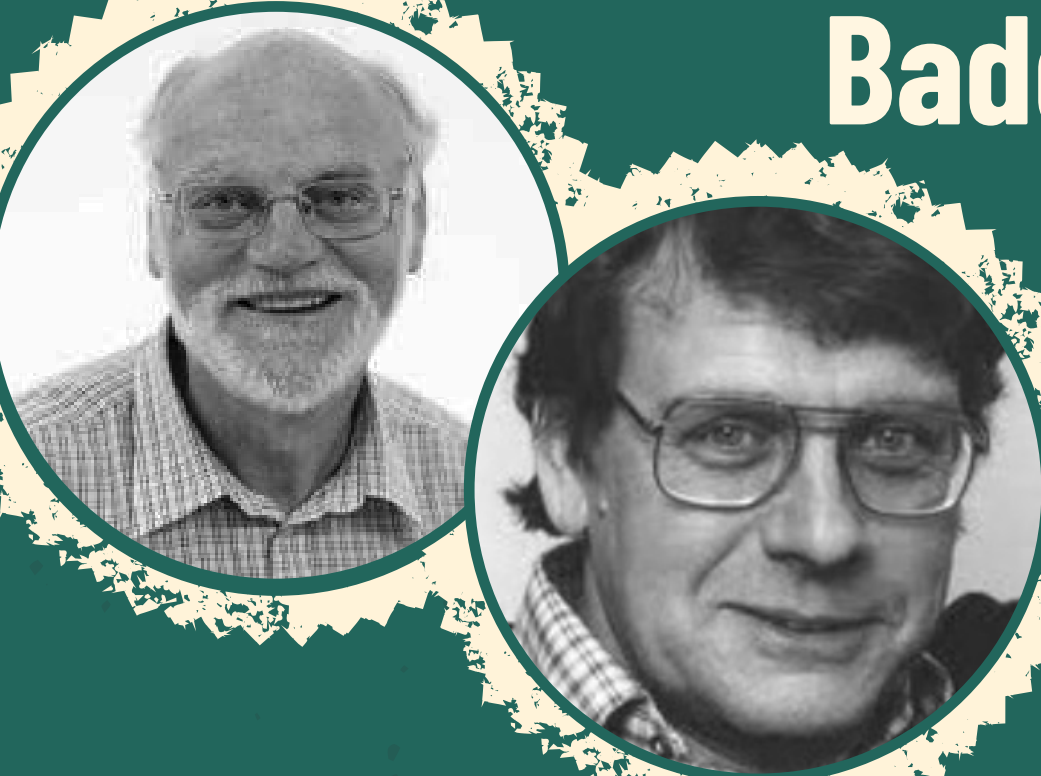
First published in *Psychological Review*, 63, 81-97.

My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution.

See: "George Miller's Magical Number of Immediate Memory in Retrospect: Observations on the Faltering Progression of Science" by Nelson Cowan (2016)

Baddeley & Hitch's Working Memory Model

1974



Key Insight: Working memory is a set of **specialized, interacting components**, allowing us to simultaneously process verbal and visual-spatial information

Importance: Foundational theory in cognitive psychology and helped make complex cognitive functions visually accessible

