

# Visual World Paradigm: Exploring anticipatory language processing

2018 NTU-UT Linguistics Festa

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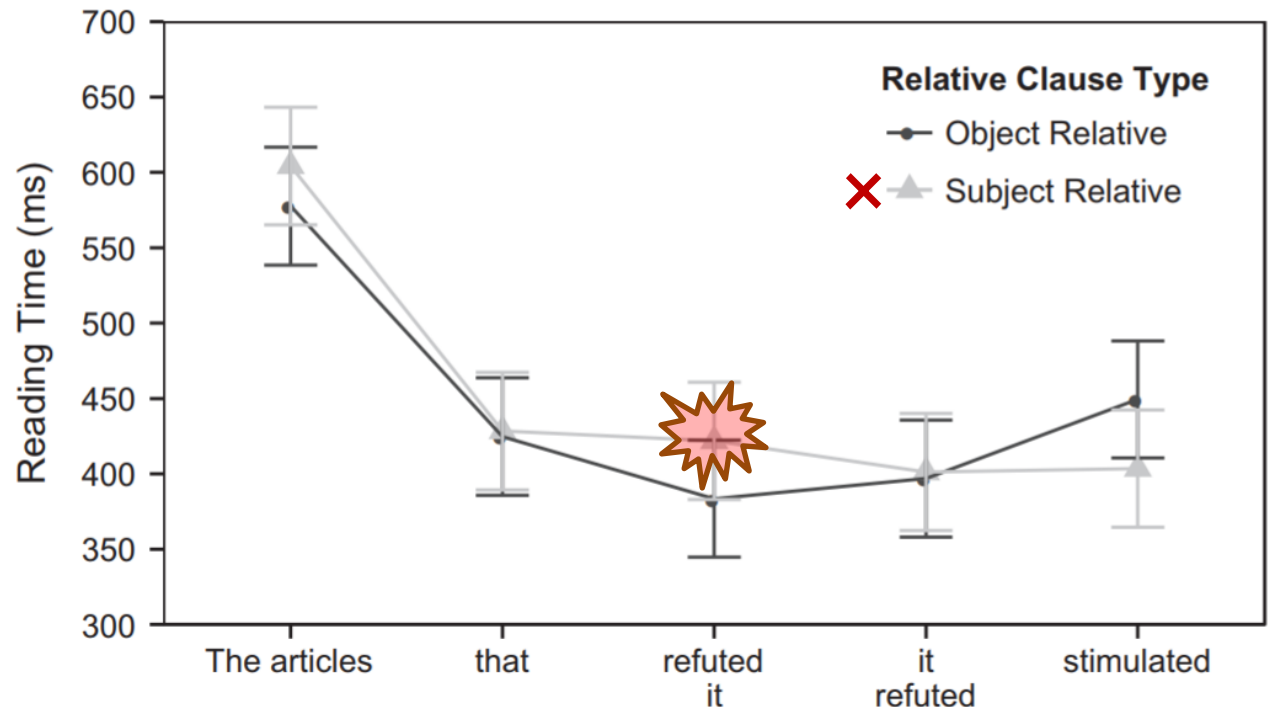
# Map

- Brief introduction (10:00-10:40)
  - Why visual world paradigm?
  - Framework of recording machines
  - Short experiment demo
- Step by step analysis (10:50-12:30)
  - Segment data trimming
  - Graphing
  - Statistics

# **WHY VISUAL WORLD PARADIGM?**

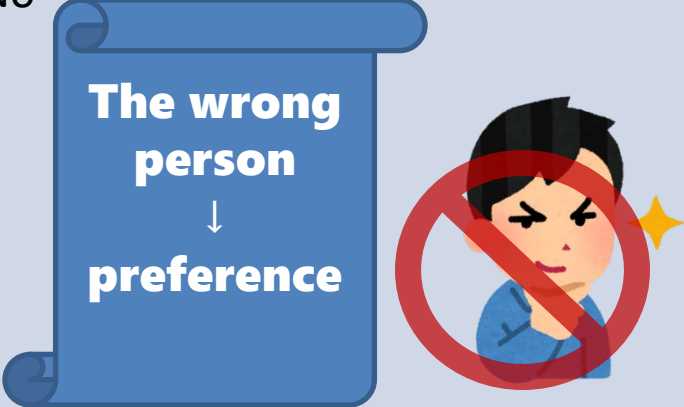


# Self-paced reading

- “The experiment was very controversial.”
  - (a) | The articles | that | refuted | it | stimulated | the debate | in | the academic community.
  - (b) | The articles | that | it | refuted | stimulated | the debate | in | the academic community.

