

Mind and Brain

남기춘

고려대학교 심리학과

순서

- 심리학 소개
- 실습 방법
- Working Memory: Visuo-Spatial Working Memory
- 어디에 사용할 수 있는가?

심리학 소개

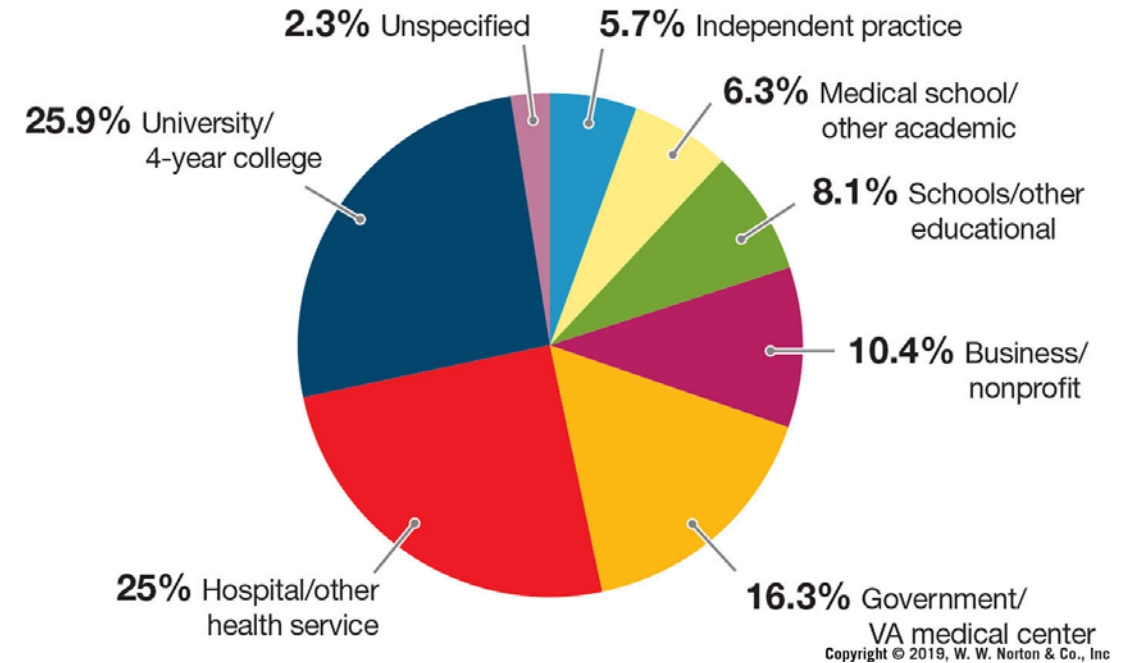
심리학이란?

- The **scientific study** of **mind** and **behavior**, which depend on **processing in the brain**
 - The mind is made up of all the **mental activity** that lets us experience the world; that is, we use our senses—sight, smell, taste, hearing, and touch—to take in information from outside ourselves.
 - Behavior refers to all the **actions** that result from sensing and interpreting **information**.
- **과학적 방법: 연역과 귀납의 논리학으로 관찰-이론-실험-재현을 바탕으로 한 방법, 인과적 설명**

심리학자의 활동 영역

TABLE 1.2
Subfields of Psychology

Subfield	Focus	Sample Questions
Evolutionary psychology	Explore how traits are selected to aid adaptation in an environment.	<ul style="list-style-type: none"> How has evolution influenced the ability to do many tasks at once? What evolutionary pressures affect selection of a romantic partner?
Biological psychology	Study how biological systems give rise to mental activity and behavior.	<ul style="list-style-type: none"> How do chemicals in the brain influence sexual behavior? How do brain cells change during learning?
Cognitive psychology/ Cognitive neuroscience	Investigate attention, perception, memory, problem solving, and language, often based on brain processes.	<ul style="list-style-type: none"> What makes some problems harder to solve than others? Do brain training programs increase attention and memory abilities?
Developmental psychology	Research how people change from infancy through old age.	<ul style="list-style-type: none"> How do children learn to speak? How can older adults maintain mental abilities as they age?
Health psychology	Examine how psychological factors affect health and well-being.	<ul style="list-style-type: none"> How does feeling stressed affect the body? How does viewing life optimistically improve health?
Personality psychology	Analyze enduring characteristics that people display over time and across circumstances.	<ul style="list-style-type: none"> Why are some people shy? How do biology, circumstances, and culture shape personality?
Social psychology	Explore how people are affected by others.	<ul style="list-style-type: none"> When do people form impressions of others? How do people form or dissolve intimate relationships?
Cultural psychology	Study how people are influenced by the societal rules that dictate behavior in their cultures.	<ul style="list-style-type: none"> How does culture shape a person's sense of self? Does culture create differences in perception?
Clinical psychology	Consider the factors that cause psychological disorders and the best methods to treat them.	<ul style="list-style-type: none"> What factors lead people to feel depressed? How does the brain change as a result of therapy for depression?
Educational psychology	Investigate effectiveness of techniques in teaching and learning.	<ul style="list-style-type: none"> Do fidget spinners help students pay attention? How can a teacher help students learn when watching videos?
Industrial/organizational psychology	Examine issues pertaining to industry and the workplace.	<ul style="list-style-type: none"> How can increasing morale help motivate workers? How can equipment be designed so workers can easily perform duties and avoid accidents?



- 미국심리학회에 약 200개의 분야별 학회가 존재, 한국심리학회에는 약 20개의 분야 학회가 활동
- 특정 영역에 한정되어 있지 않고, 연구자의 연구 문제를 해결할 수 있는 여러 영역, 연구 방법을 총동원하여 연구 수행

연구방법01

1 Formulate a theory.



You develop a scientific explanation about a phenomenon. A literature review of existing studies informs your theory. In this example, your theory is that a major cause of car crashes is distracted driving.

