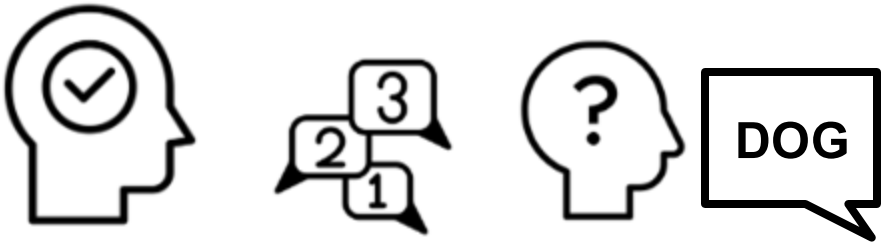
Trouble Understanding Spoken Words, but Still Able to Understand Number Words Like “One” or “Eleven”



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An accessible version of: “Word Deafness with Preserved Number Word Perception”

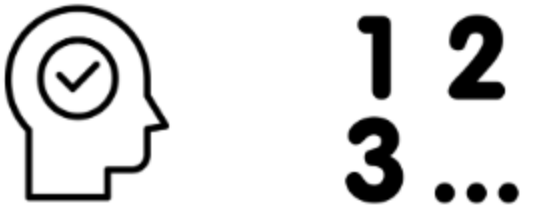
Created by Christina Mai and Heather Dial

Summary

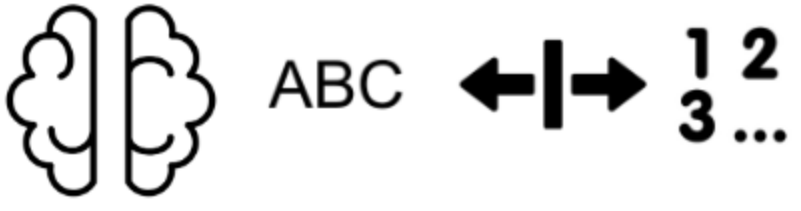
- K.A. has **Aphasia.** He has **trouble understanding** spoken **language**.

- K.A. **struggled** with **tests** that had **words**

- K.A. did **well** with **tests** that had **numbers**.



- This is **important** because it shows that **different parts** of the **brain** are needed to understand **numbers** and **words**.



Introduction

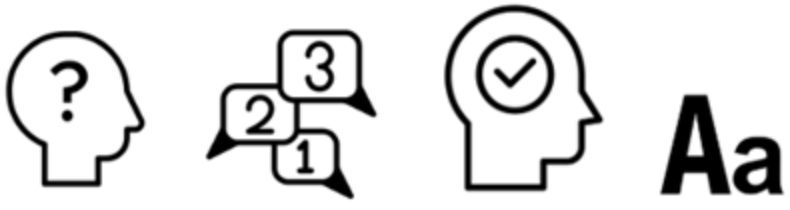
- Studies show the **brain** has **different parts** for **understanding numbers** and **words**.
    - This means the **brain** may have a **special space** for **numbers**.

- Many **people with aphasia** have trouble with **speaking numbers** and/or **letters**.

- Knowing **how** the **brain** treats words and numbers **differently** is **important**.

- **Only two** studies **show** problems with **number** understanding through **hearing**.

  - One case shows a **person** who could **not hear** numbers correctly but **could hear** letters correctly.



  - Another case shows a **person** who could **not hear** numbers correctly but **could hear** words correctly.

- This study with K.A. will show **hearing numbers correctly** but **not** words correctly.

Experiment 1 Methods

- K.A had **two strokes** affecting **both halves** of the **brain**.

- K.A. has **trouble finding words** to say.

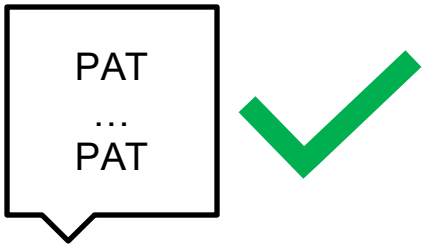
- K.A. went through many **tests** which showed:
  - he had **trouble** with **reading words**.

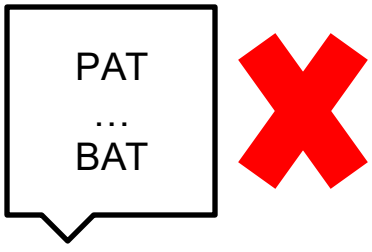
  - he could **not** understand **words** or **letters** that were **spoken**.

  - he **could** understand **numbers** that were **spoken**.

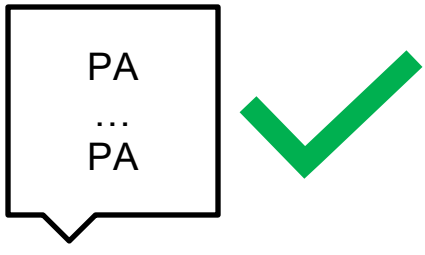
- K.A. went through **5 tests** to understand **how** his **brain** works to **understand spoken words** and **numbers**.

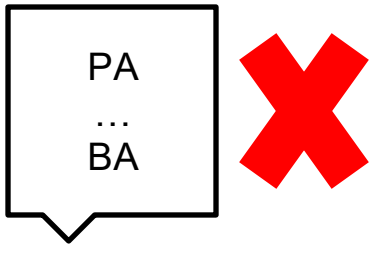

  - The **first** test made him **decide if there was a difference** for similar **sounding** words like pat and bat.