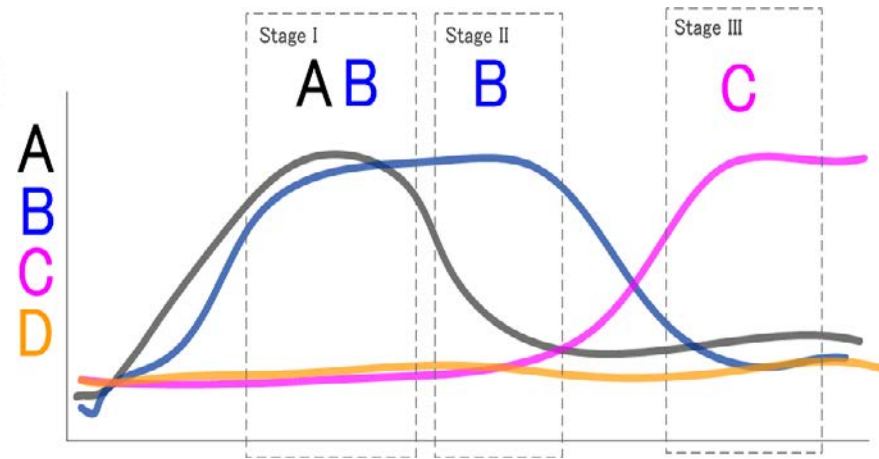


- Reading cost
- × preference
- time course

# More reality?

Method	The type of question
Self-paced reading	Yes/No 
	Multiple choices 

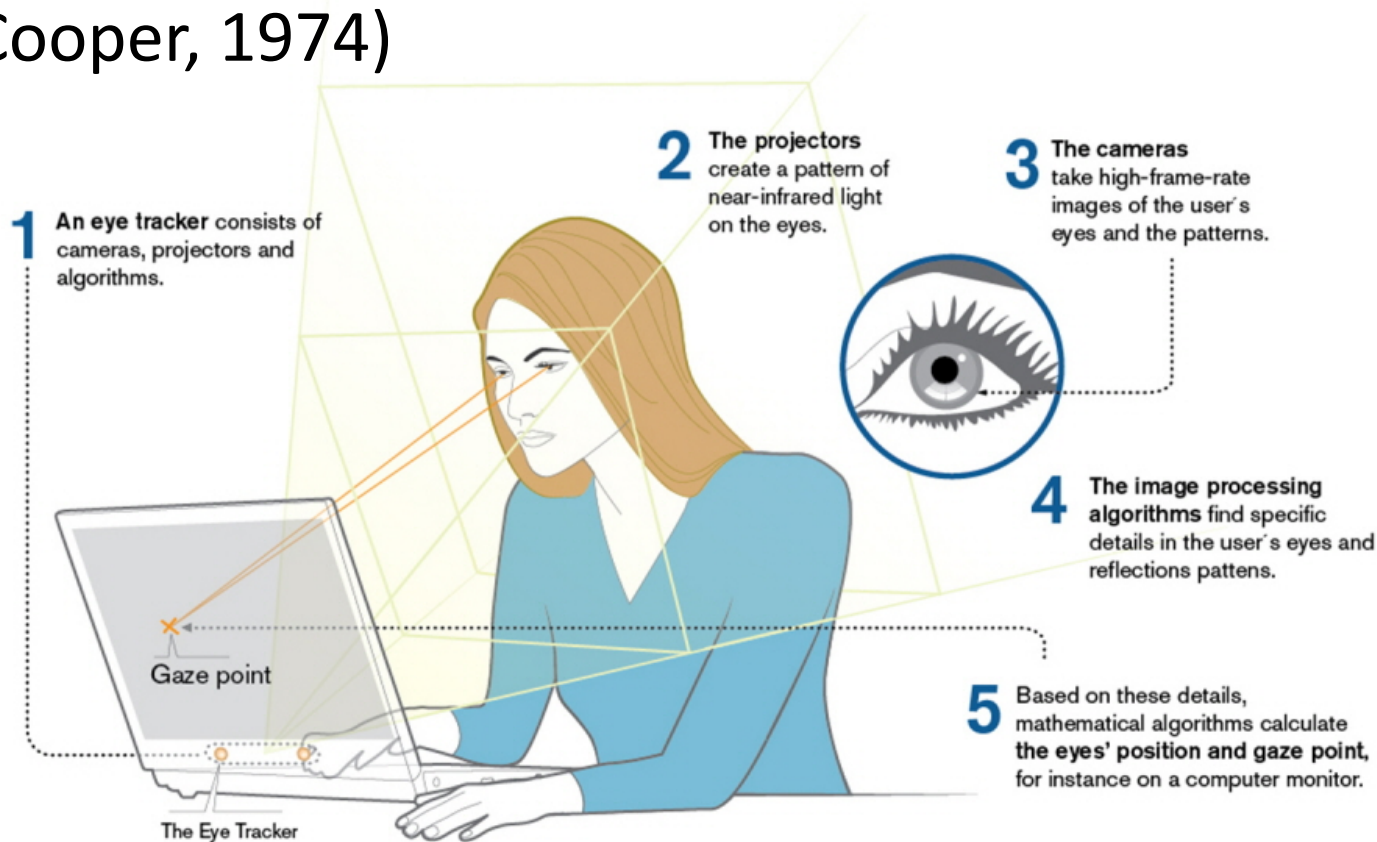
# Which guy is better for me?



