What the heck is QALMRI?

Adapted from https://www.crumplab.com/ResearchMethodsLab/qalmri.html

Reading primary research

Breadth vs **Depth**

- Textbooks give a bird's eye view of psycholinguistics
- Research articles focus on many important details

Course goal: To give you skills to help you read and interpret primary research articles in psycholinguistics/cognition/psychology/cognitive science

How to read journal articles?

- Confusing
- Takes forever
- Too long
- Technical language is confusing
- What are the questions?
- How to interpret the result?
- Usually not written for a general audience

QALMRI

QALMRI is an acronym and method for identifying and understanding major components of primary research articles

- Questions
- Alternatives
- Logic
- Method
- Results
- Inferences

Let’s check out the paper

Psychonomic Bulletin & Review
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Warning: This keyboard will deconstruct— The role of the keyboard in skilled typewriting

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Skilled actions are commonly assumed to be controlled by precise internal schemas or cognitive maps. We challenge these ideas in the context of skilled typing, where prominent theories assume that typing is controlled by a well-learned cognitive map that plans finger movements without feedback. In two experiments, we demonstrate that online physical interaction with the keyboard critically mediates typing skill. Typists performed single-word and paragraph typing tasks on a regular keyboard, a laser-projection keyboard, and two deconstructed keyboards, made by removing successive layers of a regular keyboard. Averaged over the laser and deconstructed keyboards, response times for the first keystroke increased by 37%, the interval between keystrokes increased by 120%, and error rate increased by 177%, relative to those of the regular keyboard. A schema view predicts no influence of external motor feedback, because actions could be planned internally with high precision. We argue that the expert knowledge mediating action control emerges during online interaction with the physical environment.

Question

- All research begins with a question, and the point of the research is to answer it.
- There are usually 2 levels of questions: the **big question** and the **specific question**.

Broad questions

- might be vague, implied
- are typically too general to answer in a single experiment
- provides the general topic of the paper, and can only be answered through compiling many experimental results.

Specific question

- can typically be addressed in a single experiment or set of experiments.

Questions example

- **Big question:** The broad questions center on how people comprehend and represent the relationships and positions of objects in their surroundings (spatial cognition). Do individuals have mental "maps" of where objects are located?

$\Rightarrow$The paper does not respond any of it!!

- **Specific question**: How does tactile feedback from the keyboard influence typing performance? (How does the touching the keys influence typing performance?)

Alternatives

- Good experiments consider **at least 2** possible alternative answers to a specific question and explain why both answers are plausible.
- There are always at least 2 alternatives: that factor X will show an effect, or that it won’t (that a null result will be obtained). If possible, identify other alternative patterns as well.

=> Different ways of answering the question (usually there is always a yes-effect/no-effect response)

Alternatives example

1) Typists have an **internal cognitive map** of the keyboard. The cognitive map represents the location of the keys on a computer, and typist use the internal mind map to direct their fingers to appropriate locations while typing.
2) Typists do not have a map-like representation, instead they rely on learned **associations** between cues such as the feel of the keyboard to guide their fingers during typing

Logic

- The logic identifies how the experiment design will allow the experimenter to distinguish between the alternatives.

- If alternative 1 is correct, THEN when a particular variable is manipulated, participants behavior should change in a certain way.
- If alternative 2 is correct, THEN …

=> Refer to the dependent (measured) variable (e.g., reaction time, looking time)

Logic example

1) If typists use an **internal cognitive map** that does not require feedback from the keyboard to guide their fingers, THEN typing performance should not be influenced by manipulations that remove tactile feedback, such as typing on keys vs a flat surface.

2) If typist use **feedback (learned associations)** from the keyboard to guide their fingers, THEN typing performance should be influenced by manipulations that remove tactile feedback, such as typing on keys vs a flat surface.