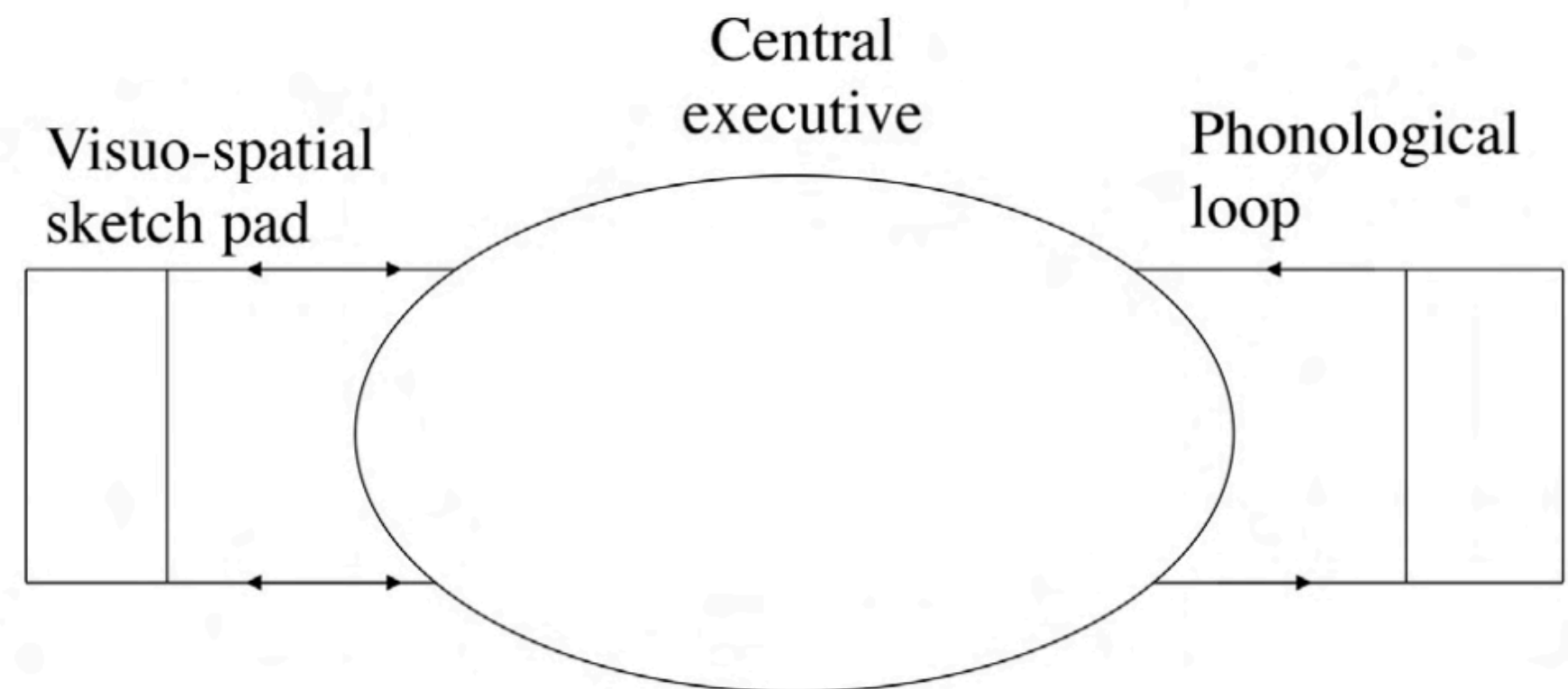
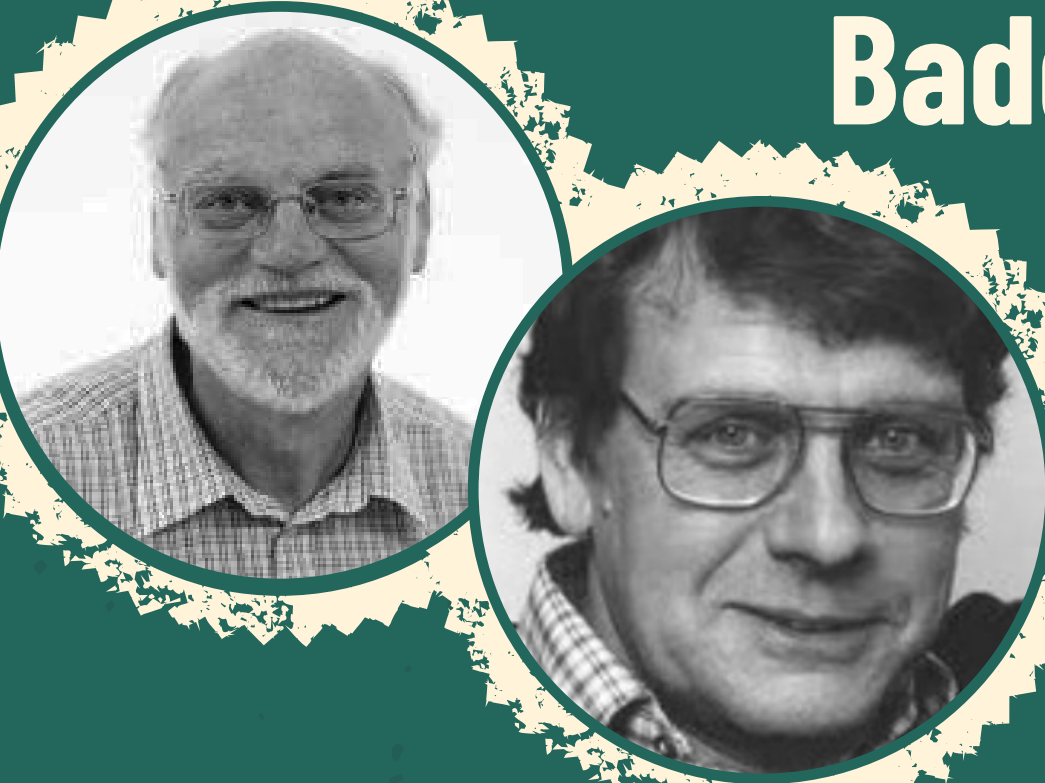


Fig. 1 – The initial working memory model proposed by Baddeley and Hitch (1974).

(Baddeley & Hitch, 2019)

Baddeley & Hitch's Working Memory Model

1974



Key Insight: Working memory is a set of **specialized, interacting components**, allowing us to simultaneously process verbal and visual-spatial information

Importance: Foundational theory in cognitive psychology and helped make complex cognitive functions visually accessible