- ABCD → (I) AB → (II) B → (III) C
  - ??(I) black hair → (II) wax → (III) perm
  - ??(I) white collar → (II) younger → (III) funny

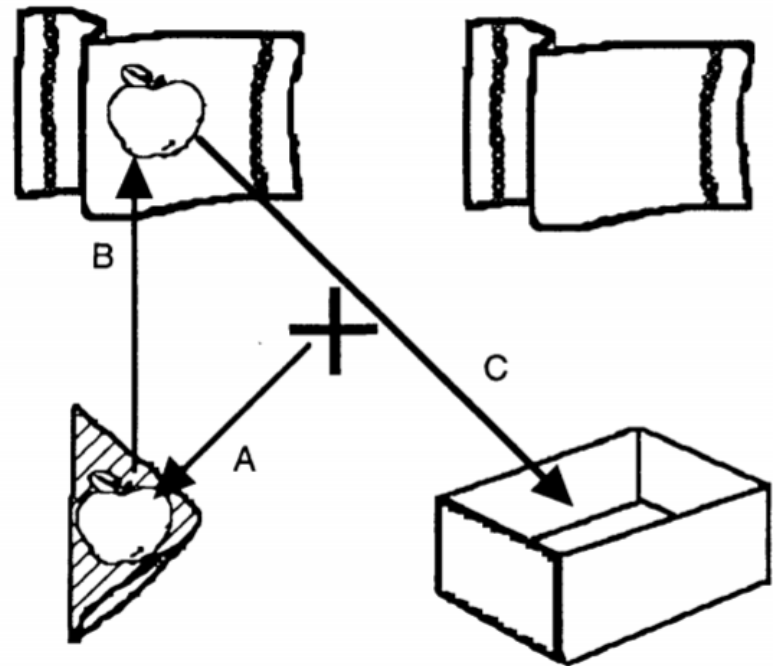
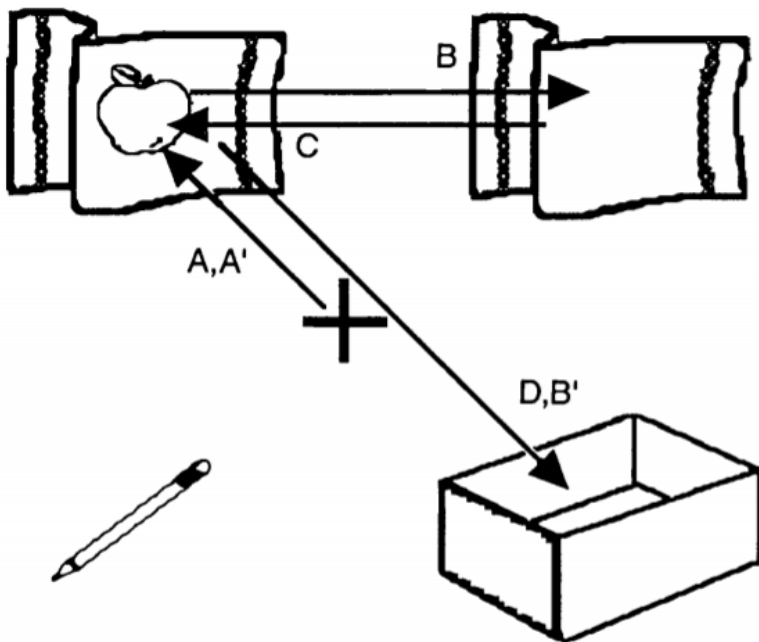
# Eye-movement reflects **prediction**

- Spontaneously direct sight to elements which are most closely related to the meaning currently heard (Cooper, 1974)