2 Develop a testable hypothesis.



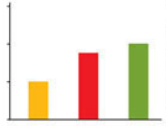
You create a specific, testable hypothesis related to the theory. In this example, a good testable prediction is that "Using a cell phone will interfere with driving because it is distracting."

3 Test with a research method.



You test your hypothesis by selecting the most appropriate research method (see study units 1.9–1.11). You then collect data to evaluate your hypothesis. For example, in an experiment you might have some participants talk on a handheld or hands-free cell phone in a driving simulator while other participants do not talk on a cell phone.

4 Analyze the data.



You analyze the data using appropriate statistical techniques and draw conclusions. If the data do not support your hypothesis, you either discard the theory or revise it (and make plans to test the revision). See, at the back of the book, Appendix A: How Do Psychologists Analyze Research Data?

5 Share the results and conduct more research.



You submit results to research journals and present them at conferences to share them with the scientific community. Then you continue the process by refining your theory, making further predictions, and testing hypotheses.

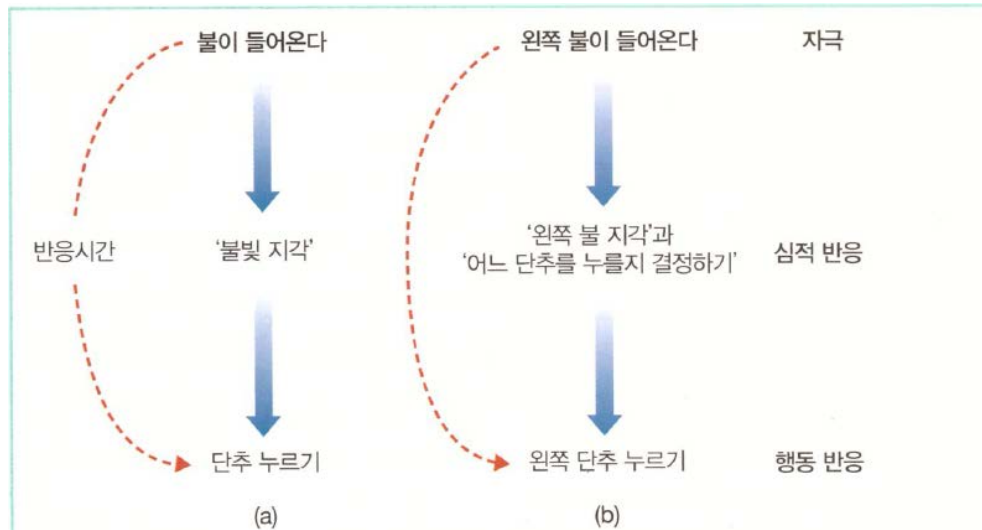
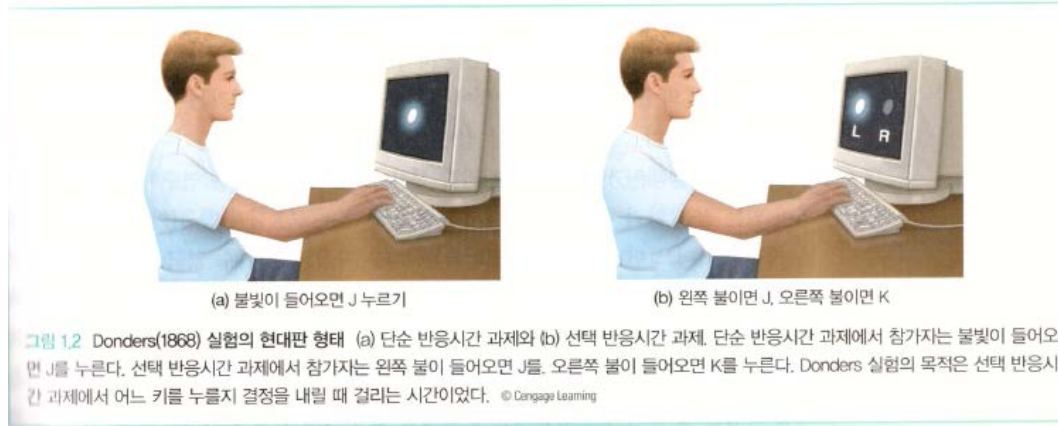
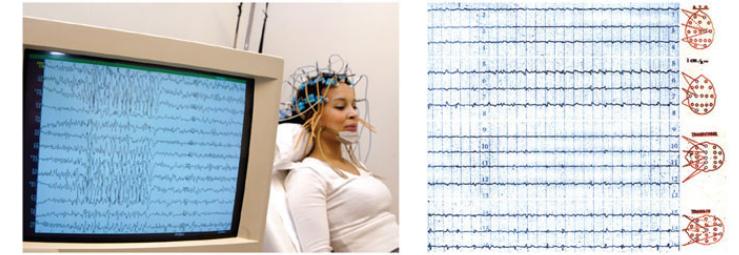
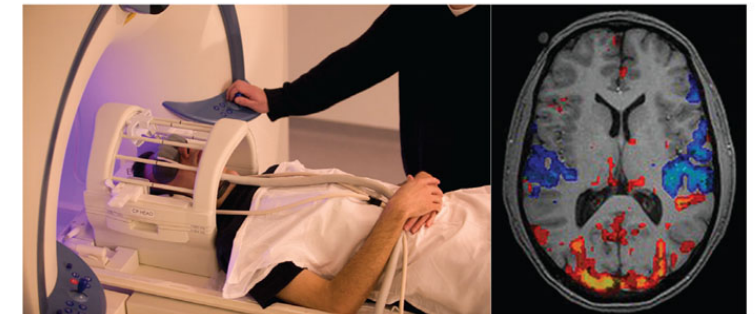


그림 1.3 Donders 실험에서 자극 제시와 행동 반응 간의 사건들의 연쇄 (a) 단순 반응시간 과제와 (b) 선택 반응시간 과제. 점선은 Donders가 불빛 제시와 참가자의 반응 사이의 시간을 가리키는 반응시간을 측정했다는 것을 알려준다. © Cengage Learning

