Does Musical Training Enhance Spatial Memory Abilities

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Overview

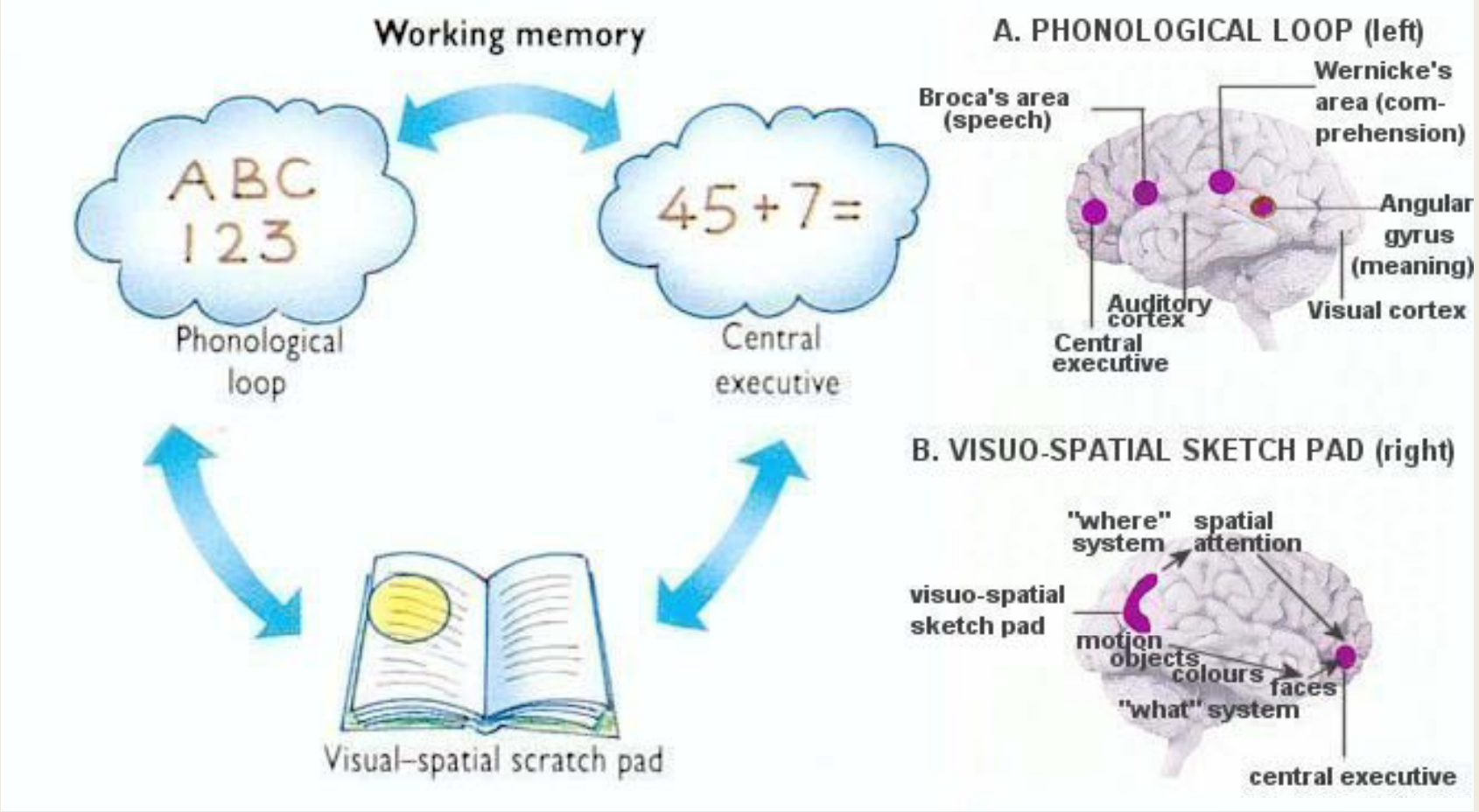
- Brocas and Wernicke's Area
- Working Memory and the Phonological Loop
- Differences between Musicians Brains and Normal Brains
- The Mozart Effect
- Study and Results
- Discussion