  - The **second** test made him **find differences** between **syllables** like “ba” and “pa”

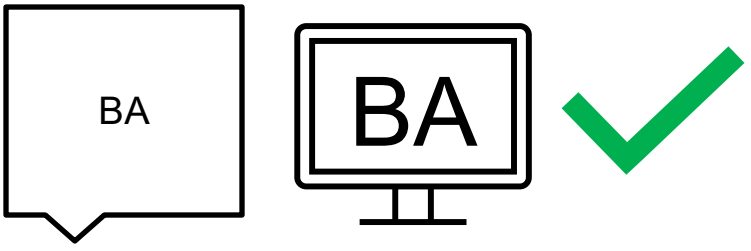




  - The **third** test checked if he could tell if a **word** was **real** or **made up.** Made up words **sounded a lot like** real words.

- The **fourth** test made him **match** a **word** he heard to a **picture**.

- The **fifth** test made him **match** a **spoken syllable** to its **written** form.



- A **comparison group** of healthy **adults** with **normal hearing** was added.

- The **tests** were done **on** a **computer** with many practice trials.

- **Math** was done to see if K.A. was **worse** than the **comparison group** and if he was **better** than **guessing**.

Experiment 1 Results

- K.A. **scored 54-66%** on the **word tests**.
  - K.A.'s scores **showed** that he could **not understand spoken** words.

- K.A.'s **trouble** with **understanding** words **shows** that part of his **brain** that helps with understanding **speech** might be **broken**.

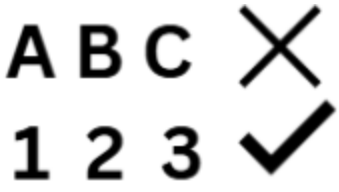
- K.A. mainly has **trouble understanding** small **sounds** in **words** and some **trouble understanding** the **meaning** of **words**.

- K.A. was very **good** at **understanding spoken numbers**.

Why can K.A. understand number words?

- **Numbers** are **easy** to **remember** because there are only a few numbers and they all **sound different**.

  - This could be why K.A. was **better** at the **number** tests **than** the **word** tests.

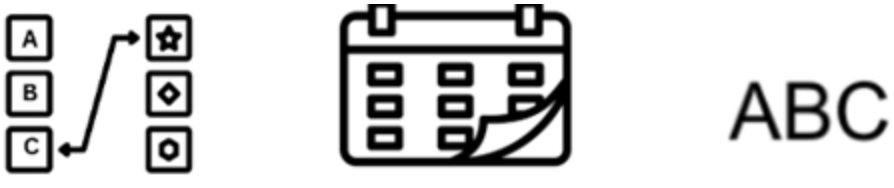


- K.A. was **tested again** with days of the week and months of the year because there are only a few and they sound different.

Experiment 2 Methods

- K.A. had **three matching** tasks, **one repetition** task, **one writing** task, and **one comparison** task.

  - The **first** matching task was K.A. **listening** and **pointing** to **match** letters, days, months, and images.



- The **second** matching task was K.A. **seeing** and **pointing** to **match** letters, days, months, and images.


- The **third** matching task was K.A. **listening** to **words** and **pointing** to the **matching** picture


- The **repetition** task was K.A. **listening** to a **word** and **repeating** it.

- The **writing** task was K.A. **listening** to a word and then **writing** it down.

- The **comparison** task was K.A. **picking** which **number** or **day** he heard **first**.

- Because **number** words are **different** and **easy** to **remember**, his **third task** included **words** that were also **different** and **easy** to remember.


Experiment 2 Results

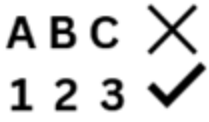
- K.A. did **good** for **number** tasks.


- K.A. made **mistakes** with **letters**, **days**, **months**, and **pictures**.



- K.A. was **better** at **reading** and **matching** than **listening** and **matching**.


- K.A. was **better** at **repeating number** words than **letters**, **days**, and **months**.

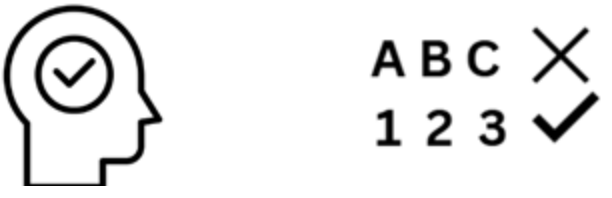



Discussion

- K.A. had **trouble** with **listening** to understand but was **good** at **reading** and understanding.

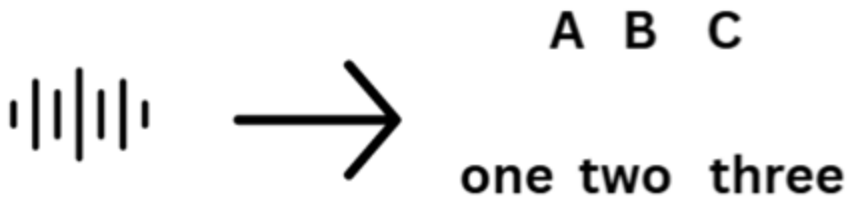
- For **number** words, K.A. was **good** with **both listening** and **reading** to understand.

- All the **tests** show that K.A. has **trouble hearing** and **understanding words** but can **hear** and **understand numbers well**.



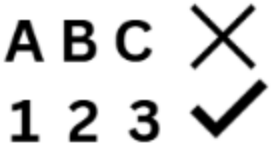
- K.A.'s study is **important** to **show** that the **brain** has special **parts**, separate for **numbers** and **words**.

- One **idea** says that the **brain** uses **small sounds** to understand all words **including numbers**.



- Another **idea** says that the **brain** uses "*building blocks*."
  - **Building blocks** are when the **brain** uses other **words** to **understand** a **word instead** of using **sounds**.

- K.A. **shows** us that his **building blocks** for words might be **broken** but **not** for **numbers**.



- K.A. might be **good** at **understanding words** that have **number sounds** in them but was **not** tested.