Methods

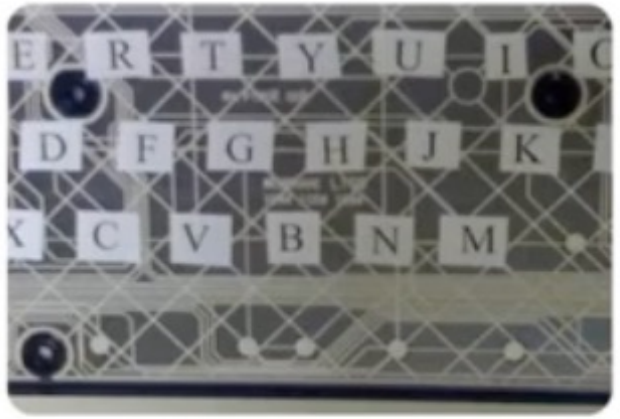
- This section identifies the **procedures** that will be used to implement the logical design. It should state:
  - the independent variable (the factor being experimentally manipulated)
  - the dependent variable (the behavior being measured) of the experiment.
  - subjects, including whether subjects were divided into groups receiving different experimental manipulations.
  - materials were used to conduct the experiment
  - what were the experimental stimuli like?
  - what was the procedure/task?

Methods example

- **Dependent variable:** Typist speed and accuracy (DV)
- **Independent variable:** four different keyboard - systematically remove tactile feedback

