Orthographic learning allows fast word recognition and fluent reading. A complete computational model of word learning should:

1. Correctly decode most novel words.
2. Decode better when the phonological form is previously known.
3. Learn even when decoding is incorrect.
4. Learn better when the phonological form is previously known.

**Background**

- Orthographic learning allows fast word recognition and fluent reading (Castles, 2018).
- Self-teaching theory: successful phonological decoding of novel written words enables orthographic learning (Share, 1995).
- Self-teaching computational models: prior knowledge of the word’s phonological form necessary for successful learning (Ziegler, 2014; Pritchard, 2018).

**The BRAID-Acq model of reading acquisition**

BRAID-Acq is a probabilistic model, an extension of the BRAID (Phénix, 2016), BRAID-Learn (Ginestet, 2022) and BRAID-Phon (Saghiran, 2020) models.

**Materials and Method**

- List of 4-to-10 letter words, randomly selected from a French lexicon.
- Orthographically novel words (i.e., excluded from the orthographic knowledge).
- Phonological novel or known words (i.e., excluded or not from the phonological knowledge).

**Simulation**

- Stimulus decoding until a termination criterion (on letter perception) is met.
- After each of the 5 exposures, orthographic and phonological learning occurs.

**Measures**

- Decoding rate:
  - Successful if identical to the stimulus lexical phonological form.
  - Recognition of the correct phonological form:
    - Corresponding either to the stimulus lexical form (when known) or to the newly created phonological lexical form (when novel).
  - Processing time.

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**Results**

- **Phonological probability**
  - No phonological form.
  - Known phonological form.

- **Iterations**
  - Decoding rate:
    - Novel: 82%
    - Known: 98%
    - Incorrect: 18%
    - 2%

- **Successful**
  - Most words successfully decoded.
  - Words better decoded with known phonological knowledge.

- **Decoding rate**
  - Recognition of the “correct” phonological form.
  - Recognition of the incorrect phonological form.

- **Learning even when decoding is incorrect**
  - Faster learning with phonological knowledge.

**Conclusion**

- **BRAID-Acq** decodes most novel words successfully.
- Prior phonological knowledge improves decoding.
- The absence of prior phonological knowledge does not prevent orthographic learning (creation of a new phonological form).
- Novel words can be learned even when decoding is incorrect (by either associating the new orthographic form with the stimulus phonological form or creating a new phonological form).
- Overall, BRAID-Acq accounts for a wider diversity of learning situations than previous self-teaching computational models.

**References**