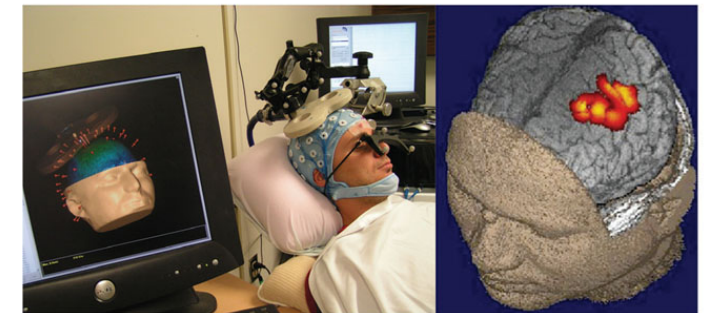
(a)



(b)



(c)



연구방법02

목적: The brain's ability to alter its functional and structural architecture in response to experience and learning for middle-aged and elderly healthy volunteers.

설계: Memory Training Group(8-week training by utilizing the Method of Loci (MoL)) and Control Group (동일기간 동안 운동)

측정과 분석: Both the memory trainers and the controls underwent magnetic resonance imaging (MRI) scans and memory testing pre and post 8 weeks of training or no training, respectively.

결과: Memory training improved source memory performance and showed regional increases in cortical thickness compared with controls.

결론: Mental exercise may induce short-term structural changes in the aging human brain.

Engvig 등(2010), Effect of memory training on cortical thickness in the elderly

연구방법03

Table 2

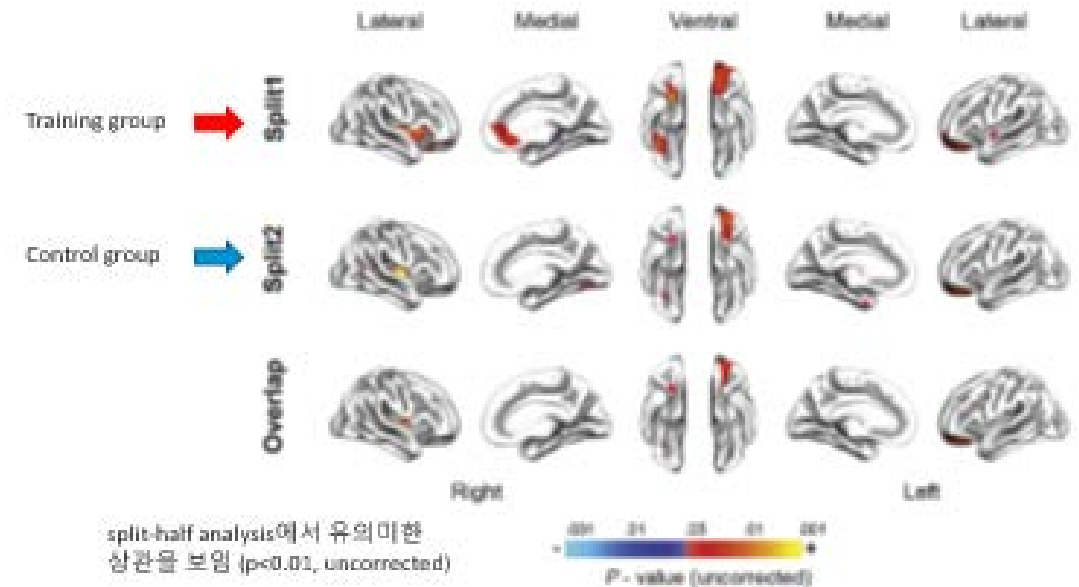
Group means and standard deviations for memory performance at tp1 and tp2.

	Baseline (tp1)		Retest (tp2)		<i>p</i> -value*
	M	SD	M	SD	
<i>Memory training (12F/9M)</i>					
Recognition, correct hits	54.0	3.99	53.6	3.81	0.736
Recognition, false alarms	3.13	5.23	1.27	3.07	0.006
Correct source memory judgements	28.1	9.04	39.1	9.82	<0.001
Source/recognition, ratio	0.512	0.146	0.727	0.160	<0.001
<i>Controls (10F/9M)</i>					
Recognition, correct hits	52.3	5.53	54.2	3.49	0.097
Recognition, false alarms	2.21	2.49	2.00	1.89	0.736
Correct source memory judgements	29.8	6.88	33.5	6.62	0.063
Source/recognition, ratio	0.568	0.106	0.618	0.115	0.101

