# Traditional research designs versus intensive longitudinal designs

## Modeling Intensive Longitudinal Data

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# 1. Cross-sectional design

Cross-sectional research consists of a **single snapshot** of a sample of individuals.

Schmitz and Skinner (1993, JPSP) studied **academic performance** in 9- to 12-year-olds.

**Cross-sectionally (i.e., nomothetic):**

- children who experience **more control**, put in **more effort**
- children who put in **more effort**, **perform better**
- children who **perform better**, **evaluate their performance more positively**
- children who **evaluate their performance more positively**, experience **more control**

# Nomothetic versus idiographic

Does this **reflect** the process at the within-person level?

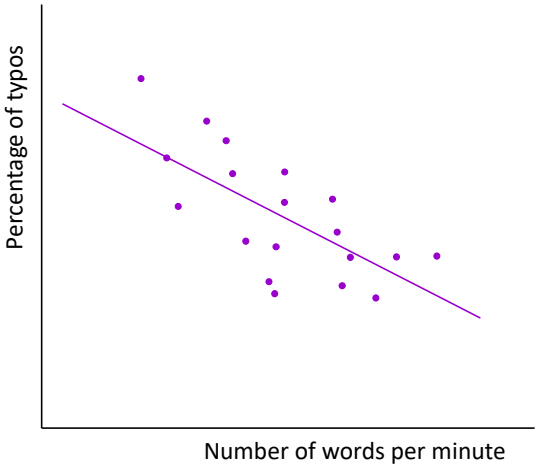
**Process:**

- Does experiencing more control **lead to** putting in more effort?
- Does putting in more effort **lead to** better performance?
- Does performing better **lead to** a more positive self-evaluation?
- Does a positive self-evaluation **lead to** the experience of more control?

Using TSA on N=1 data Schmitz and Skinner concluded that:

- some children have a pattern **similar** to the cross-sectional results
- some children have **very different** patterns

# Generalization slip (aka ecological fallacy)



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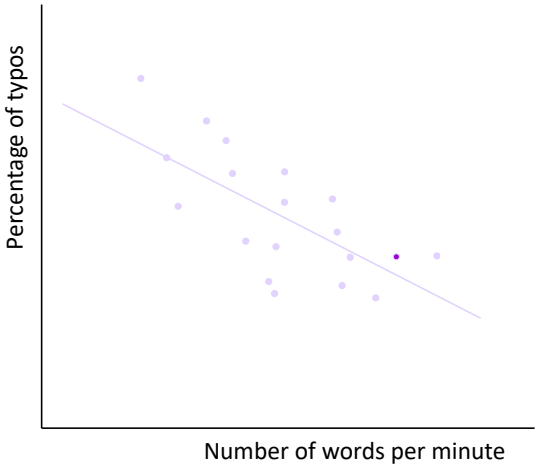

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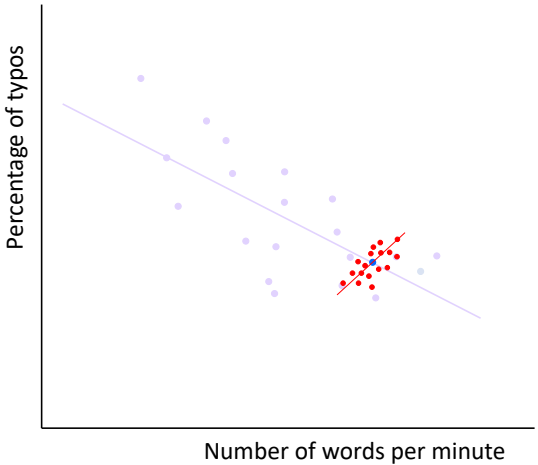

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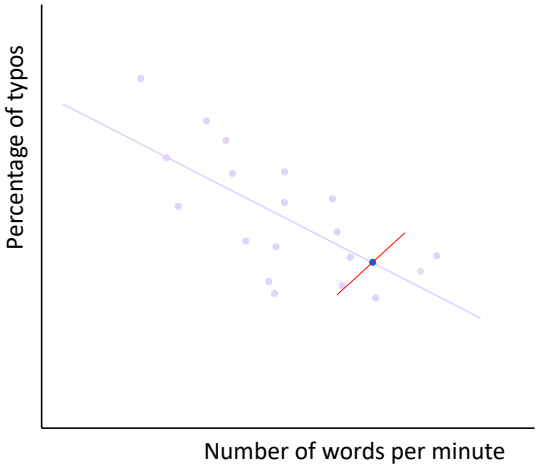