Music/Spatial Working Memory/Language

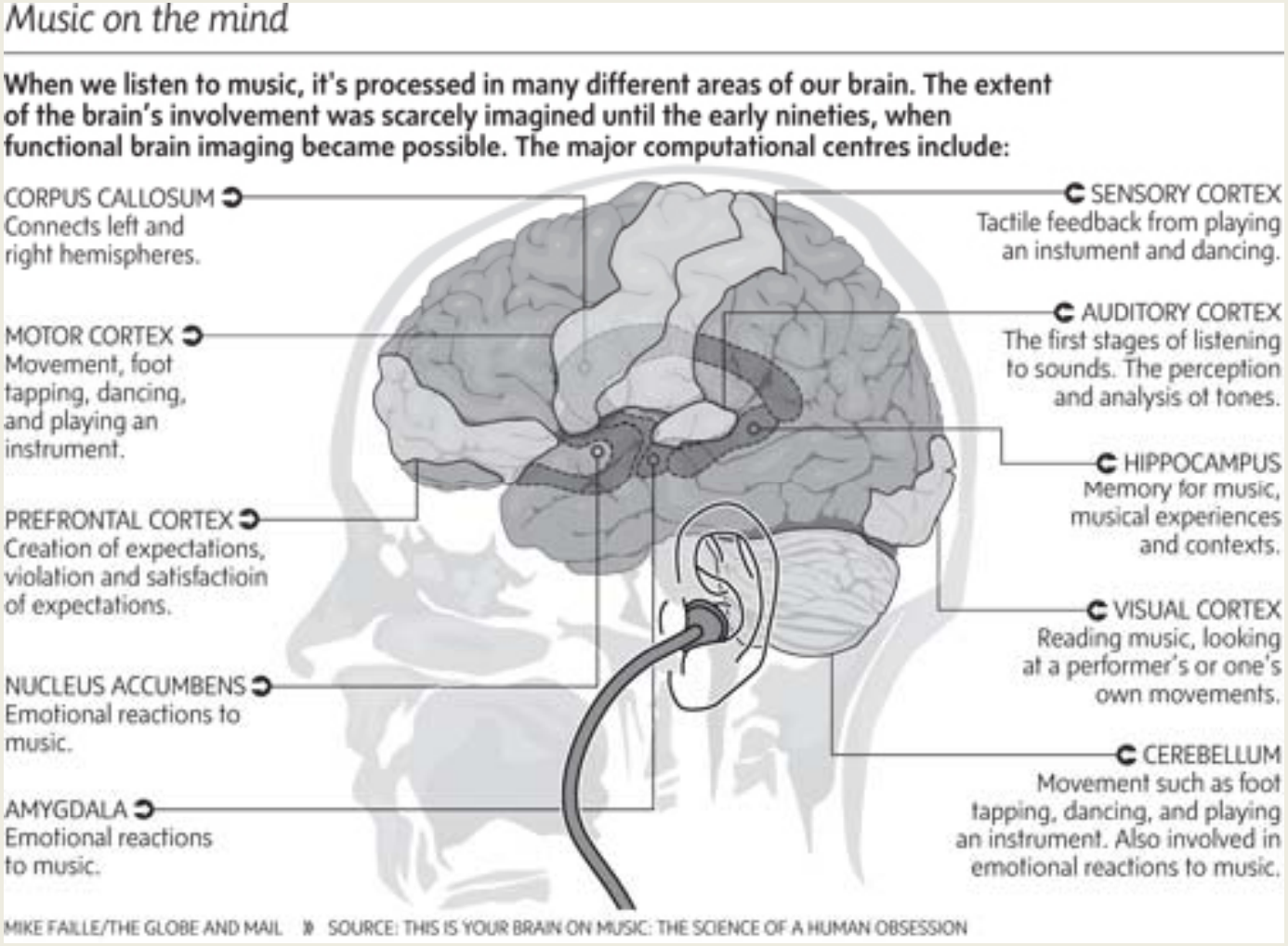
- **Hypothesis:**
- Does Learning Music enhance one's Spatial Working memory?
- Is there a relationship between Music Training and Spatial Working memory?

Broca & Wernicke's

Working Memory and Phonological Loop – Brocas and Wernicke's Area



Musicians Brain



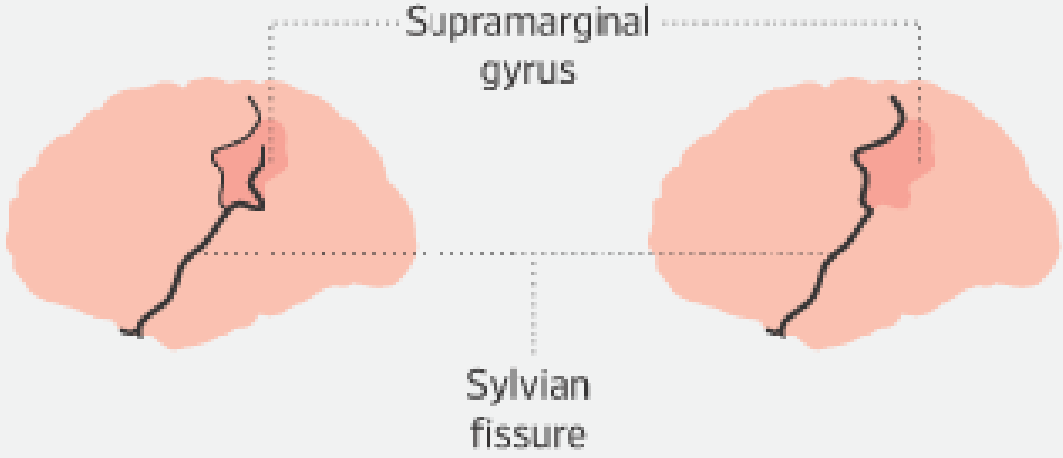
Einsteins Brain
Spatial Reasoning

Not as Groovy

The part of Einstein's brain associated with visual and spatial reasoning was 15% larger than normal. Even more remarkable, Einstein's brain was missing a crevice present in typical brains.