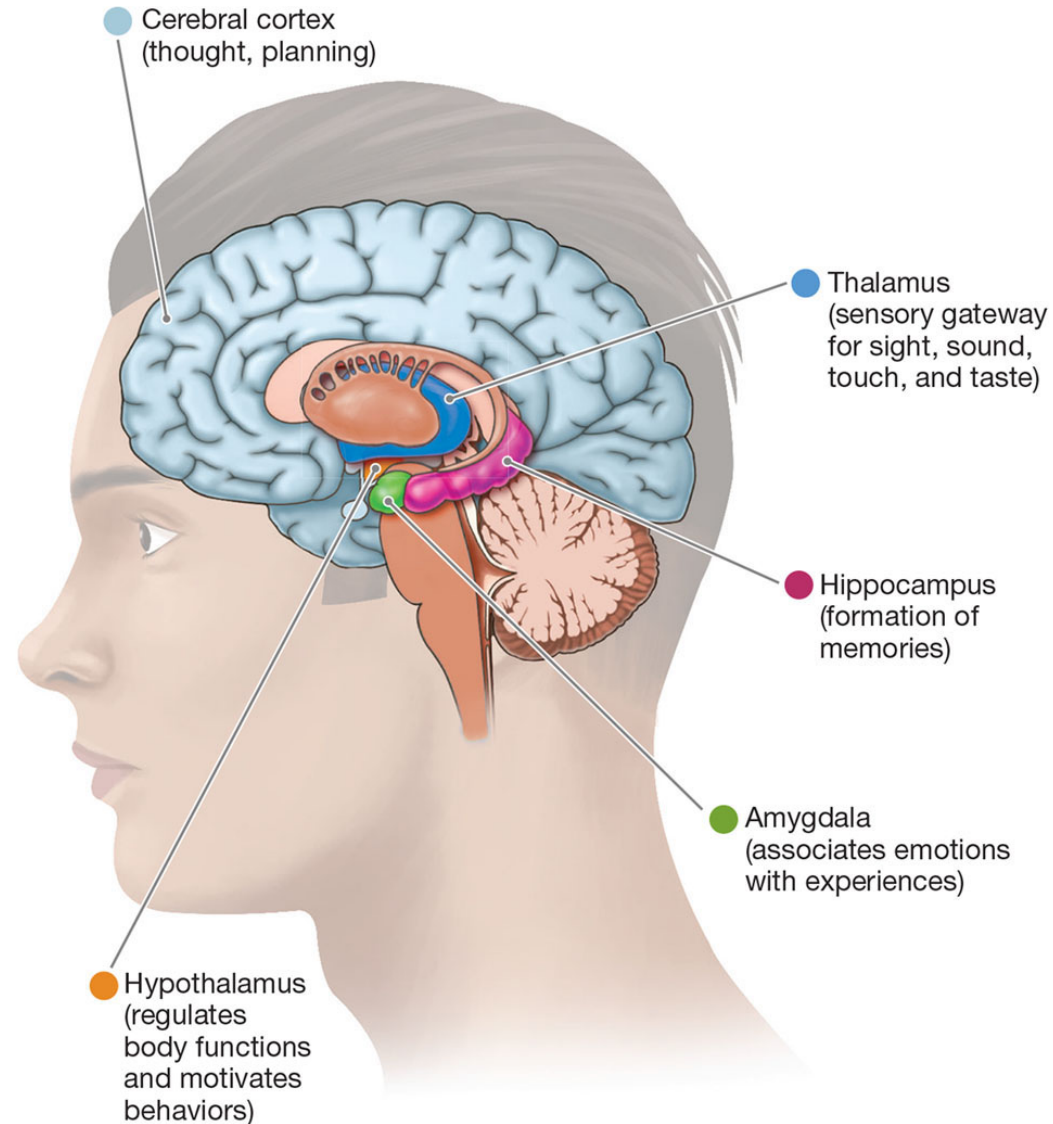
Note. 'Recognition, false alarms' denotes new words that are categorized as previously displayed.

* *p*-values are based on paired samples *t*-tests.

left lateral orbitofrontal cortex,
right lateral orbitofrontal cortex, fusiform cortex (training)