# Tanenhaus et al. (1995)

- “Put the apple on the towel in the box”
  - **Comparison** between napkin and towel **helps** processing

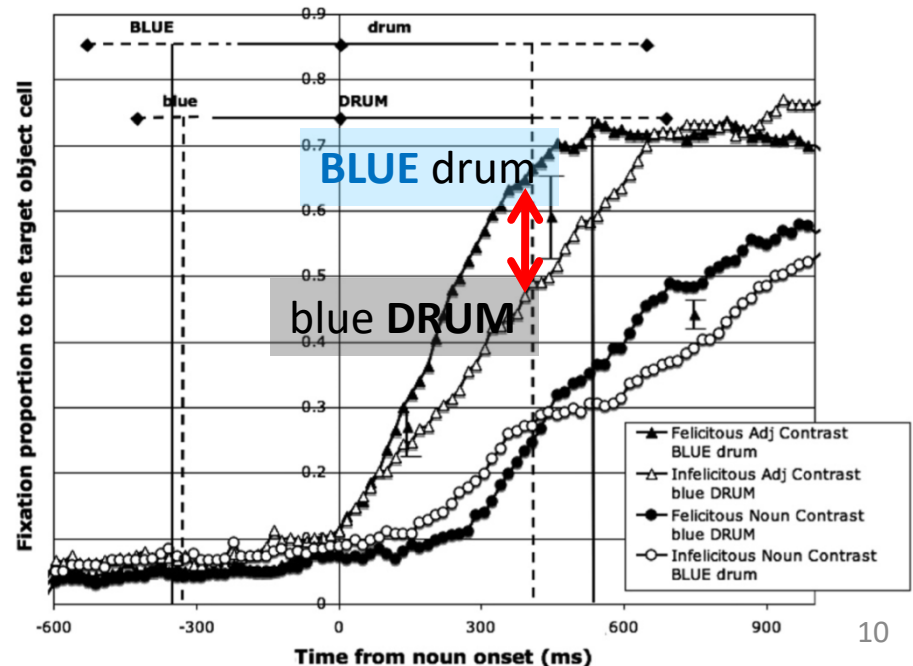




**MORE EXAMPLES**

# Ito & Speer (2008)

- Contrastive pitch accent
- “Hang the green drum.”
  - (a) “Now, hang the **BLUE** drum”
  - (b) “Now, hang the blue **DRUM**”



# Hirose & Mazuka (2015)

- Compound Accent Rule in Tokyo Japanese
- Single: Mikan “orange”
- Compound: Mikan-risu “orange-squirrel”
- “Mikan....” → more looks on compound nouns  
(before head “-risu” is encountered)

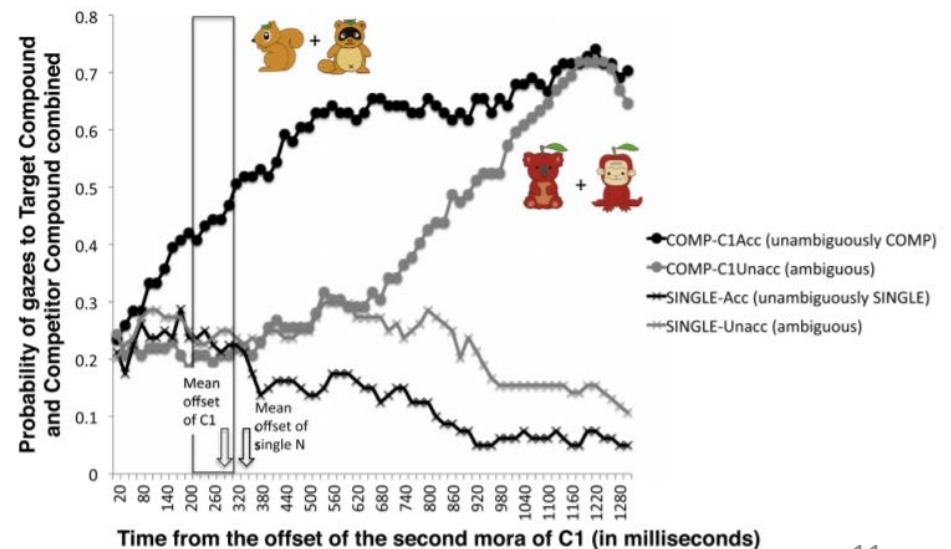
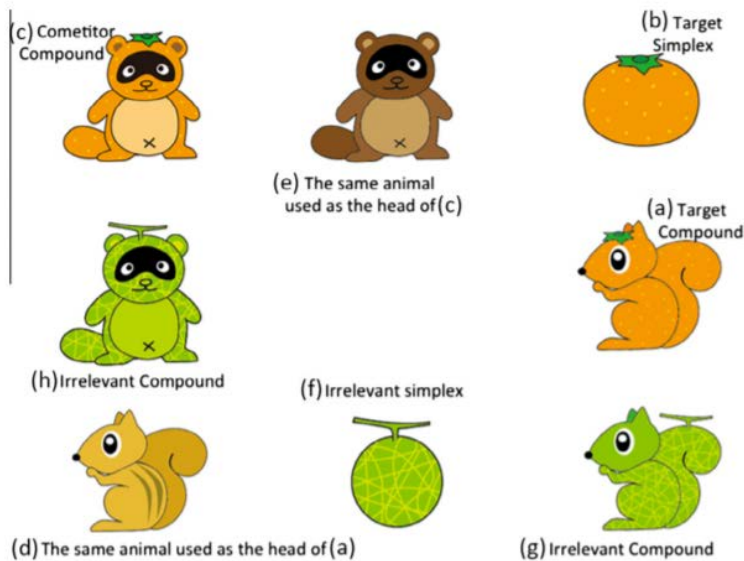