Typical brain
The Sylvian fissure divides a part of the brain called the supramarginal gyrus.

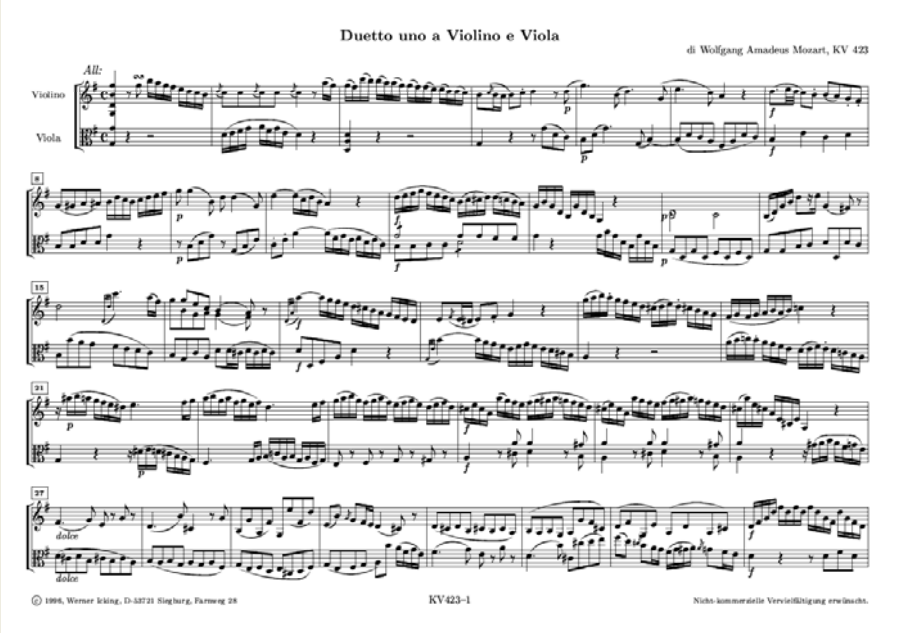
Einstein's brain
The supramarginal gyrus is not divided by the Sylvian fissure.



Source: Prof. S.F. Witelson, Michael G. DeGroote School of Medicine, McMaster University
Photos: Everett Collection (left)

Music and Spatial Working Memory

- Is there a relationship?
- Mozart Effect – Fact or Fiction



Aim of the Study

- Formal Music Training Vs No Training
- Comparison between a group of musically trained undergraduates with a group who had received no musical training, other than what is on a typical school curriculum
- Examine the relationship between various musical tests and spatial working memory

Method

- 40 Undergraduates – 2 Groups – Mean Age 28.65 years – Range 17 – 63 years
- **Music Group** – Previous Formal Musical Training other than school curriculum
  - N = 13, 1 male/12 female
  - Mean Age 30.69 years. Range 18-63
- **Non Music Group** – No music training
  - N = 27, 9 males/18 females
  - Mean Age 27.67 years. Range 17-49 years

Method

- Montreal Battery of Evaluation of Amusia
  - MELODIC ORGANIZATION
    - Scale discrimination
    - Different contour
    - Same contour
  - TEMPORAL ORGANIZATION
    - Rhythmic contour
    - Metric task
  - INCIDENTAL MEMORY TEST (Peretz, Champod & Hyde, 2003)
- Spatial working memory (WMS)
  - Spatial addition (Weschler, 2009)

Results

	Musicians N = 13		Non Musicians N = 27	
Variable	M	SD	M	SD
Melodic – Scale Discrim	26.69	7.92	26.37	3.56
Melodic – Different Cont	27.62	2.40	24.70	3.83
Melodic – Same Contour	26.31	3.04	24.04	3.94
Temporal – Rhythm Cont	27.15	3.39	25.07	3.91
Temporal – Metric	26.08	5.22	23.52	5.63
Incidental Music Memory	27.38	2.60	25.96	2.98
WMS Spatial WM Addition	11.38	1.76	10.89	2.50

Results
Correlations

	WMS IV – Spatial Working Memory	
	Corr	Significance
Melodic scale discrimination	.036	.824
Melodic - different contour	.318	**.045**
Melodic - same contour	.216	.181
Temporal - rhythmic contour	.351	**.026**
Temporal - metric contour	.343	**.030**
Musical memory	.276	.085

Discussion

- Do you think that the correlations are pointing evidence towards the Mozart Effect?
- Is music a primer for spatial abilities
- Does musical training enhance cortical development?
- Musical training is age a factor in cross over benefits?