3055

Physical Retrieval Dynamics of Unexpected Fluent Processing

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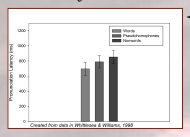
Fluency and Familiarity

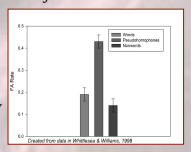
- Fluent processing often produces strong feelings of *familiarity* (1;2).
  - ✧ Familiarity produced by fluency is often mistakenly attributed to prior experience.
  - ✧ In memory, this attribution process yields inflated **false-alarm rates** (1;3;4).
- Fluency can be measured with pronunciation latency (5).



- ✧ Word pronunciation latency is shorter than latencies for pseudohomophones (e.g., MEWSIC, HOWCE) and nonwords (e.g., HENSION).

The Role of Expectations

- You never experience nagging familiarity upon seeing your spouse in the kitchen (6).
  - ✧ You do, however, have these experiences when seeing familiar people *out of context*.
- The *unexpected* realization that MEWSIC has meaning elicits an internal discrepancy.
- ***Discrepancy-attribution***: Unconsciously attributing fluency to a source in the past.
  - ✧ Increased FA rates (7;8).

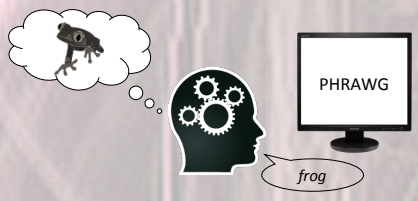


Selective Construction and Preservation of Experience (SCAPE) Framework

- SCAPE proposes that recognition decisions are the outcome of two stages (9):

1) Production

- ✧ The individual generates a mental representation of the current stimulus.



2) Evaluation

- ✧ The individual *evaluates* the efficiency, or quality, of production.

- When fluency is expected, evaluation should be rapid.
- When fluency is *unexpected*, evaluation should be exhaustive.

Abstract

Inexplicable perceptual fluency often evokes feelings of familiarity, leading observers to interpret fluency as an indication of past experience. This discrepancy-attribution process (Whittlesea & Williams, 2001) is a central component of the Selective Construction and Preservation of Experience (SCAPE) framework (Whittlesea & Williams, 1998). SCAPE suggests that recognition memory entails two stages: (1) *Production* of mental states, (2) *Evaluation* of the success and efficiency of the Production stage. The current experiments used dynamic mouse-tracking to investigate the time-course of fluency effects within the SCAPE framework (Whittlesea, 1997; Whittlesea & Williams, 1998). Across experiments, participants studied words, pseudohomophones (e.g., kanser), and nonwords. During subsequent recognition or lexical decisions, we monitored participants' dynamic mouse movements to fluent (old) items, dysfluent (new) items, and unexpectedly fluent items (e.g., old words presented as pseudohomophones). We observed inflated false alarms for unexpectedly fluent items, and used mouse-tracking to document the time-course of these fluency effects.

The Present Investigation

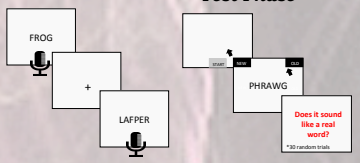
*Exactly **where**, and **how**, in the stream of processing does unexpected fluency have its effect?*

- MouseTracker (10) was used to track decisions:
  - ✧ **Initiation times**: *Production?*
  - ✧ **Area Under the Curve (AUC):** *Evaluation?*

General Method

- Right-handed, native English speakers (n = 24 in Exp 1, n = 18 in Exp 2) first completed a pronunciation task.

Pronunciation Phase ***Test Phase***



- At test, mouse movements were tracked at 70 Hz.

Experiment 1: Unexpected Fluency

- New test items were either truly new, or changed versions of studied items (see table below).

Experiment 2: Unexpected Disfluency

- All new items were truly new. NWs items were divided between Regular (e.g., ARROPHY, MICKED) and Irregular (e.g., STOWFUS, PLUNDICT).

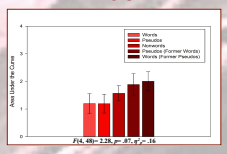
Experiment	Studied Item	Tested Item	Expected Fluency
Exp 1 & 2	Horse	Horse	Expectedly fluent
Exp 1 & 2	Plactuf	Plactuf	Expectedly disfluent
Exp 1	Bottle	Bautle	Unexpectedly fluent
Exp 1	Loyer	Lawyer	Unexpectedly fluent
Exp 1	Mewsic	Mewsic	Unexpectedly fluent
Exp 2	Docal	Docal	Unexpectedly disfluent

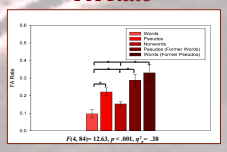
Results

Experiment 1

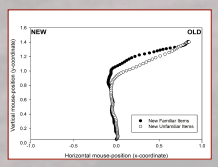
Will processing fluency affect familiarity (FA rates)? Does this effect occur during production (initiation times) or evaluation (AUC)?

AUC *FA Rate*





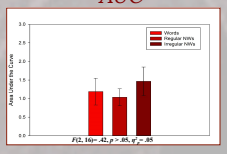
- Small effect on AUC; no effect on initiation times.
- AUC was affected by familiarity: Unexpected fluency/familiarity yielded more curved trajectories.
  - ✧ SCAPE evaluation stage.

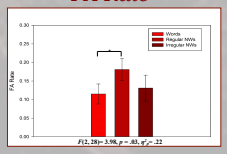


Experiment 2

How does unexpected disfluency affect memory?

AUC *FA Rate*





- No effect on AUC or initiation times.

Discussion

- Unexpected processing fluency (Exp 1), or *disfluency* (Exp 2), produced stronger feelings of familiarity, relative to expected fluency.
  - ✧ This was reflected in inflated FA rates, consistent with Whittlesea and Williams (1998).
- Processing fluency marginally influenced AUC (Exp 1).
  - ✧ Suggests that fluency impacts the later, evaluation, stage of SCAPE.
- Fluency did not influence the production stage of SCAPE, as reflected by initiation times (Exps 1 and 2).
- Combined, the results suggest that unexpected fluency produces an exhaustive *evaluation* of the production process, without influencing production itself.
- Unanswered questions for future research:
  - ✧ *People are usually not in "encoding or retrieval mode" (11). Is the memory task required?*
  - ✧ *Can participants recollect the change, and is this masking effects?*

References are available on handout:

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