Fig. 1. A sample visual display for the sentence *Mikan-ri-su wa do-re?* 'Where's the tangerine-squirrel?'

# Chen et al. (2016)

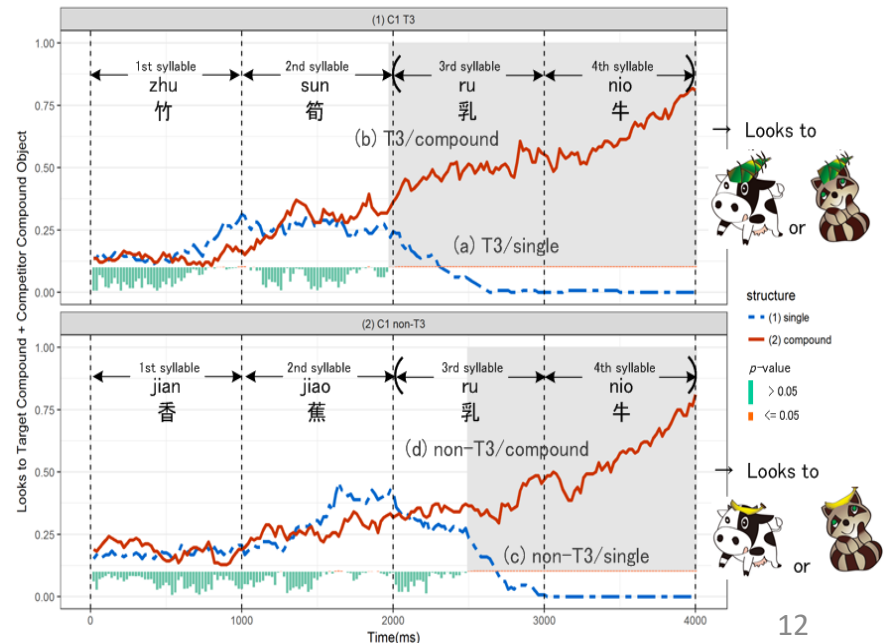
- Tone 3 Sandhi in Mandarin Chinese
- T3 + T3 → T2 + T3

[Competitor Compound]

竹zhu2 筍sun2 -  
 浣wan3 熊xiong2  
 “bamboo shoot raccon”

[Target Compound]

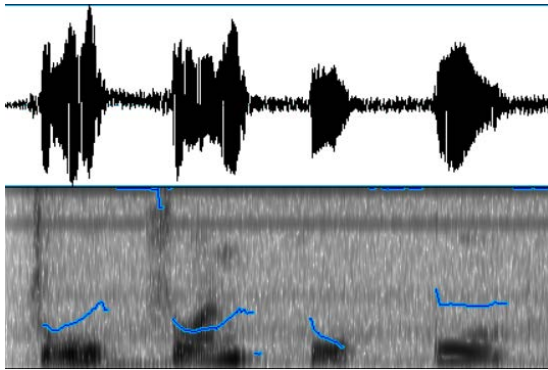
竹zhu2 筍sun2 -  
 乳ru3 牛niu2  
 “bamboo shoot cow”



