

Impaired Lexical Decision Following Subcortical Stroke

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Background

- Impaired language function is often observed after damage to the brain's cerebral cortex, particularly the left perisylvian region.
- Aphasia is frequently considered as a classical example of cortical disorder, and contrasted with subcortical dementias which, supposedly, do not involve language impairment
- However, in the mid-twentieth century Wilder Penfield argued that thalamocortical circuits form a core of the brain's language system (Fig. 1).
- The role of thalamocortical circuits in language has recently been gaining support from brain imaging connectivity studies.
- We examined a simple language-based task – lexical decision – in patients with subcortical lesions.

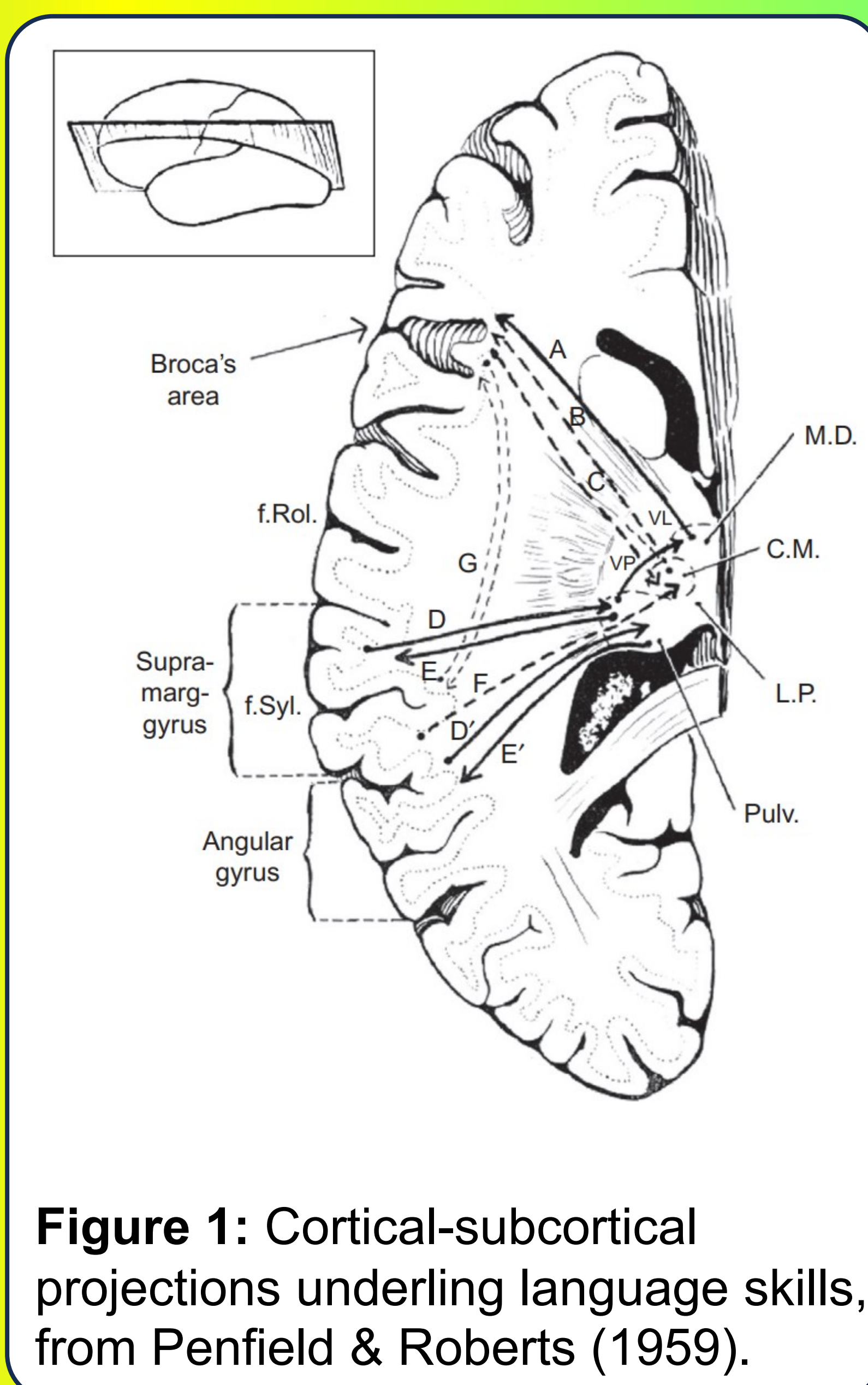


Figure 1: Cortical-subcortical projections underlying language skills, from Penfield & Roberts (1959).

Methods

- Nine patients with suspected ischemic strokes (confirmed in 8 cases) and mainly subcortical pathology were assessed.
- All had multiple small lesions, located most frequently in the frontal and parietal corona radiata, internal capsule, basal ganglia, and thalamus.
- All patients had no or minimal cognitive impairment on the Montreal Cognitive Assessment (MoCA).
- Eighteen healthy age-matched participants were also recruited as a control group.
- All patients and controls were Thai and performed a validated lexical decision task in the Thai language and script (Fig. 2).
- In that task they had to distinguish real words from pseudowords (i.e., words that appear reasonable according to spelling conventions but do not exist in the Thai language).
- They were also assessed with the modified Wisconsin Card Sorting Test (Fig. 3), as a measure of fluid executive cognitive control.