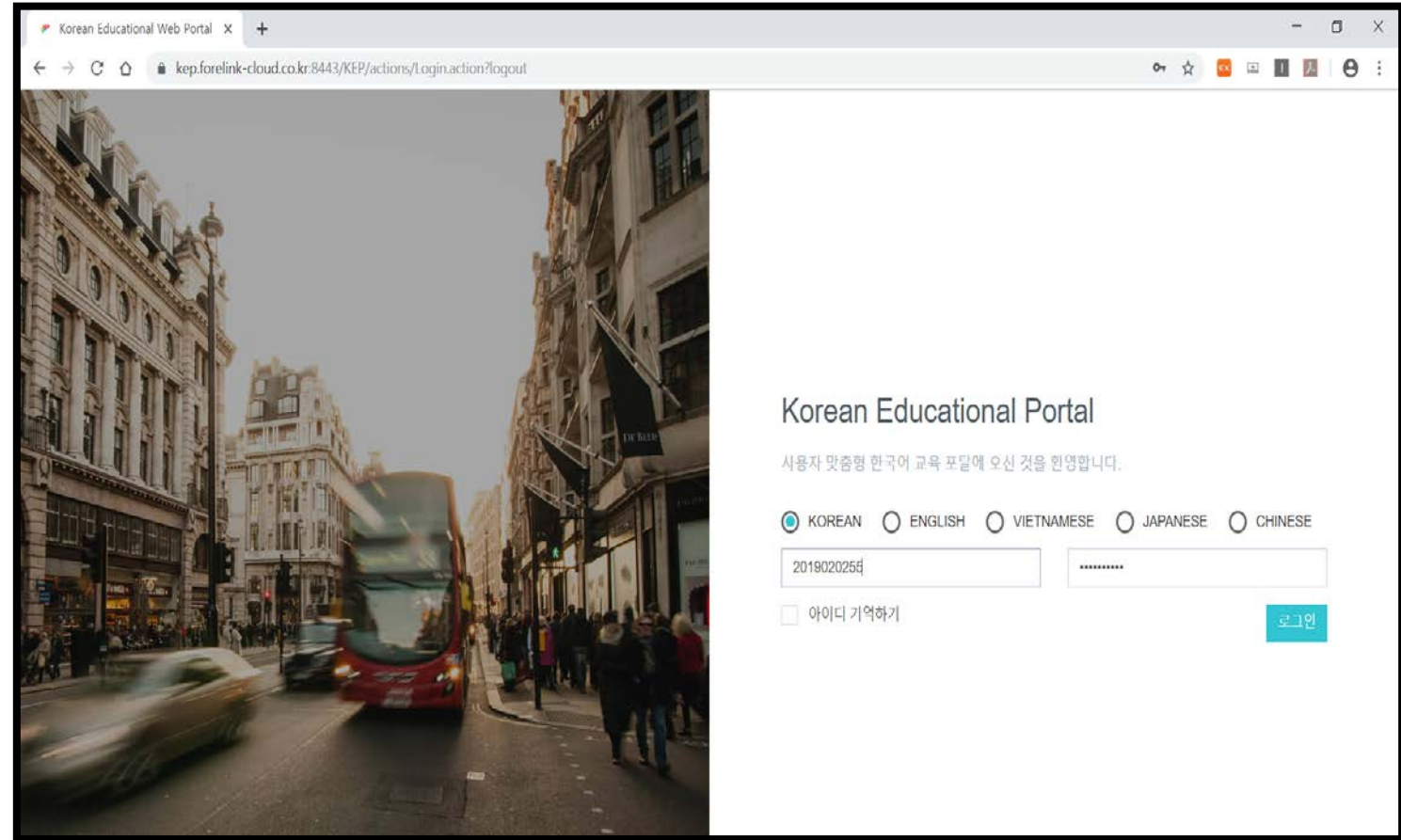
Human Brain and Function



실습 방법

사이트 접속

- **kep.forelink-cloud.co.kr** 접속
- ID: 수강생의 학번
- PW: 수강생의 학번

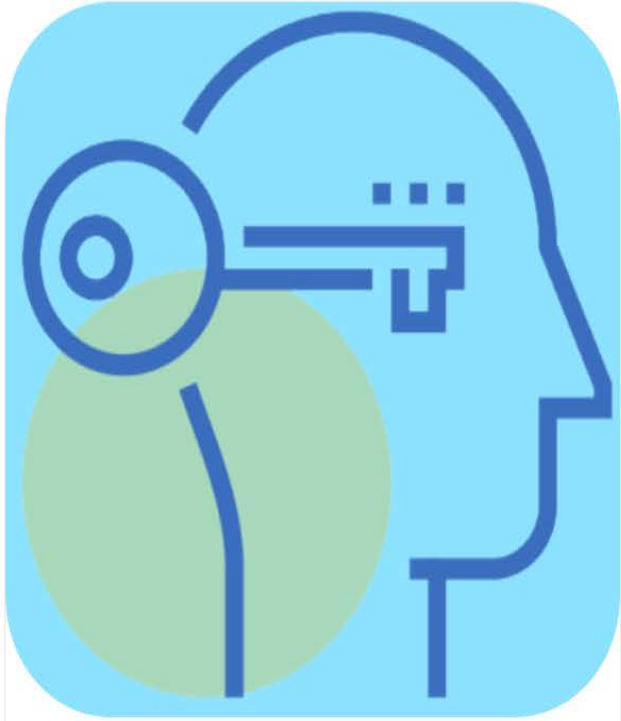


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인지
인지능력(기능) 검사

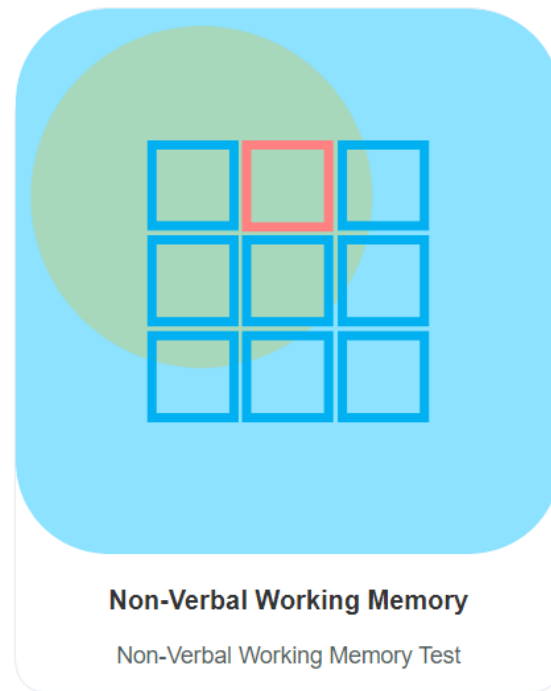
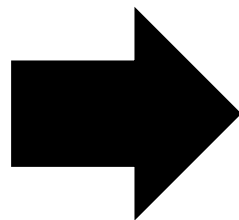


한국어
한국어 능력 검사



설문(지)
설문 검사

과제 진행



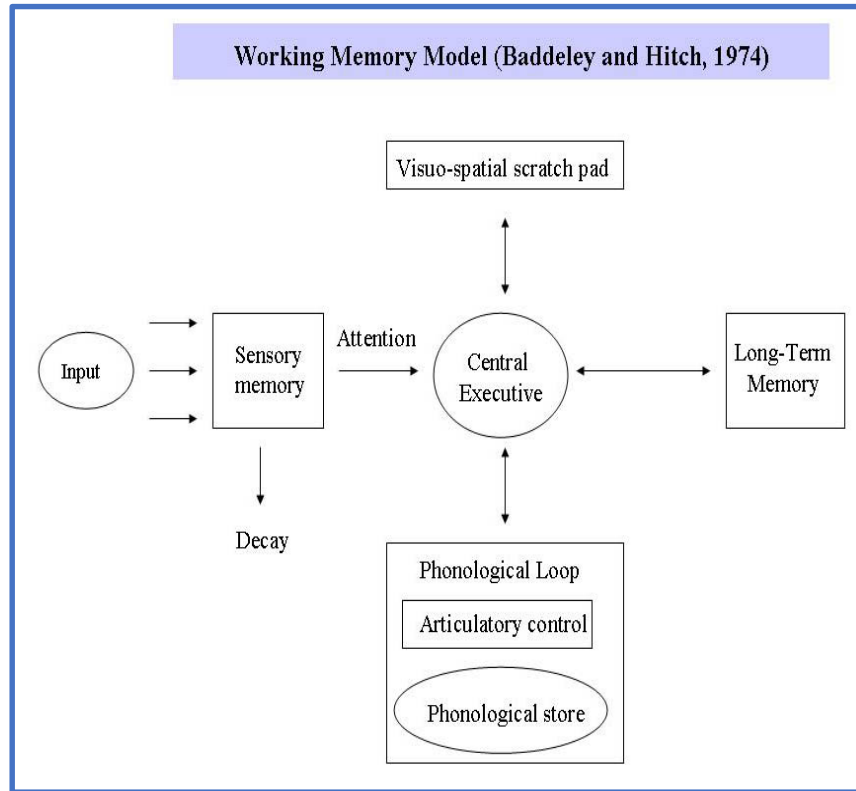
※ Session1만 진행하세요.