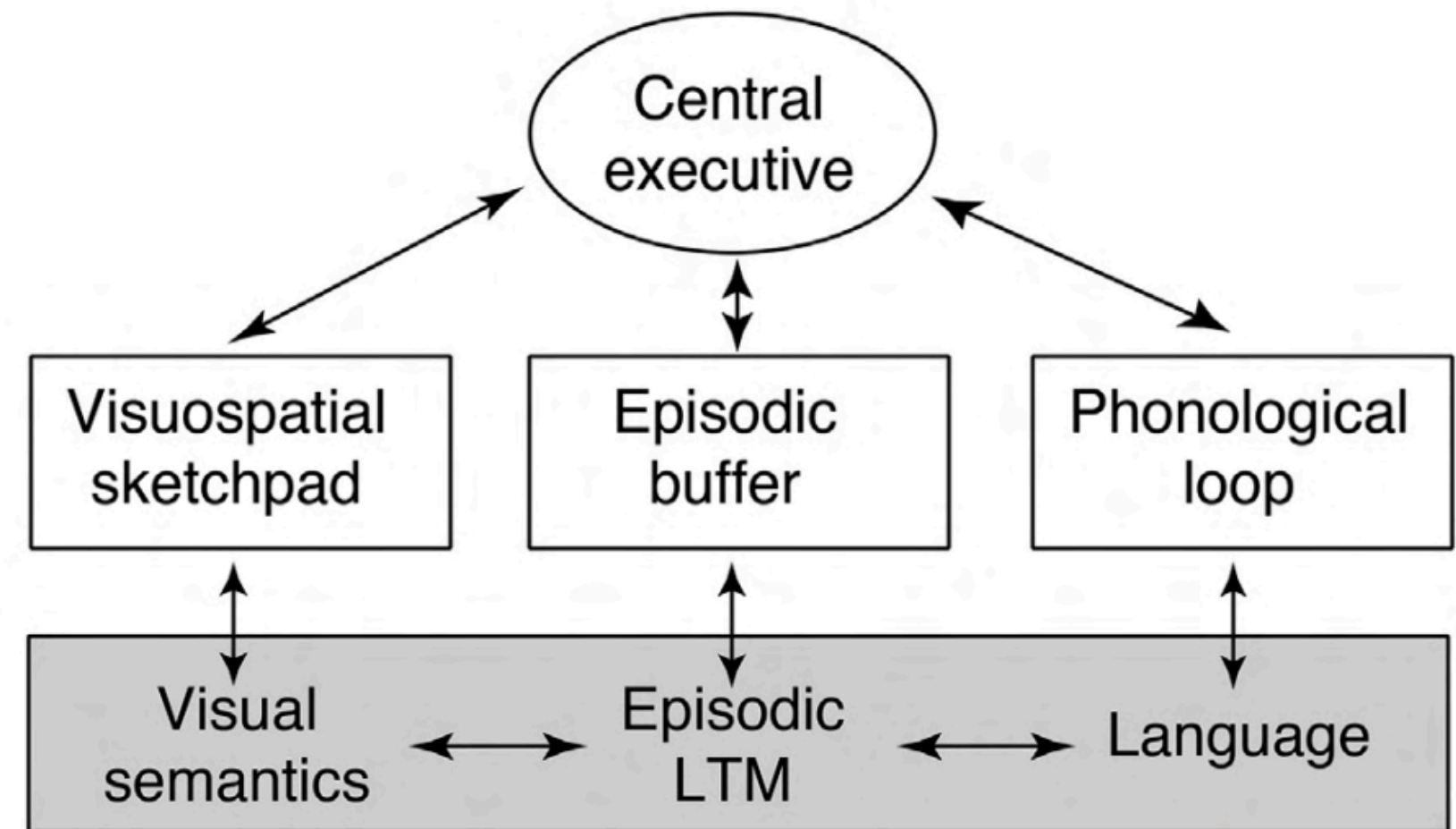


Fig. 5 – Modification of the multicomponent model to include a fourth component, the episodic buffer (Baddeley, 2000).

(Baddeley & Hitch, 2019)

Baddeley & Hitch's Working Memory Model

1974

Key Insight: Working memory is a set of **specialized, interacting components**, allowing us to simultaneously process verbal and visual-spatial information

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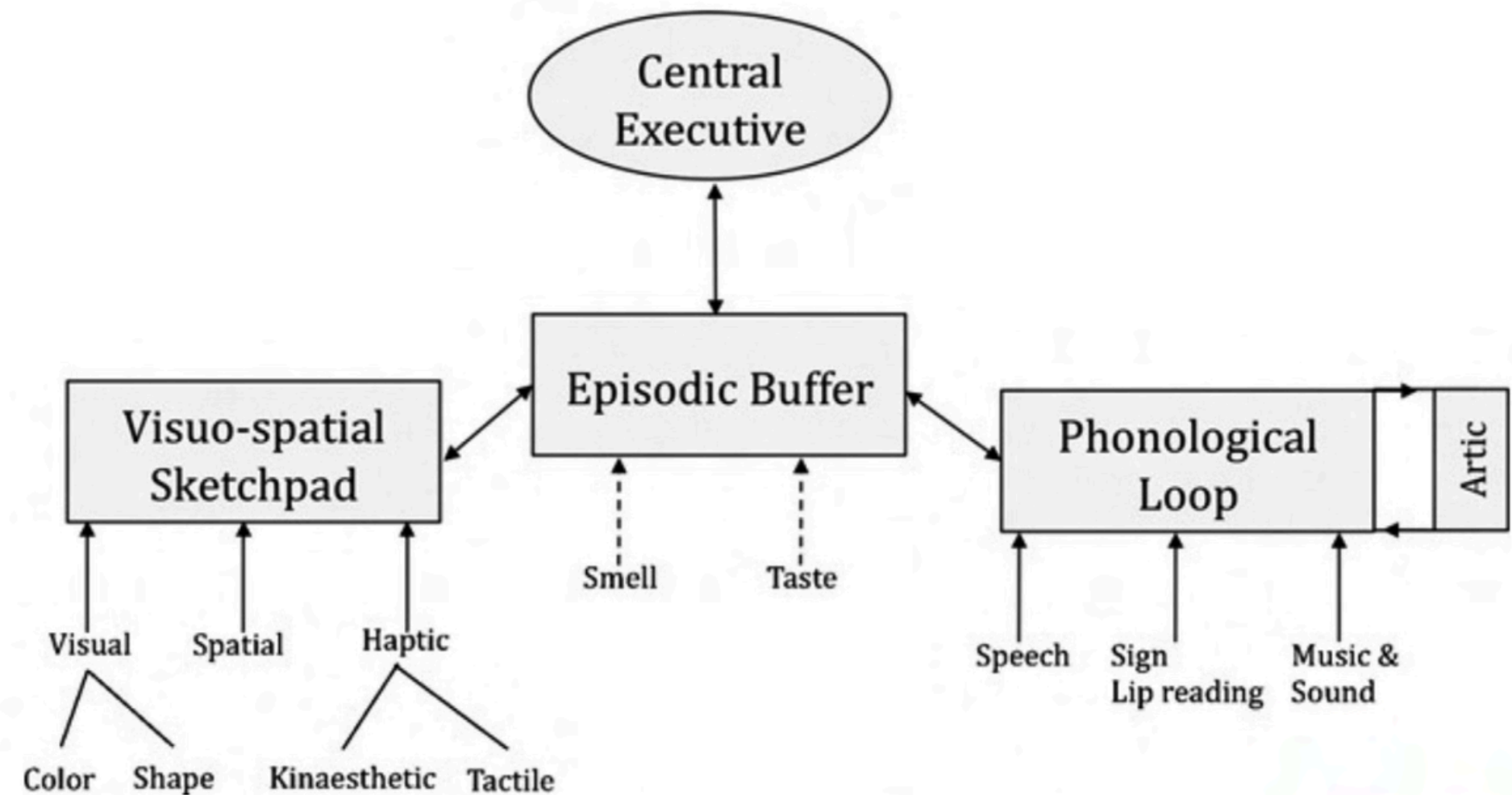
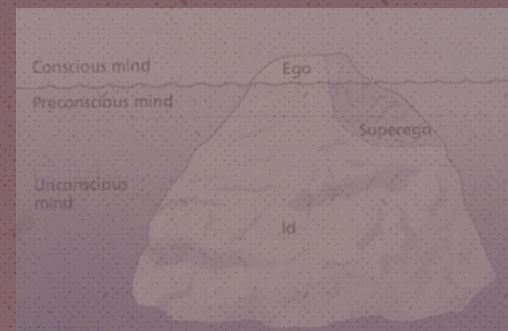