กบาล	—	เกื่อน
คเมช	—	จวัก
โอษฐ์	—	ทัศภาติ
ทรรษา	—	นาคา
ทืชากร	—	ถานร
ขจัก	—	ศกุนี
kitchen	—	harrick
puma	—	laptess
plorinum	—	levity
cuticle	—	andrinand
flonty	—	xylophone
craxent	—	sofa

Figure 2: The lexical-decision task involved Thai words and pseudowords. It is equivalent to the English language Spot-the-Word Test (shown in lower panel).

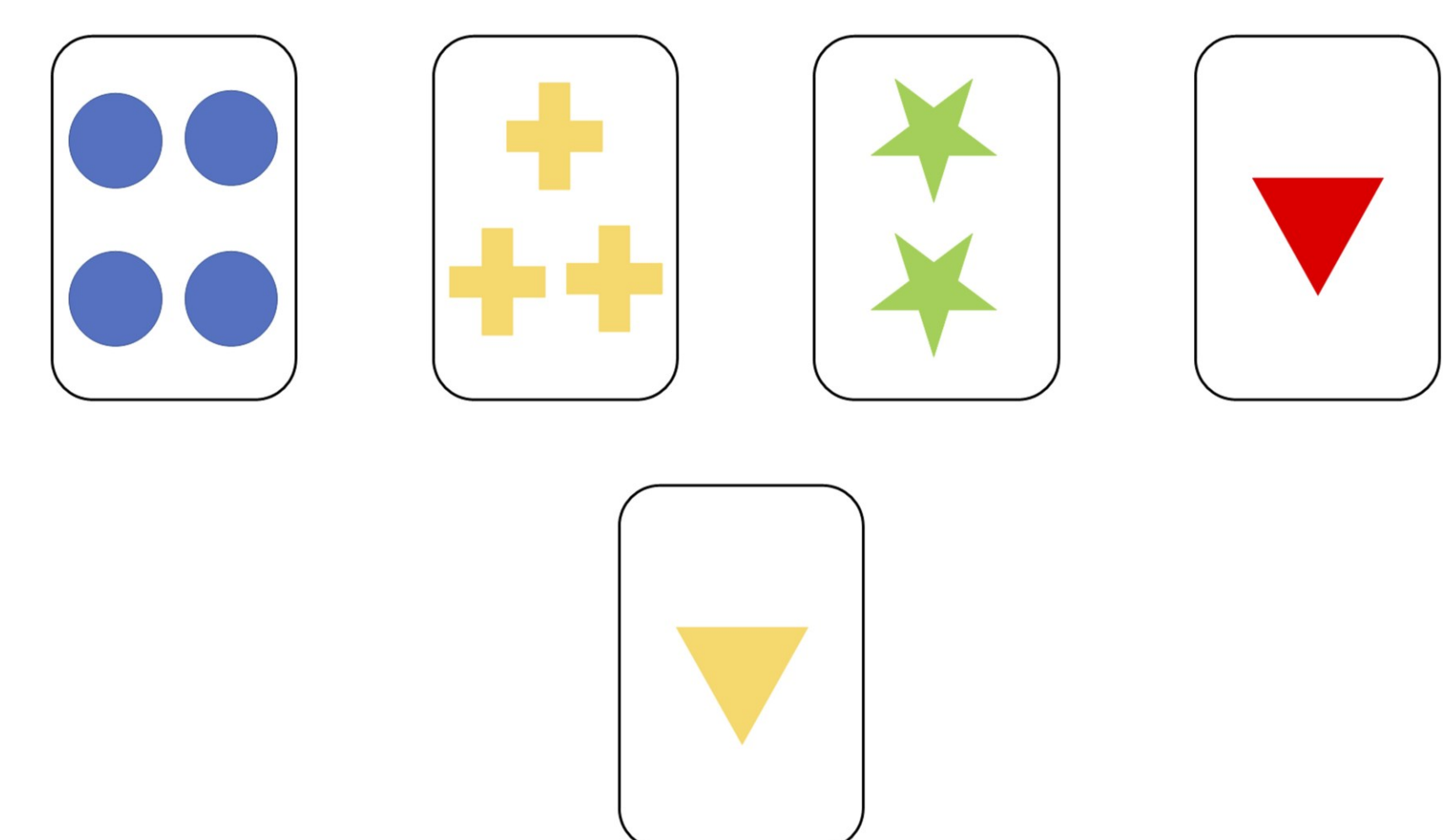


Figure 3: All participants were also assessed with the Modified Wisconsin Card Sorting Test (WCST) as a measure of fluid / executive cognitive control.

Results

Table 1: Mean demographic and task performance scores for patient and controls.

	Control	Patient	p
N =	18	9	
Age	60.2	65.1	.14
Education	16.6	14.8	.25
WCST Categories	4.44	4.67	.76
WCST Perseverative	26.8	29.3	.72
Lexical Decision	39.1	36.0	.04*

Conclusions

- Lexical decision performance was significantly worse in the subcortical ischemic stroke group, compared to a control group.
- These findings suggest that lexical decision is particularly sensitive to subcortical pathology, and support theories that suggest a role of subcortical regions in some aspects of linguistic processing.
- The results are unlikely to be caused by lower general cognitive ability, because there was no evidence of reduced fluid executive cognitive control, and, in addition, all patients performed well on a standard dementia screen- the MoCA.
- Beyond basic neuroscience understanding, the results have implications for the use of lexical decision tasks as measures of premorbid cognitive function in neuropsychological assessments.
- Lexical decision tasks that are frequently used as estimators of premorbid function, such as the Spot-the-Word Test, may be more susceptible to impairment from acquired brain injury than previously recognized.