Working Memory

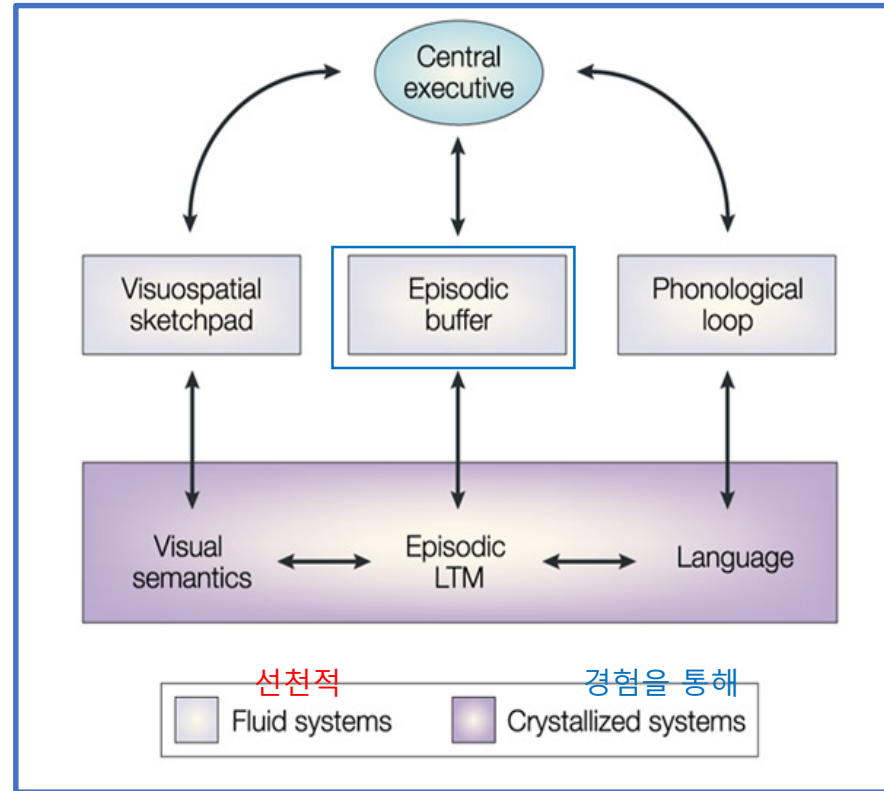
Visuo-Spatial Working Memory

작업기억 모델

단기기억 개념의 재형성



Baddeley & Hitch (1974)



Baddeley (2000)

The neural correlates of the verbal component of working memory

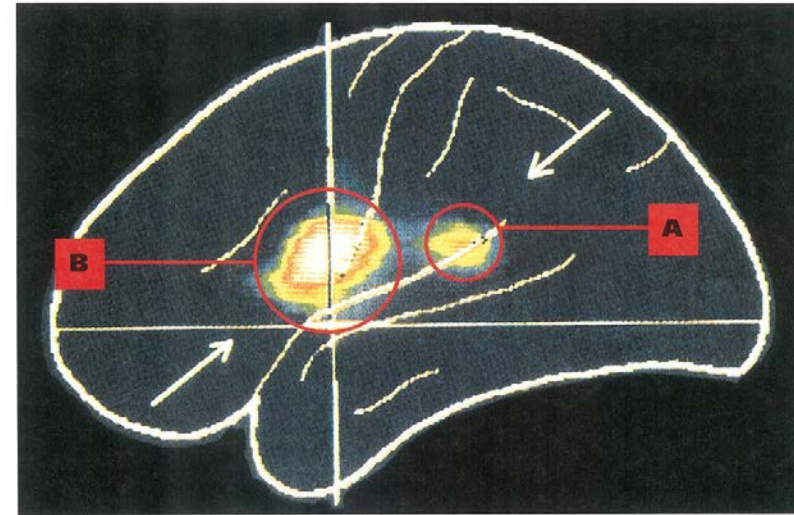
E. Paulesu^{*†}, C. D. Frith^{*‡§} & R. S. J. Frackowiak^{*}

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[‡] Psychological Department, University College London, Gower Street, London WC1E 6TB, UK