Fig. 6 – The current version of our multicomponent model of working memory (Baddeley, 2012).

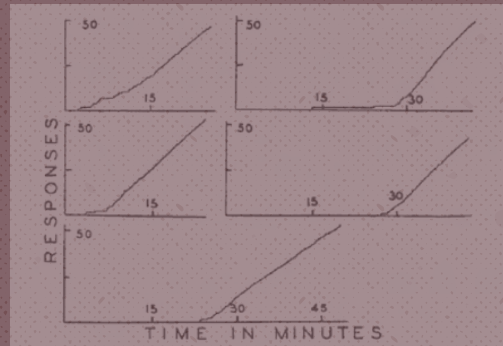
(Baddeley & Hitch, 2019)

TIMELINE

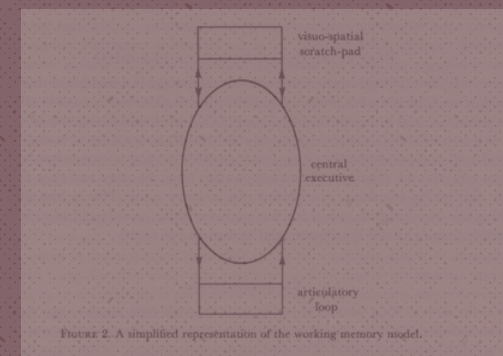
Early 1800s



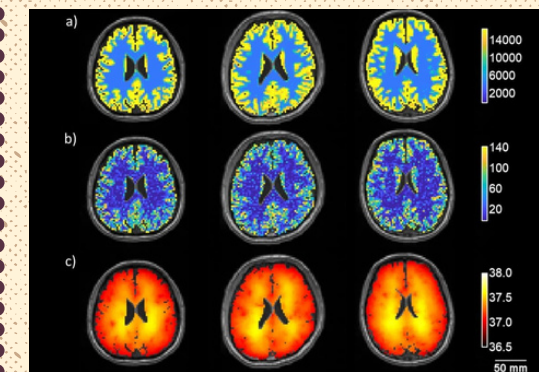
Early Conceptual &
Theoretical Diagrams



Empirical Graphs



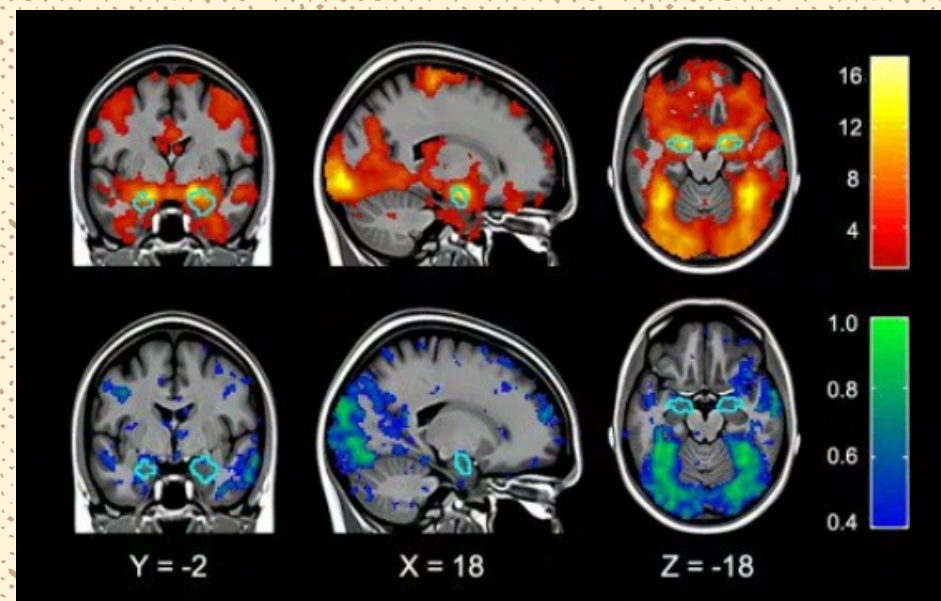
Cognitive &
Information Processing
Models