**CONDUCT A VWP EXPERIMENT**

# What should you prepare?

## Sound files (e.g. 4 conditions)



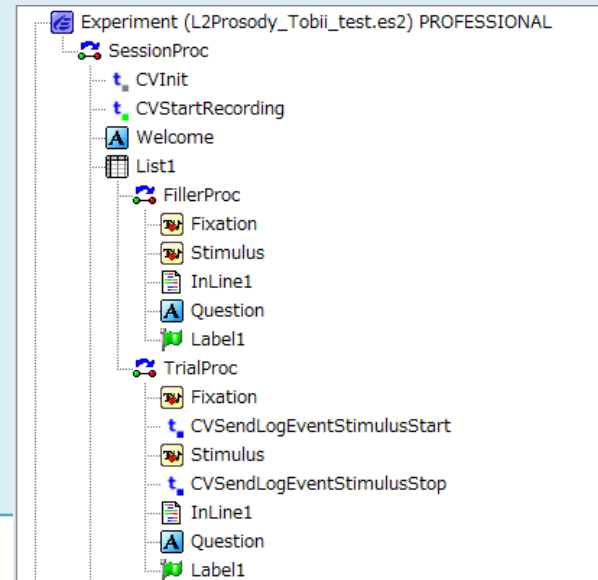
## Visual displays (e.g. > 4 divisions is OK)



## Item list

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	List1												
2	RandomWeight	NestedProcedure	ListNo	TrailNo	ItemNoA	ItemNoB	Condition	Picture	Sound	AOI1	AOI2		
3	1	1	FillerProc	1	1	7	31 filler	Pn007f	An6	filler	filler		
4	1	1	TrialProc	1	2	10	34 n3	Pn010	Pn1As3	TargetSim	Irrelevant		
5	2	1	TrialProc	1	3	3	33 Ps003	Ps5As5	Competit	Irrelevant			
6	2	1	FillerProc	1	4	20	20 filler	Ps020f	An2	filler	filler		
7	3	1	TrialProc	1	5	21	21 3x	Ps021	Ps5	Irrelevant	TargetCor		
8	4	1	TrialProc	1	6	8	32 nx	Pn008	Pn3	Irrelevant	Irrelevant		
9	3	1	FillerProc	1	7	3	27 filler	Pn003f	An6	filler	filler		
10	5	1	TrialProc	1	8	23	33 Ps023	Ps4As5	TargetCor	SingleHea			
11	6	1	TrialProc	1	9	2	26 n3	Pn002	Pn4As4	Irrelevant	TargetSim		
12	4	1	FillerProc	1	10	16	16 filler	Ps016f	An3	filler	filler		
13	7	1	TrialProc	1	11	4	28 nx	Pn004	Pn4	Irrelevant	Irrelevant		
14	8	1	TrialProc	1	12	22	46 n3	Pn022	Pn3As3	TargetSim	Irrelevant		
15	5	1	FillerProc	1	13	24	24 filler	Ps024f	An6	filler	filler		
16	9	1	TrialProc	1	14	17	17 3x	Ps017	Ps4	Irrelevant	TargetSim		
17	10	1	TrialProc	1	15	14	38 n3	Pn014	Pn2As4	Irrelevant	TargetCor		
18	6	1	FillerProc	1	16	19	43 filler	Pn019f	An6	filler	filler		
19	11	1	TrialProc	1	17	11	11 33 Ps011	Ps6As2	Irrelevant	Competit			
20	12	1	TrialProc	1	18	5	5 3x	Ps005	Ps6	TargetCor	Irrelevant		
21	7	1	FillerProc	1	19	11	35 filler	Pn011f	An1	filler	filler		
22	13	1	TrialProc	1	20	7	7 33 Ps007	Ps1As2	Competit	Irrelevant			
23	14	1	TrialProc	1	21	15	15 33 Ps015	Ps5As1	filler	SingleHea			
24	8	1	FillerProc	1	22	8	8 filler	Ps008f	An4	filler	filler		

