

# Subjecthood & Linguistic Encoding:

## Real-time Production of wh-Questions in English and Mandarin

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### 1. Introduction

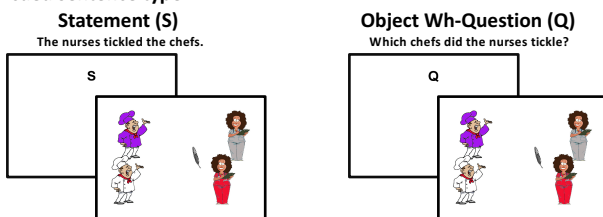
- Language production, like comprehension, is incremental<sup>[1]</sup>
- When describing an image, speakers: (1) Apprehend Scene → (2) Formulate Message → (3) Grammatically Assemble Message/Select Lexical Items → (4) Phonologically Encode Message → (5) Begin Articulation
- What factors determine where we start incrementally formulating messages?
  - Linear Accounts:** Start with most accessible lexical concept; mention that first (e.g. as the subject in English).<sup>[2]</sup>
  - Structural Accounts:** Start with subject of the sentence; insert relevant lexical concept into the 'subject slot'.<sup>[3]</sup>
  - Multi-factorial Accounts:** Production varies due to accessibility and structure.<sup>[4]</sup>
- How do we tease apart these accounts if subjects are often the first arguments in a sentence?
  - Active vs Passives: Grammatical (not thematic) roles drive message formulation, but still subject-initial.<sup>[5]</sup>
  - Free word order: Russian, Finnish<sup>[6]</sup> || Verb-initial: Tzeltal, Tagalog<sup>[7]</sup>
  - But, results complicated by discourse and/or morphological factors

### 2. Current Study

### 3. Hypotheses & Predictions

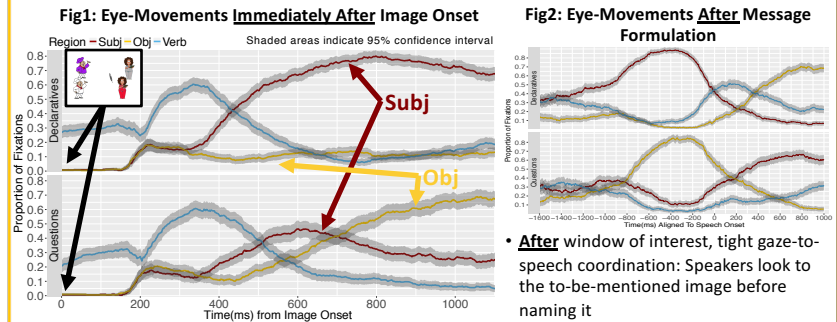
### 4. Experiment Design

- Participants **first** saw sentence type cue, **then** saw image; produced the **cued** sentence type



- Verbs indicated by instruments (e.g. feather), instrument location indicated subject character
- 33 targets; 30 fillers. Familiarization session before experiment
- To elicit object wh-questions, (1) participants only shown object wh-questions in examples and (2) told to about 'who the action is happening to'
- Measured Proportion of fixations to **subject**, **object** and **verb**, & Sub-Obj Difference Scores

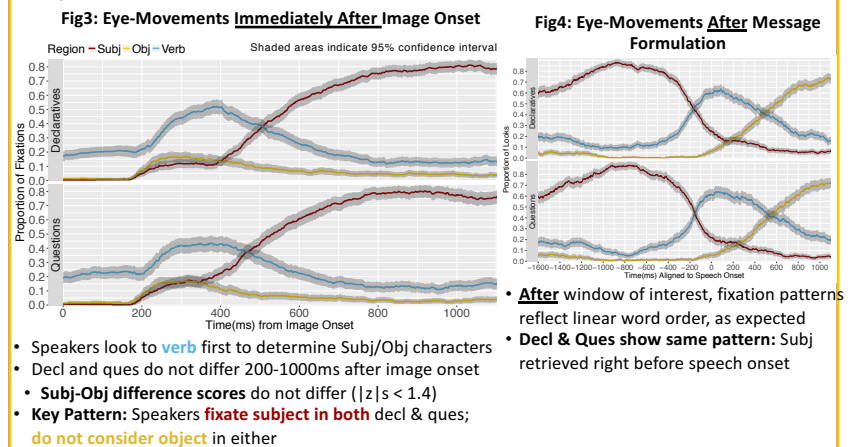
### 5. Exp 1. English: Linear Word Order vs Subjecthood



- Speakers (n=30) look to **verb** first to determine Subj/Obj
- Differences between decl & ques emerge ~400 ms, becoming significant ~600 ms
  - Subj-Obj difference scores in declaratives larger than in object wh-questions ( $|z| = 2.67$ )
- Key Pattern: Speakers look to the **subject before object** in decl & ques (~400ms), but consider the **object more in ques** than in decl
- Message formulation modulated by syntactic structure
  - Decl: Rapid rise in looks to subject only ~400ms
  - Ques: Rise in looks to subject & object ~400ms
- How do linear word order and subjecthood interact?
  - They are separable, competitive effects
  - Subjecthood is privileged over linear word order during message formulation
  - But, linear word order is not ruled out: It competes with subjecthood

### 6. Exp 2. Mandarin: Word Order vs Information Focus

- Research Questions: wh-words are informationally focused elements. To what extent did *information focus* drive competitive looks to the object in Exp 1?
  - Exp 2 (n=35) conducted in Mandarin Chinese (Subject-Verb-Object)
    - Wh-questions and declaratives have the same linear word order
- Declarative: 护士们 枪毙了 厨师。  
The nurses shot the chefs.
- Object Wh-Question: 护士们 枪毙了 哪个厨师?  
The nurses shot which chefs?



- Speakers look to **verb** first to determine Subj/Obj characters
- Decl and ques do not differ 200-1000ms after image onset
- Subj-Obj difference scores do not differ ( $|z| < 1.4$ )
- Key Pattern: Speakers **fixate subject in both** decl & ques; **do not consider object** in either

### 7. Discussion & Conclusion

- First look at real-time production of questions
- Planning is structurally incremental
- Speakers start with syntactic roles even when it conflicts with linear word order
- No evidence covert dependencies formulated in the same way as overt dependencies
- No evidence information focus affects eye-movements during message formulation; Exp 1 results not confounded by focus
- In line with prior work showing relatively 'late emergence of discourse-pragmatic effects in production'<sup>[8]</sup>

#### Message Formulation is Multi-Factorial

Subjecthood is privileged

Subject

But not all in the same way

Some other factors can still play a role

Agent

Linear word order

Information focus?

### References

REFERENCES: [1] Levelt, 1989; Bock and Levelt, 1994 [2] Gleitman et al., 2007; Brown-Schmidt & Konopka, 2008 [3] Griffin & Bock, 2000 [4] Kuchinsky, 2011; Konopka, 2012 [5] Griffin & Bock, 2000 [6] Myachykov et al., 2011 [7] Norcliffe et al., 2015; Sauppe et al., 2013 [8] Ganuscak et al., 2014, 2017

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