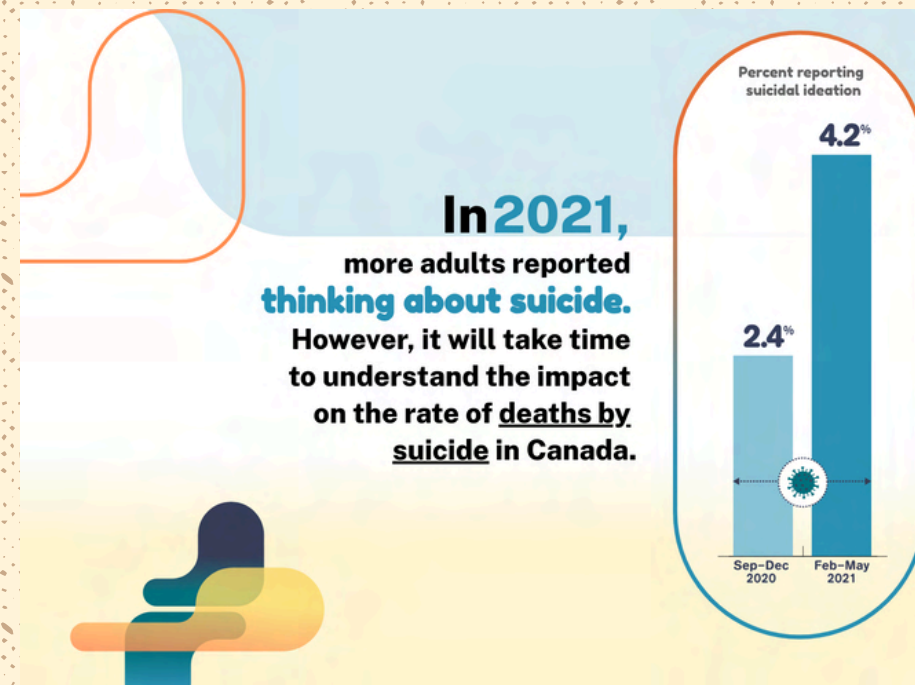
Modern Big Data
Visualization

Present

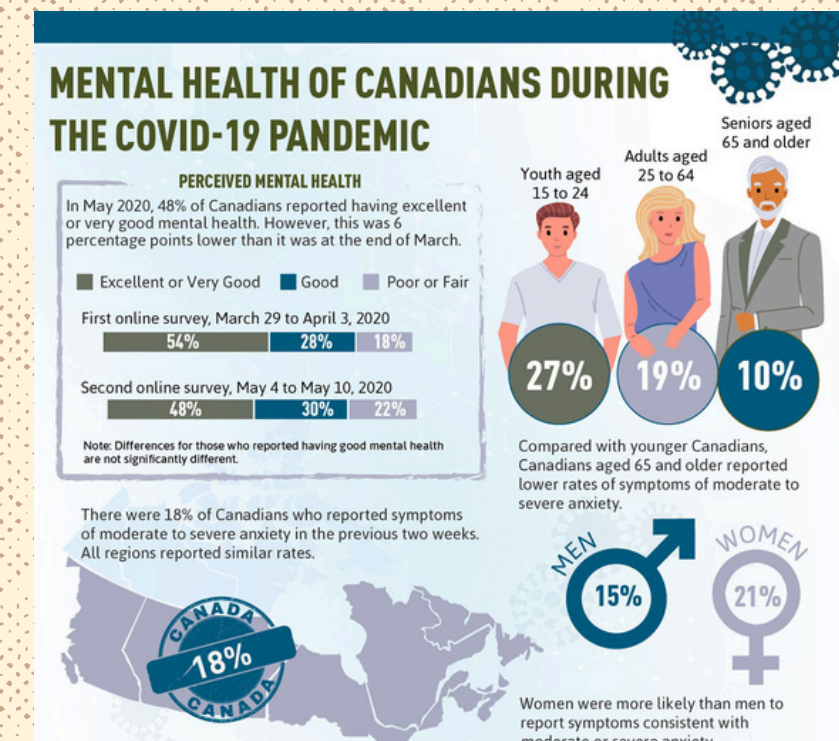
MODERN DATA VISUALIZATIONS IN PSYCHOLOGY



Brain Imaging



Interactive
Dashboards



Mental Health Awareness
Infographics

Brain Imaging (PET, fMRI, EEG)

1970s

Importance:

- From abstract to anatomical
- From theoretical models to empirical maps
- Data complexity & interactivity
- Statistical mapping