## Programming (e.g. Eprime, PsychoPy)



# Some Notices

- Analysis according auditory conditions
- Fillers in visual display

ti	di
gi	ze

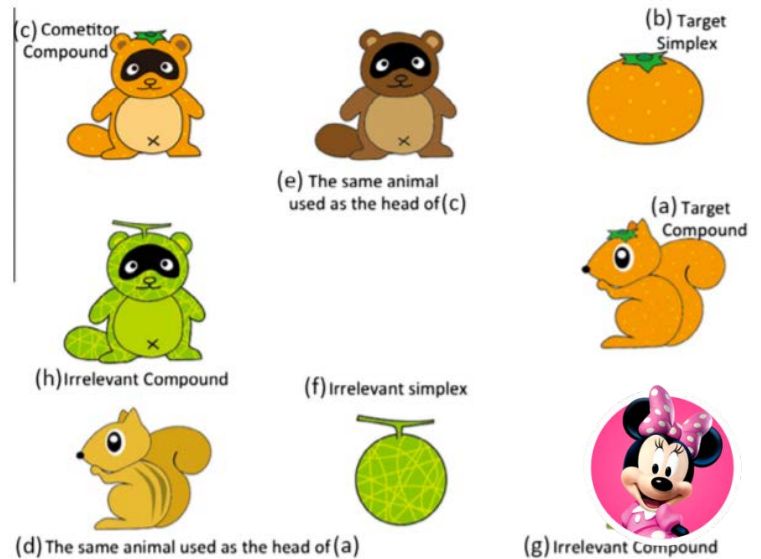
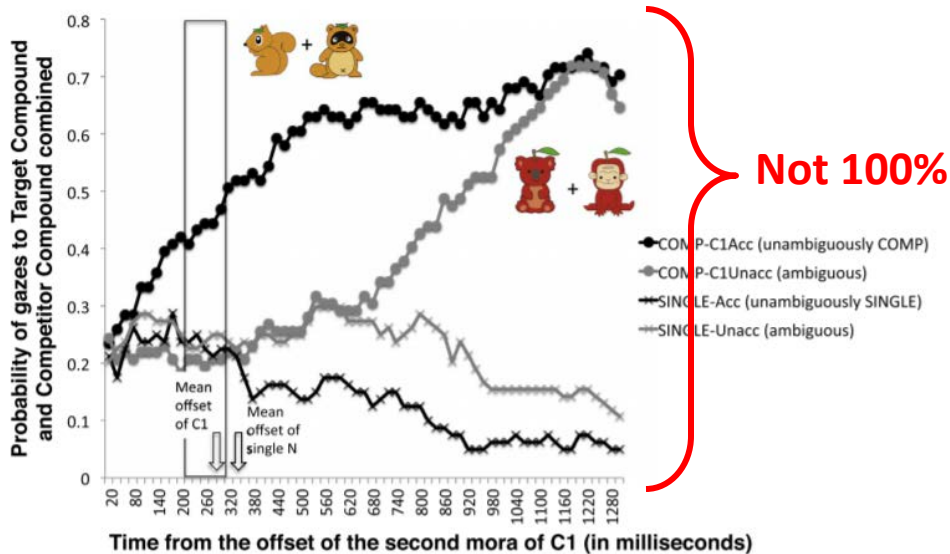
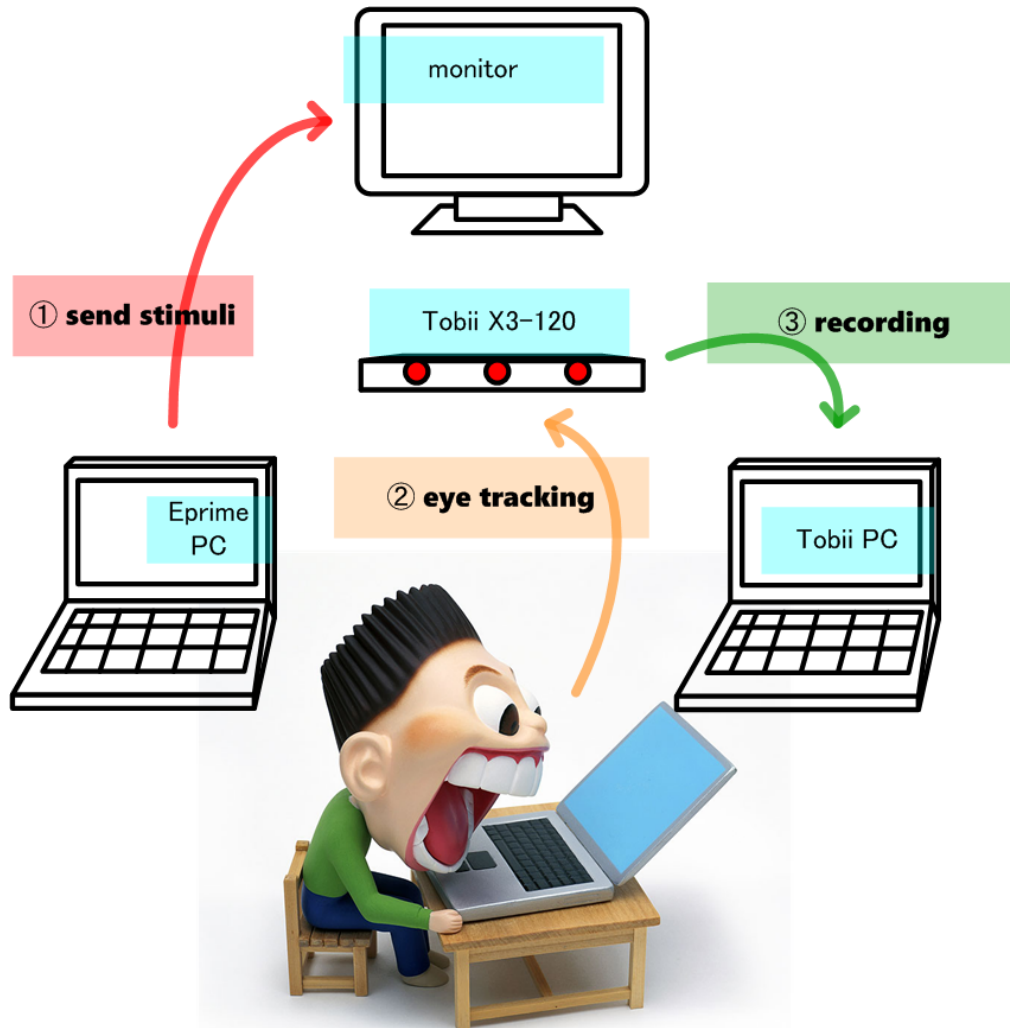