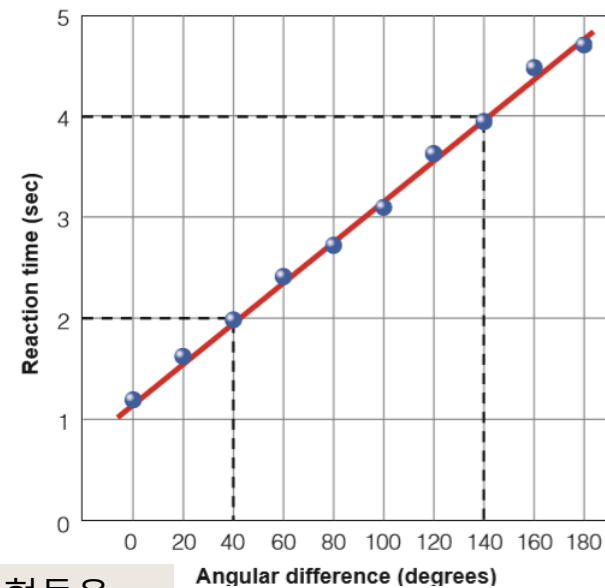
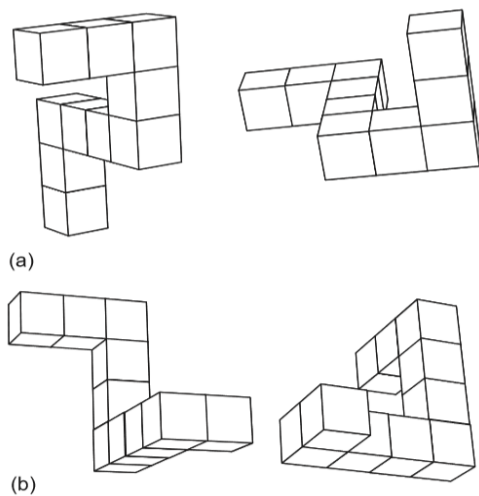
By repeating words 'in our head', verbal material (such as telephone numbers) can be kept in working memory¹ almost indefinitely. This 'articulatory loop' includes a subvocal rehearsal system²⁻⁶ and a phonological store^{3,6-10}. Little is known about neural correlates of this model of verbal short-term memory. We therefore measured regional cerebral blood flow, an index of neuronal activity, in volunteers performing a task engaging both components of the articulatory loop (short-term memory for letters)⁵⁻¹⁰ and a task which engages only the subvocal rehearsal system (rhyming judgement for letters)^{4,11}. Stimuli were presented visually and the subjects did not speak. We report here that comparisons of distribution of cerebral blood flow in these conditions localized the phonological store to the left supramarginal gyrus whereas the subvocal rehearsal system was associated with Broca's area. This is, to our knowledge, the first demonstration of the normal anatomy of the components of the 'articulatory loop'.



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시공간 잡기장

Shepard
&
Metzler(1971)



- 피험자들에게 입체적으로 회전한 도형들을 제시
- 회전 각도와 반응시간 사이에는 정적 상관관계
- 심적 회전

An improved spatial span test of visuospatial memory

David L. Woods^{a,b,c,d}, John M. Wyma^a, Timothy J. Herron^a and E. William Yund^a

^aHuman Cognitive Neurophysiology Laboratory, VANCHCS, 150 Muir Rd., Martinez, CA 94553, USA; ^bDepartment of Neurology, UC Davis, 4860 Y St., Suite 3700, Sacramento, CA 95817, USA; ^cCenter for Neurosciences, UC Davis, 1544 Newton Ct., Davis, CA 95616, USA; ^dCenter for Mind and Brain, UC Davis, 202 Cousteau Place, Suite 201, Davis, CA 95616, USA