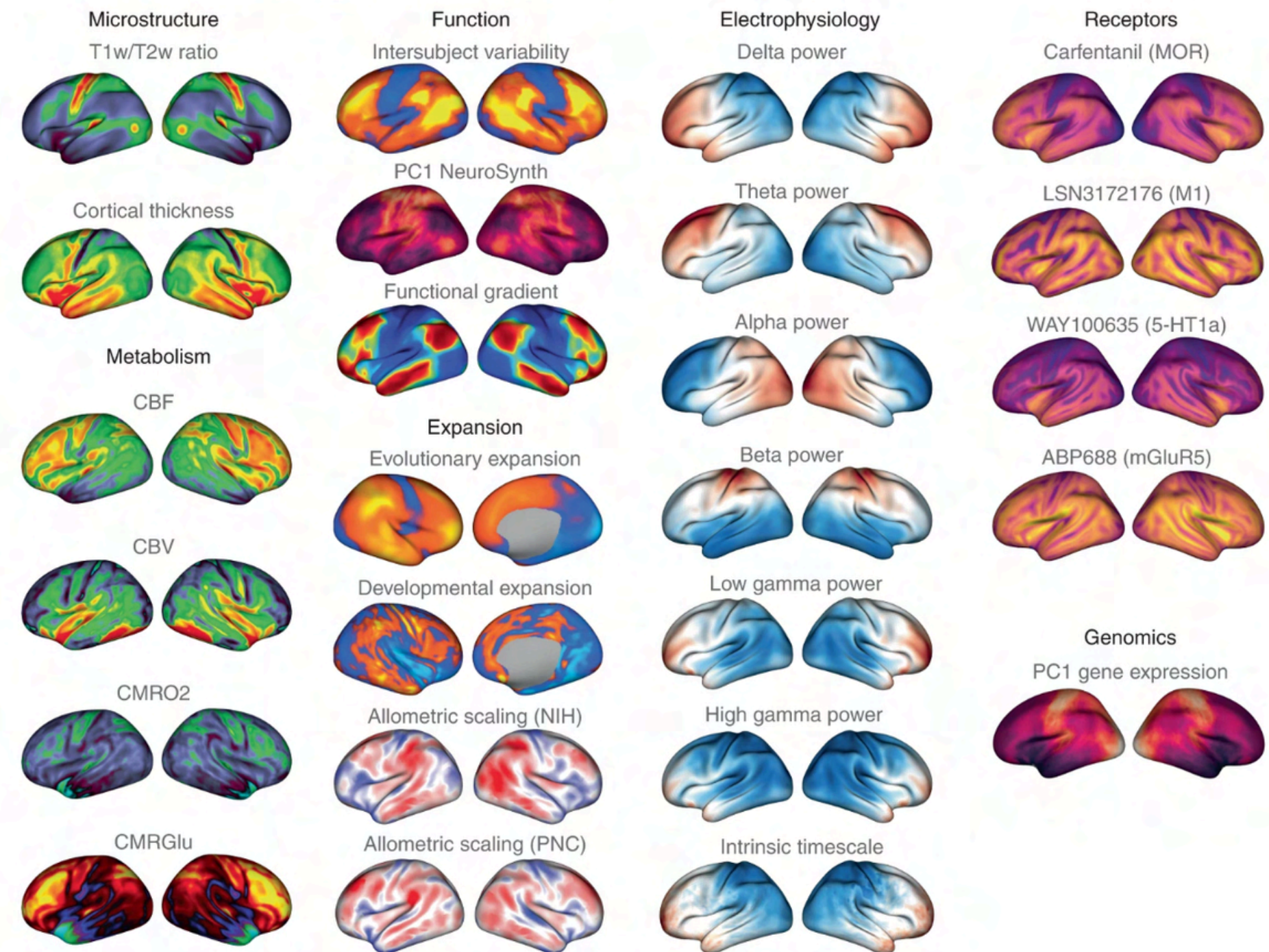
Data Visualization Tools:

- SPM
- FMRIB Software Library (FSL)
- Connectome Workbench
- **R Packages:** CerebroViz, NeuroimaGene, ggseg, ggseg3d

(Goldstone, Pestilli, & Börner, 2015; Lunn, Shaw, & Winder, 2022)

Fig. 2: Brain maps from the published literature.

From: [neuromaps: structural and functional interpretation of brain maps](#)



(Markello et al., 2022)

Interactive Dashboards

Late 2000s

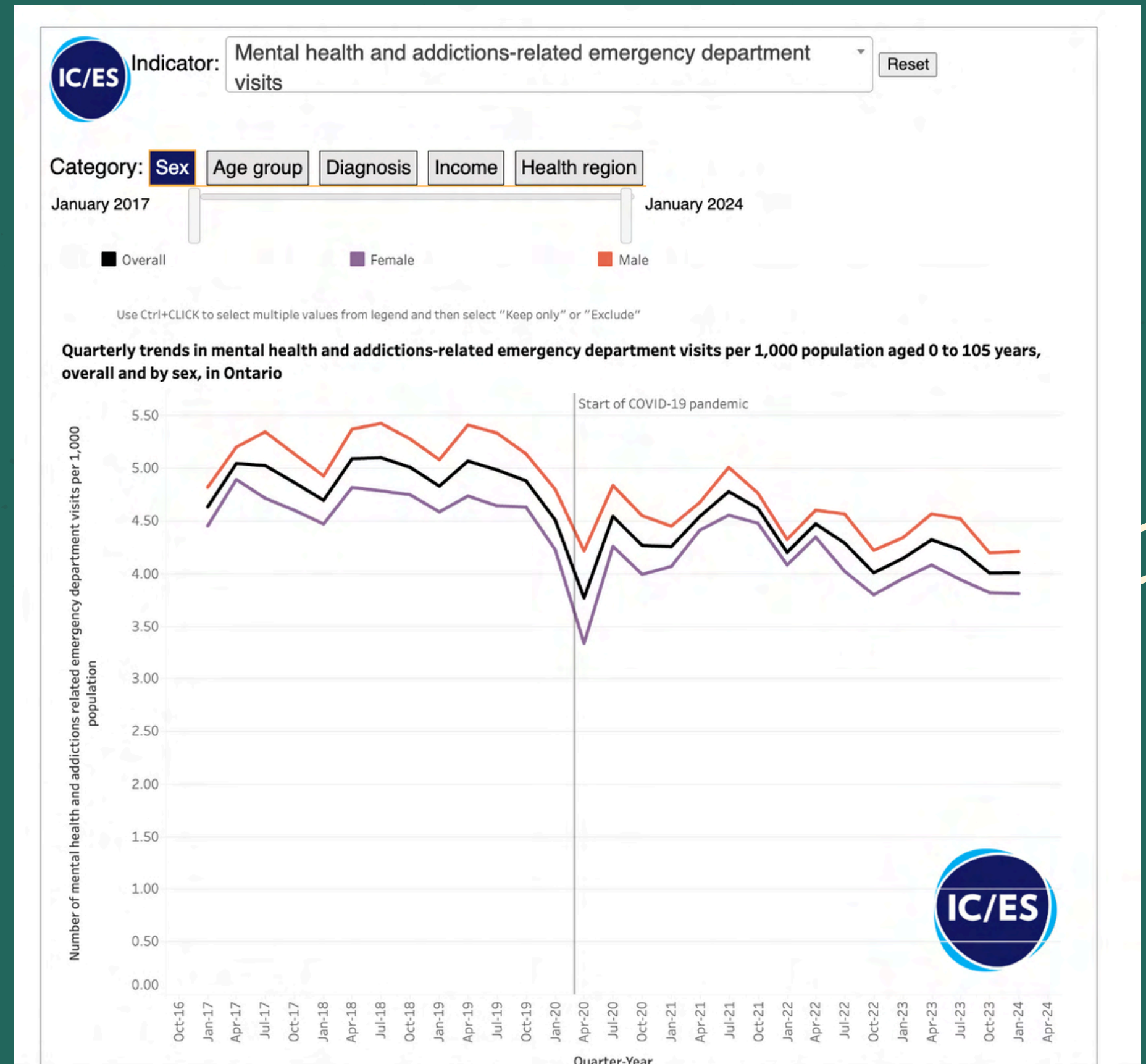
Importance:

- From static to interactive
- Real time data monitoring
- Improved accessibility & transparency
- Multimodal integration

Data Visualization Tools:

- R Shiny
- Tableau
- Power BI
- Google Data Studio
- Python Dash

(Ellis & Merdian, 2015; Papas & Whitman, 2011)



(ICES, 2024)

Mental Health Awareness Infographics

Mid 2010s

Importance:

- Access to psych knowledge
- Combatting stigma
- Preventative education
- Action & advocacy

Data Visualization Tools:

- Canva
- Piktochart
- Figma
- Infogram

MENTAL ILLNESS IN CANADA



MENTAL ILLNESS is characterized by changes in an individual's **thinking, mood, or behaviour** and is usually associated with significant distress or impaired functioning in social, occupational and other activities.¹



Examples of mental illness:

- MAJOR DEPRESSIVE DISORDER
- BIPOLAR DISORDER
- GENERALIZED ANXIETY DISORDER
- POSTTRAUMATIC STRESS DISORDER
- SCHIZOPHRENIA
- EATING DISORDERS
- SUBSTANCE-RELATED DISORDERS

Mental illness can affect anyone. Some factors have been associated with mental illness, including:



FAMILY HISTORY



STRESSFUL LIFE EVENTS



NEGATIVE EARLY LIFE EXPERIENCES



SOCIO-ECONOMIC STATUS



EARLY CARE AND SEEKING TREATMENT can help individuals recover from or manage a **MENTAL ILLNESS**. However, stigma and other barriers can delay people from seeking help.

According to national data:³

In 2016-2017:

1 in 7 Canadians used health services for a **MENTAL ILLNESS**.



57% were female



43% were male

Between 2000 and 2016:

Overall, the proportion of Canadians using mental illness-related services was **STABLE**.

However, among those aged **19 and under**, the proportion **INCREASED** by an average of **2.6%** per year.



The **Canadian Chronic Disease Surveillance System (CCDSS)** is supported by a pan-Canadian partnership between the Public Health Agency of Canada (PHAC) and all provinces and territories.

LEARN MORE ABOUT MENTAL ILLNESS:

VISIT Canada.ca and SEARCH 'Mental illness'
LIKE US @[HealthCanada](https://www.facebook.com/HealthCanada)
FOLLOW US @[GovCanHealth](https://www.instagram.com/GovCanHealth)

GET DATA health-infobase.canada.ca/ccdss/data-tool
MORE www.cmha.ca |
www.mentalhealthcommission.ca |
www.who.int/mental_health/management/en/

COVID-19 has brought unprecedented changes to Canadians. PHAC will be using multiple data sources to examine the impact of COVID-19 on mental illness.

SOURCES:
1. American Psychiatric Association. Use of the manual. In: Diagnostic and statistical manual of mental disorders (5th ed.). 2013 (Retrieved January 2020). <https://doi.org/10.1017/9780521875866.001>
2. Canadian Community Health Survey - Mental health (CCHS - MH), 2012. Percentage of the household population aged 12+ living in the 10 provinces that met criteria for at least one of six mental disorders (including mood disorders, generalized anxiety disorder, and substance use disorders).
3. Canadian Chronic Disease Surveillance System (CCDSS), August 2019. Mental illness and alcohol/drug-induced disorders (use of health services) (aged 1+). CCDSS data are based on people with a diagnosed mental illness who had contact with the health system during the data collection period, which may underestimate the total number of people diagnosed with a mental illness during a lifetime. Age-standardized rates are age-standardized to the 2011 Canadian population. Crude rates were based on randomly rounded counts to an adjacent multiple of 10.

Public Health Agency of Canada
Agence de la santé publique du Canada

Canada

Mental Health Referral Insights in Ontario 2023

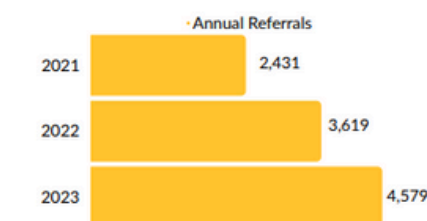
askforhelptoday.ca

Anxiety is the primary issue across all ages

Depression ranks second among adults and teens, while children primarily face challenges related to emotion regulation. Trauma is a significant concern for adults, whereas ADHD is prevalent among teens and children, ranking third. School-related issues hold the fifth position for teens and fourth for children.



