THE SQUIRREL TEST: COMPETING FORMS FOR NEOLOGISMS IN INTERACTION

Institute for Language Sciences (ILS), Utrecht University
Jiayi Zhou & Madalina Zgreaban

HOW DOES MEANING FIND ITS FORM?

Text: The squirrel family makes cookies, squirrel homemade cookies (SHC), which are becoming popular among young people. These cookies are also called **ksiksipis** in the squirrel language, and people also call them **squirrellers**, **squicookies** or **kolokos** (the sound of eating these cookies).

Prompt: If you want to talk about these cookies, how would you fill in the blank?

Question: -Hey! Do you know __ ?

	Examples in English	In Squirrel Test
1. Acronym	COVID	SHC
2. Lexical Borrowing	sushi	ksiksipi
3. Portmanteaus	podcast (ipod+broadcast)	squicookie
4. Morphological Derivation	blogger	squirrellers
5. "Arbitrary" coinages		koloko

(Rysikina et al., 2020)

FERRER I CANCHO AND SOLE (2003)

- Zipf's law: the principle of less effort
  - Zipf theorised that the distribution of word use was due to tendency to communicate efficiently with least effort.
- Listener and speaker utility:
  - speaker – minimizes articulatory effort, brevity, phonological reduction, will choose more **frequent** words, which are often the most ambiguous ones;
  - listener -wants forms as **explicit/specific** as possible; higher ambiguity, higher effort for the hearer.

RESEARCH QUESTIONS

For human participants

❑Are there any preferences for forms of neologisms in interaction, and especially from the speaker's side and the listener's side with/without participants?

For large language models (LLMs)

❑Do LLMs also have the same ability in pragmatic inference?

THE HUMAN EXPERIMENT

	Speakers	Listeners
Implicit Participants	If you want to talk about X, how would you fill in the blank? -Hey! Do you know___?	If you are asked about X, what would you prefer to hear? -Hey! Do you know___?
Explicit Participants	If you want to talk about X **with another person**, how would you fill in the blank? -Hey! Do you know___? -Ah, I know it.	If another person asked you about X, what would you prefer to hear? -Hey! Do you know___? -Ah, I know it.

- Participants: 30 native English speakers.
- Materials: 20 stimuli with background knowledge about the new concept, and the five neologism forms each.
- Independent variables: the condition of the stimuli (speaker or listener with implicit or explicit participants).
- Dependent variables: **the preferences on different forms of neologisms** and **the reaction time** (reflect the amount of effort taken in answering the question).
- Predictions:
  - speakers with implicit participants would prefer forms requiring less cognitive effort, like portmanteaus and morphological derivation;
  - listeners with implicit participants are predicted to favor forms that are more specific, such as lexical borrowings and arbitrary coinages;
  - when the participants are explicitly mentioned, it is anticipated that there would be a greater tolerance for medium forms.

THE LLMS EXPERIMENT

- **Debated if they can (Futrell et al, 2019; Frank et al., 2015; Willems et al. (2016) or cannot (Oh and Schuler, 2023; Arehalli et al., 2023) estimate human surprisal values.**
- **Theory of Mind: pro (Hu et al., 2022) and con (Sap et al., 2023; Trott et al., 2023). Lower than humans (Trott et al., 2023), but Hu et al (2022) show that bigger models can achieve human-like performance in many phenomena.**
- **No previous study investigating surprisal and listener/speaker differences in LLMs. Preferences for listener/speaker forms could indicate ToM abilities.**
- **Models tested: mBERT (Devlin et al., 2018), mT5 (Xue et al, 2020), GPT-3 (Brown et al., 2020), with different sizes Small mT5, Base mT5, Large mT5, XL mT5, XXL mT5, etc.**
- **Important choices: both mono/multilingual models tested.**

PROMPTING AND PREDICTIONS

Implicit participants	If a speaker would like to talk about these cookies, he would use kolokos/SHCs/squicookies/squirrellers/ksiksipis.

Surprisal: keeping the text, replacing the question by affirming the choice of one of the five forms, and calculate surprisal for each form.

- Testing: the probability of each last word of the prompt;
- Predictions: no difference in surprisal scores , given lack of evidence of ToM in LLM.
- Contrary results: more familiar ones eliciting lower surprisal in the speaker condition, and bigger one in the listener one.

REFERENCES