## FROST, ARMSTRONG, & CHRISTIANSEN (2019) PSYCH BULL.

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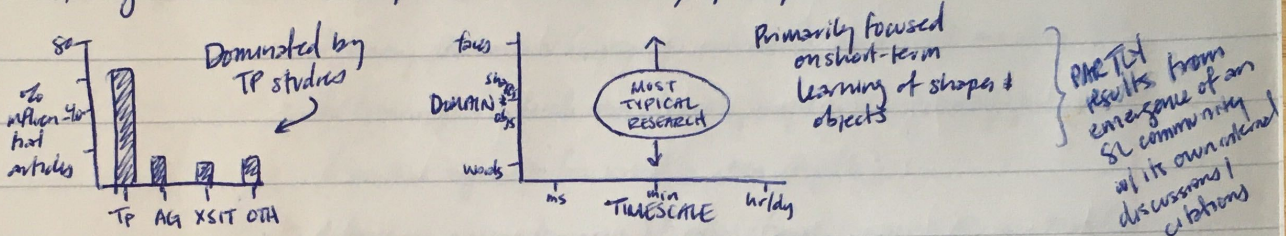
A critical look at the state of SL research & suggested directions forward

**A LOOK BACK** 1996–2016 (influential experimental SL studies)

Immense growth since Saffran et al.'s (1996) article, far outpacing other fields of cognitive science (e.g. attention, memory, perception)




In brief: explosion of SL work, but much addresses questions very close to those raised in the initial study

(NB: lots of exceptions! e.g. spatial variants, lower TPs, NT kids, non-human animals, adaptations of AGL, etc.)

* Many replications & variants is good for scientific certainty but less good for robust theoretical constructs due to the limitations of individual types of evidence. We for sure have new existence proof that these can be learned.

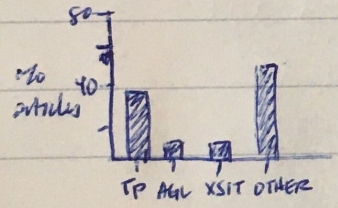
~ UNITARIAN vs. PLURALIST PERSPECTIVES on SL ~

* UNITARIAN view focuses on commonalities across domains but may lead to / be limited to fuzzy / abstract theories absent more specific common denominators between domains (e.g. neurocognitive implementations, behavior over time)
* PLURALIST view focuses on differences between domains to get closer to specific mechanisms, (but may miss fundamental commonalities across domains) for example looking at what unique regions of the brain are activated for some SL tasks but not others
* EVIDENCE AGAINST FULL UNITARIAN VIEW? Lack of stable cross-modality SL indiv. diffs, limited cross-modality transfer, modality specific activity in cognitive studies...

"TAUTOLOGY PROBLEM" ↑ Tasks focus on tasks that "work" according to preconceived notions

* A major barrier: limited ecological validity, e.g.:
  - learners typically have access to more than TP info & learning in these contexts may occur on the basis of that other info
  - most past studies used extreme TP differences (e.g. TP=1 w/i words) but many phenomena (language included) have much smaller TPs, the learning of which more strongly implicates memory processes (similar argument for variable stim length)
  - A focus on passive learning of novel stimuli ignores the joint roles of attention & prior experience (which may also shape each other)

## A LOOK @ PRESENT SL RESEARCH — 2016-2018 experimental SL studies




CHANGES: More diverse (non-TP) paradigms, more neuro work, more auditory work not based on speech syllables, more work on non-NT populations

SIMILARITIES: Extreme TP diffs, uniform-size learning chunks, 2AFC measure of learning, rate of non-human animal work

## THE COMPLEX LEARNING ENVIRONMENT?

How to learn from the many sources of environmental regularities?

ATTENTION? INFORMATIVENESS? ~ COMMUNICATIVE VALUE, UNCERTAINTY REDUCTION

MULTIPLE/COMPLEX REGULARITIES? ~ CUE COHERENCE/OVERLAP, SEQUENTIAL INTERFER.

## THE MORE REALISTIC LEARNER?

How to use past experience when learning new things/updating representations?

PRIOR RELEVANT EXPOSURE? ~ NARROWING EFFECTS on LEARNING

LONG TERM ASSIMILATION? ~ FIT w/ ACCUMULATED INFO

## INCORPORATING SL INTO OTHER DOMAINS?

DOMAIN SPECIFIC REGULARITIES/CONSTRAINTS (e.g. reading, face perception) ~ SPECIFIED IMPLEMENTATIONAL THEORIES

IMPLICIT vs EXPLICIT ~→ ATTENTION'S ROLE IN SL (INFORMED BY ATTN. RESEARCH)

(SENSITIVITY ≠> RETENTION)

FAST LEARNING / SLOW ASSIM & OUTCOMES ~ INTEGRATE CONSOLIDATION ≠ MATURATIONAL CHANGE

PATHS FORWARD?

* ONLINE (NOT OFFLINE) LEARNING MEASURES (e.g. w/ recall, RT, EEG)
  ↳ TEST w/ RELEVANT PROCESSING CONTEXT

* MORE WORK ON INDIV DIFFS BREAKING OUT SHARED & NON-SHARED COMPONENTS of SL

* MORE USE of MODELS TO EXPLAIN EMPIRICAL DATA, BUILD IN COMPLEX CONSTRAINTS, & CONCRETIZE PROPOSED MECHANISMS / HYPOTHESES.

WRT METHODS, WHAT IS THE IMPORTANCE of CONTINUITY (e.g. in comparing infants & adults) & WHAT THEORETICAL ISSUES ARE INVOLVED? CAN WE COMPARE?