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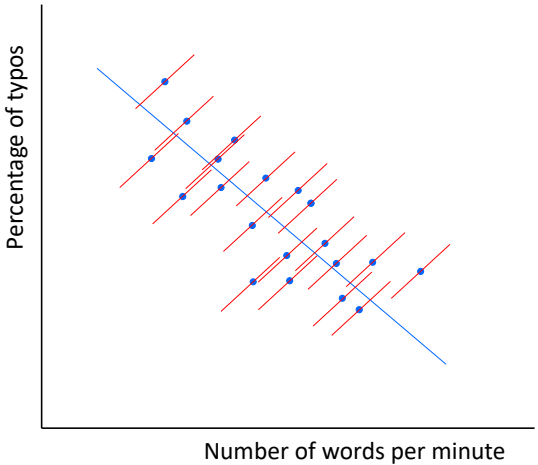

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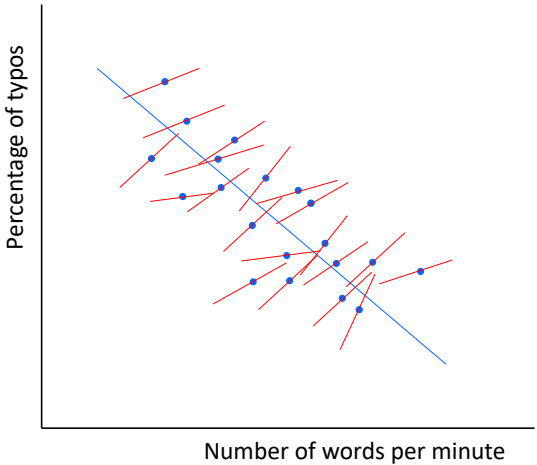

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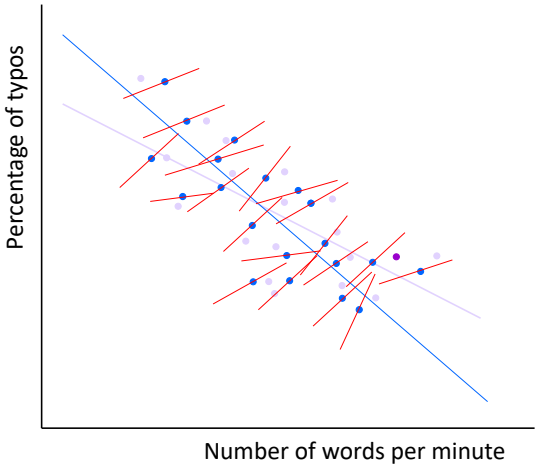

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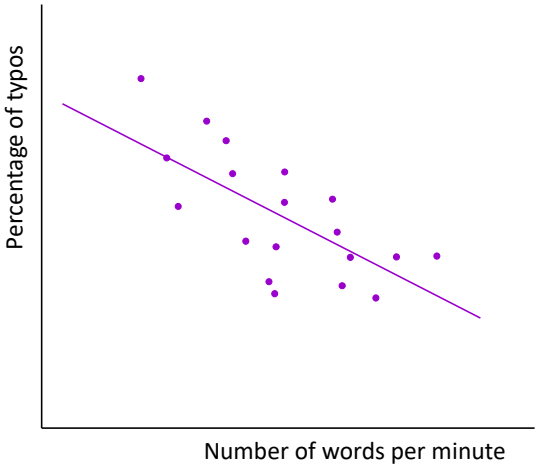


# Limitations of cross-sectional research

Cross-sectional research is

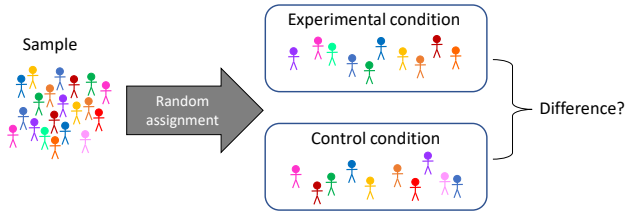
- concerned with **characteristics of the population**
- useful for **selecting** individuals

Cross-sectional research is **not suitable** for studying

- processes and (causal) mechanisms
- individual differences in processes and (causal) mechanisms

Note: If we cannot generalize from the individual to the population, then we cannot generalize from the population to the individual.