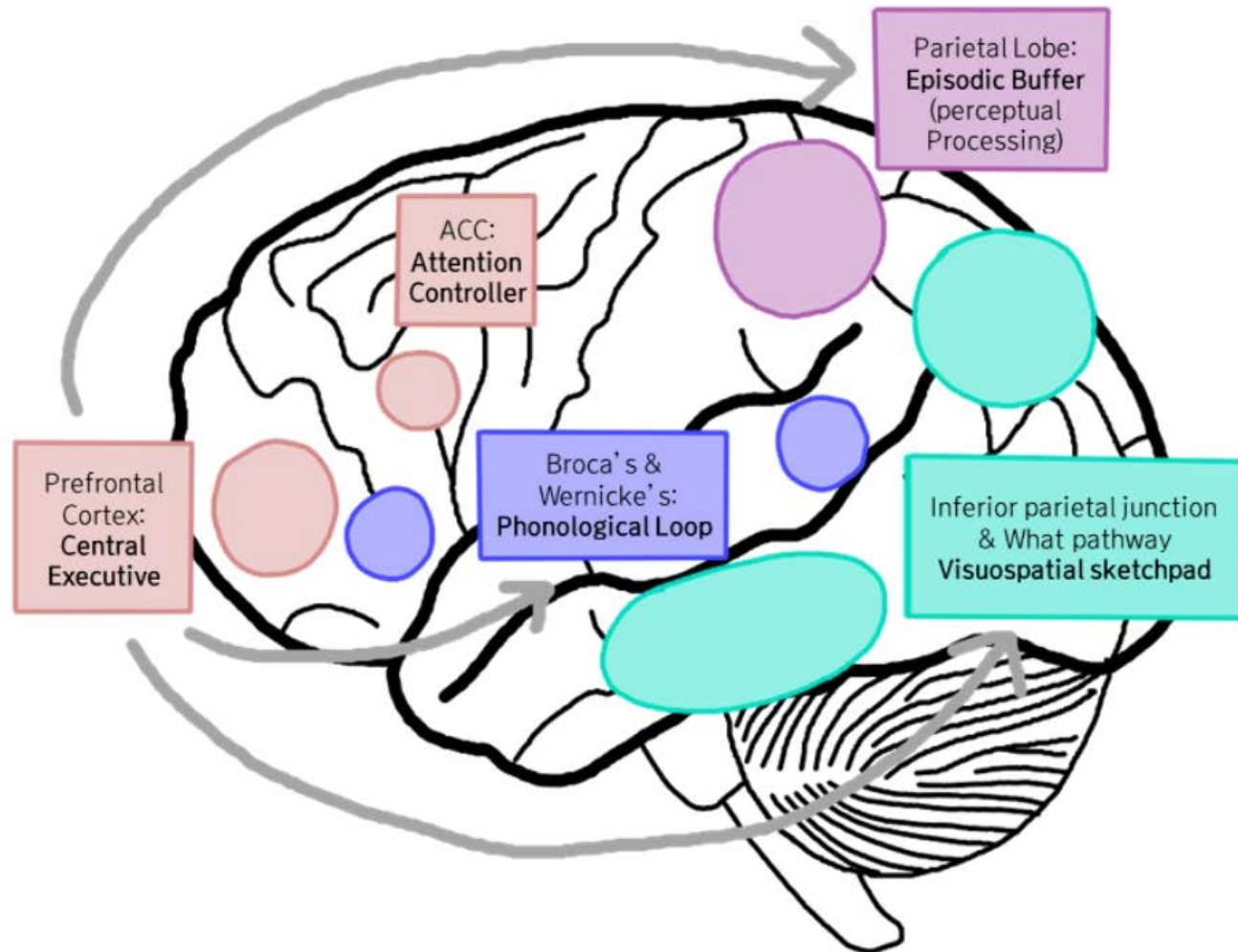
ABSTRACT

In the widely used Corsi Block Test and Wechsler Spatial Span Tests, participants must reproduce sequences of blocks in the order touched by the examiner until two trials are missed at the same sequence length. The examiner records either the maximum number of blocks correctly reported or the total number of correct lists. Here, we describe a computerized spatial span test (C-SST) that uses psychophysical procedures to quantify visuospatial mean span (MnS) with sub-digit precision. Results from 187 participants ranging in age from 18 to 82 years showed that accuracy declined gradually with list length around the MnS (by ~30% per item). Simulation studies revealed high variance and biases in CBT and Wechsler measures, and demonstrated that the C-SST provided the most accurate estimate of true span (i.e., the sequence length producing 50% correct). MnS declined more rapidly with age than mean digit span (MnDS) measured in the same participants. Response times correlated with both MnS and MnDS scores. Error analysis showed that omission and transposition errors predominated, with weaker primacy and recency effects in spatial span than digit span testing. The C-SST improves the precision of spatial span testing and reveals significant differences between visuospatial and verbal working memory.

어디에 사용할 수 있는가?

어디에 사용할 수 있는가?

Human Mind Understanding



어디에 사용할 수 있는가?

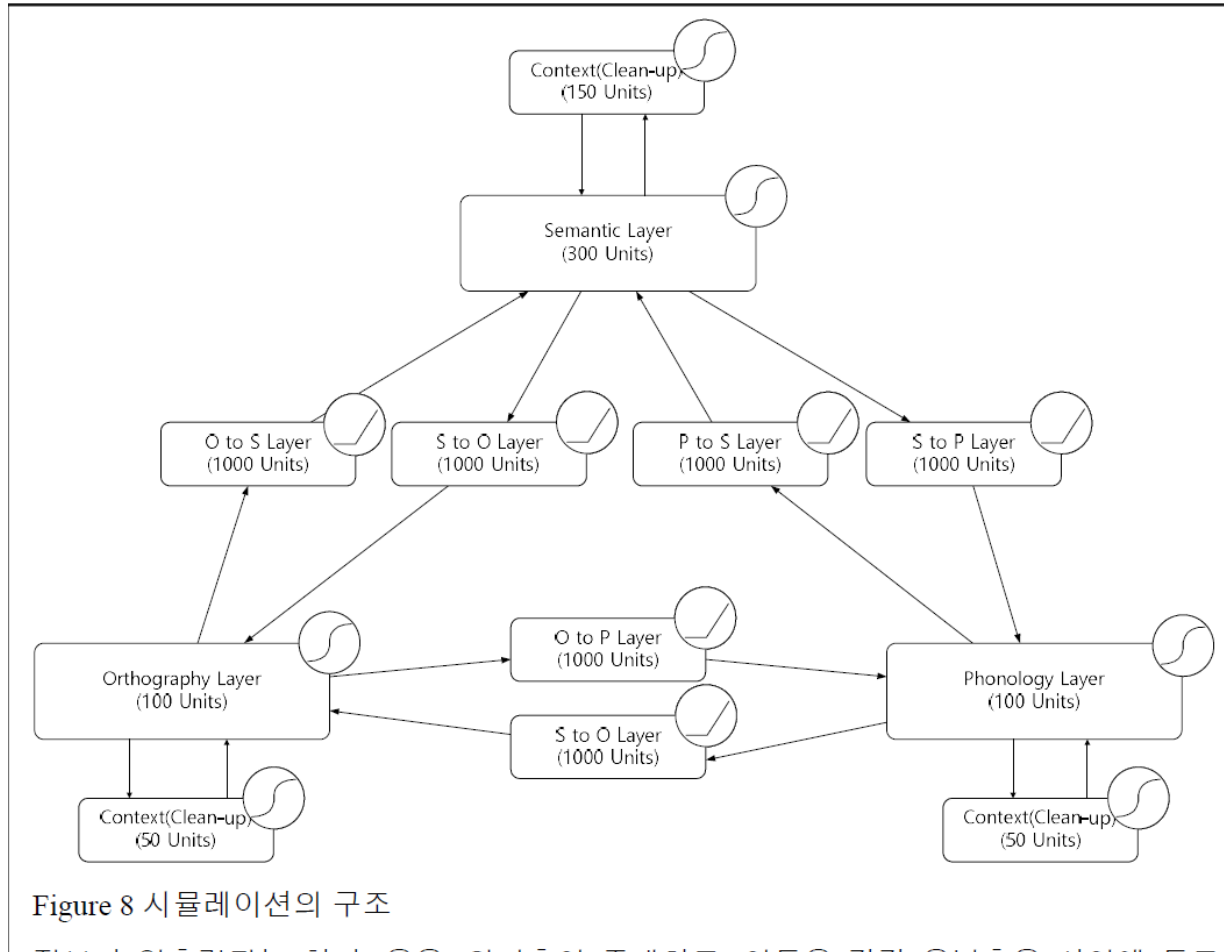
Learning and Better Life

CIT CIT 예시 : Nonverbal working memory



어디에 사용할 수 있는가?

Patient and AI



지금 퀴즈

- 지금부터 15분 동안 한글 혹은 워드로 작성해서 아래의 이메일로 파일을 보내세요.
- 이메일 보낸 시간을 check합니다. 시간 내에 보내셔야 합니다. 정해진 시간보다 5분이후에 도착한 메일은 인정하지 않습니다.
- 퀴즈
 - Working Memory의 일부인 visuo-spatial WM의 기능을 10문장 이내로 설명하시오
- 파일을 보낸 이메일주소
 - psychotest2020@gmail.com