Bypassed 10,000 Referrals in October 2023



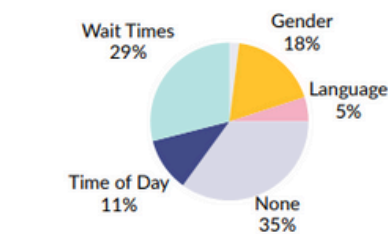
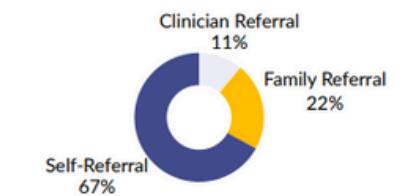
Growing demand for psychological services

- Private services on the rise post-COVID due to limited access to public agencies
- 27% more referrals in 2023 compared to 2022 (as of November 30th)
- Largest annual rise seen in children & youth (0-12) from 2021 to 2022
- Seniors (66+) saw the highest increase between 2022 & 2023

Individual therapy continues to be the most sought-after psychological service. Psychological assessment services, which saw a 224% increase between 2021 and 2023, was second.

Referral patterns

11% of referrals were sent by physicians, nurse practitioners & other clinicians. Of these, 60% were sent as part of the publicly funded frontline workers program, indicating the public sector will leverage services when they are publicly funded (e.g., OHIP).



Patient preferences

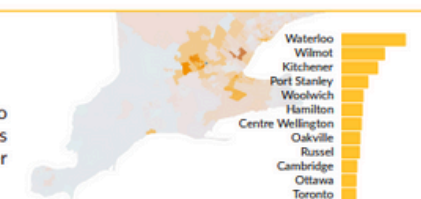
While 35% of Ontarians had no specific preference with regards to their psychologist, many indicated low wait times & the clinician's gender as most important.

In-person visits preferred over virtual care in 2023; a reversal from 2021 & 2022.



Regional insights

Higher demand per capita in southern Ontario cities. This may signal greater need, less access to publicly funded services, and/or better access to benefits, among other things.



OPA provides a scalable and integrated centralized intake service that matches patients of all ages with the support they need. Get in touch with us today to discover more.

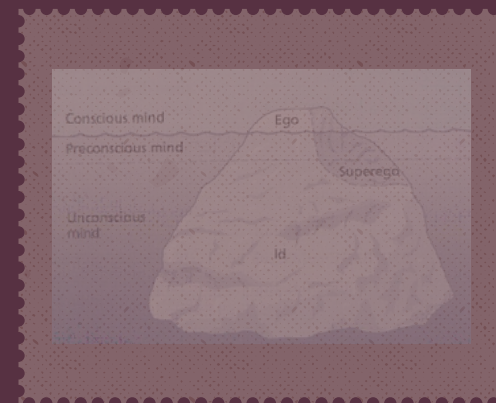
Strata Health

www.askforhelptoday.ca
Phone: (437) 242 7809
Email: askforhelptoday@psych.on.ca

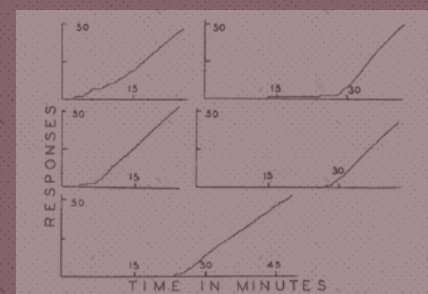
ONTARIO PSYCHOLOGICAL ASSOCIATION

TIMELINE

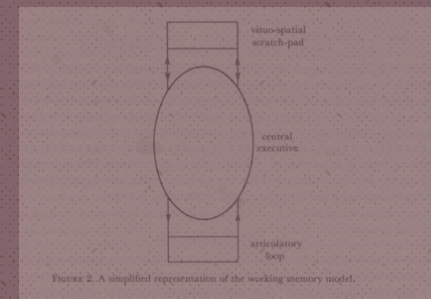
Early 1800s



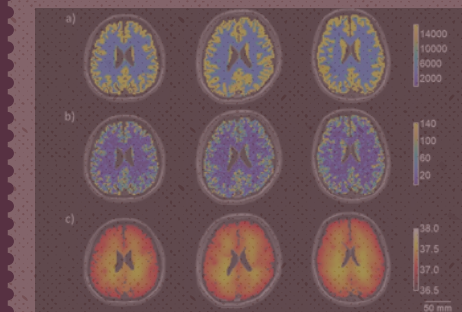
Early Conceptual & Theoretical Diagrams



Empirical Graphs



Cognitive & Information Processing Models



Modern Big Data Visualization



Future Directions in Psychological Data Visualizations

FUTURE DIRECTIONS IN PSYCHOLOGICAL DATA VISUALIZATIONS

AI-Generated

(e.g., Lin et al., 2023)

Virtual & Augmented
Reality

(e.g., Olshannikova et al., 2015)

Sonification & Haptics

(e.g., Sawe, Chafe, & Treviño, 2015)

Natural Language
Processing

(e.g., Lin et al., 2023; Uddin, 2024)

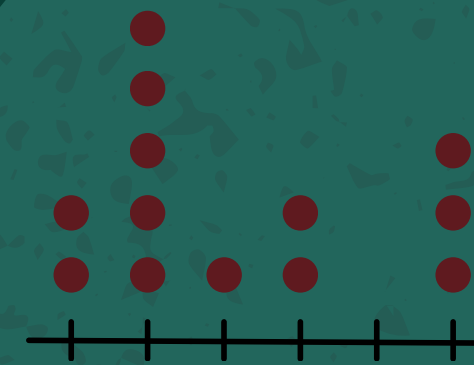
Real-Time
Biofeedback

(e.g., Gradl et al., 2018)

Thank you!



Points to Ponder



- 1 What voices, perspectives, theories, or phenomena might be lost (or newly included) as data visualization continues to evolve in psychology?
- 2 How has the shift from hand-drawn models to digital, data-driven visualizations changed how we define, interpret, and trust, psychological "evidence"?
- 3 How has the evolution of psychological visualization changed the audience/consumers of psychological knowledge?