Regular

Buttons



Flat

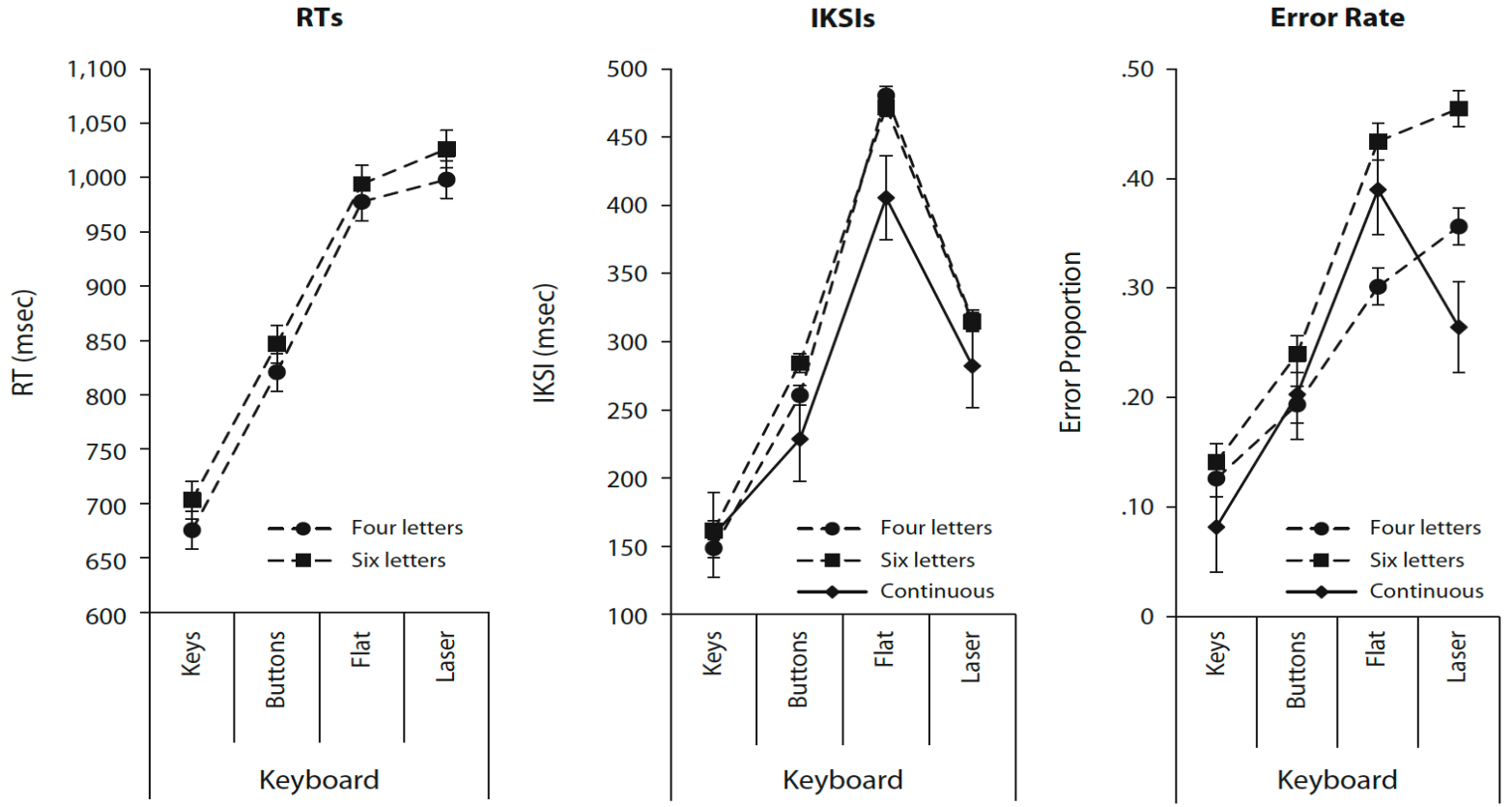
Laser

Results

- What was the outcome of the experiment? Describe the results of the primary measures of interest.
- Did different subject groups yield different group means? What were these means?
- Did the entire subject population produce a distinctive pattern of responses? Describe that pattern.
- For this section, it is often a good idea to use graphs or tables to illustrate the pattern of data you obtained.

Results example

- Typist were fastest and most accurate on a regular keyboard, and always slower and less accurate on the keyboard with less tactile feedback.



Inferences

- What can the results of the experiment tell us about the alternatives? If the study was well designed, the results should allow you to eliminate at least one of the possible alternatives.

Inferences example

Alternative 2: Typists do not have a map-like representation, instead they rely on learned **associations** between cues such as the feel of the keyboard to guide their fingers during typing

Result: Reducing tactile feedback from the keyboard caused slower and more error-prone typing.

Inference: Typists do not rely on an internal map of the keyboard, especially one that doesn’t rely on feedback from the keys.

Inferences continued

- Any potential problems with the experiment that could have explained the results? Any confounds?

- Problems during data collection?

- What is the hypothetical next step, if you were to conduct a follow up, what would it be?
- What next specific question remains unanswered?
- What new questions do the results raise?

Finding the QALMRI sections:

The basic parts of an APA manuscript are

1. **Title** - Offers clues about the big idea and finding
2. **Abstract** - Usually a useful summary of the whole research.
3. **Introduction** - Big questions are usually near the beginning, specific questions are usually in the middle. Alternatives (or Hypotheses) and Logic are usually just before the Experiment, and sometimes in the short introduction to the experiment.
4. **Methods** - a whole section devoted to the M part
5. **Results** - a whole section devoted to the R part
6. **Discussion** - Usually provides a summary of the main important finding right at the beginning
7. **General Discussion** - Should connect the main finding to the hypotheses and questions under investigation

Your turn

PNAS PNAS PNAS

Russian blues reveal effects of language on color discrimination

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English and Russian color terms divide the color spectrum differently. Unlike English, Russian makes an obligatory distinction between lighter blues (''goluboy'') and darker blues (''siniy''). We investigated whether this linguistic difference leads to differences in color discrimination. We tested English and Russian speakers in a speeded color discrimination task using blue stimuli that spanned the siniy/goluboy border. We found that Russian speakers were faster to discriminate two colors when they fell into different linguistic categories in Russian (one siniy and the other goluboy) than when they were from the same linguistic category (both siniy or both goluboy). Moreover, this category advantage was eliminated by a verbal, but not a spatial, dual task. These effects were stronger for difficult discriminations (i.e., when the colors were perceptually close) than for easy discriminations (i.e., when the colors were further apart). English speakers tested on the identical stimuli did not show a category advantage in any of the conditions. These results demonstrate that (*i*) categories in language affect performance on simple perceptual color tasks and (*ii*) the effect of language is online (and can be disrupted by verbal interference).

categorization | cross-linguistic | Whorf

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