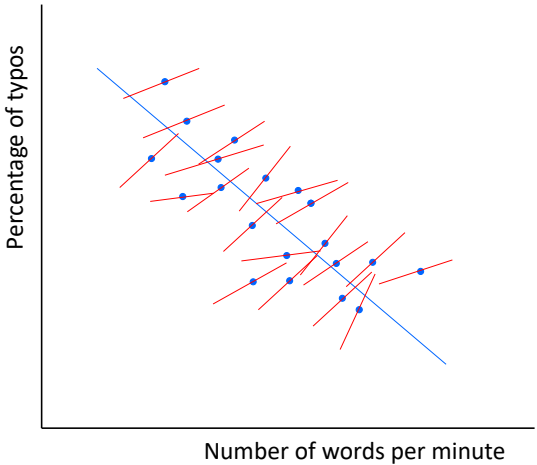
# 2. Experiment al design (aka randomized controlled trial)




**Premise**: Random assignment ensures the groups **are the same** prior to the intervention; hence, mean differences between the groups after intervention **must** stem from the intervention.

Difference in group means is the **average causal effect**.

# Typing example



# Limitations of RCTs

Random assignment is not always **possible** or **ethical**:

- what is the effect of postnatal depression on children's development?
- how do everyday stressors affect physiological processes?
- how does workload spill over into family life?

Also, experiments often focus on

- a **static outcome** of process
- a process that is completed at a **short timescale** (minutes, hours)
- the **average causal effect** (or: average treatment effect)

# 3. Panel design

Panel data consist of **a few snapshots** of the same people.

Panel research is often used to

- investigate (developmental) **trends** (e.g., growth curve modeling)
- investigate **dynamics** (e.g., cross-lagged panel model)

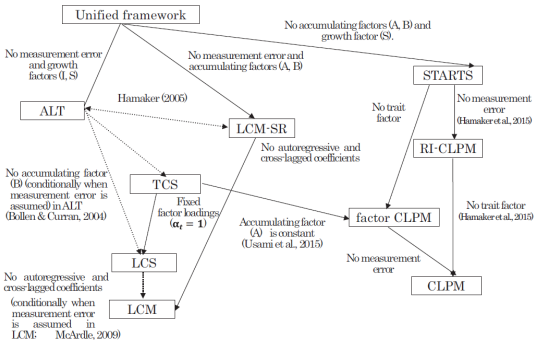



Figure 2 from Usami et al. (doi: 10.1037/met0000210)

# Limitations of panel research

Panel research is often characterized by

- large time intervals between measurements; this makes it **hard to see the actual dynamics** of the process
- only a few measurements per person; this makes it **hard to study individual differences** in the dynamics

# Summary

**Strengths** of traditional research methods:

- Cross-sectional research is appropriate for description and selection
- Experimental research is appropriate to study the average causal effect
- Panel research is appropriate for describing global trends

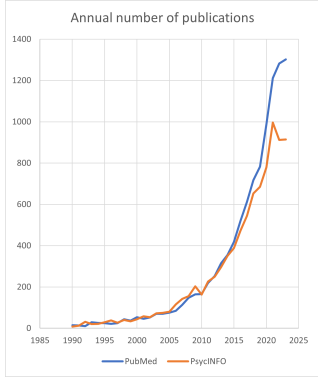
These techniques are **not appropriate** for:

- gaining insight in the momentary dynamics of everyday processes
- investigating the idiographics of such processes
- forecasting at the individual level

# Intensive longitudinal design (ILD)

**Diverse forms**:

- daily diary (DD)
- experience sampling method (ESM)
- ecological momentary assessment (EMA)
- ambulatory assessment (AA)
- real-time data capture (RTDC)
- event-based measurements
- observational measurements

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# Advantages

**Strengths of ILD**:

- compared to retrospective questionnaires: little/no recall bias
- compared to lab experiments: much longer time spans possible
- ecological validity is high
- monitoring/feedback as part of eHealth

And it forms a window into **underlying dynamics**, and how these may **differ across individuals**.

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