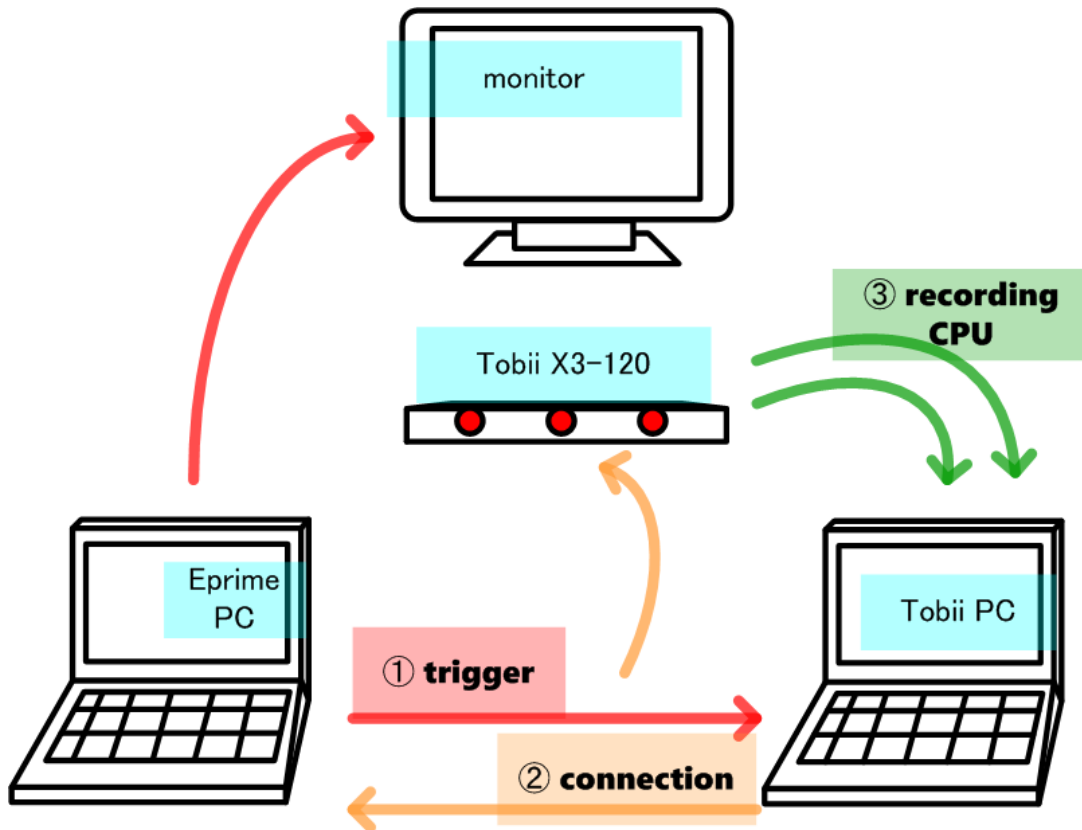
Fig. 1. A sample visual display for the sentence *Mikan-ri'su wa do're?* 'Where's the tangerine-squirrel?'

# Basic framework





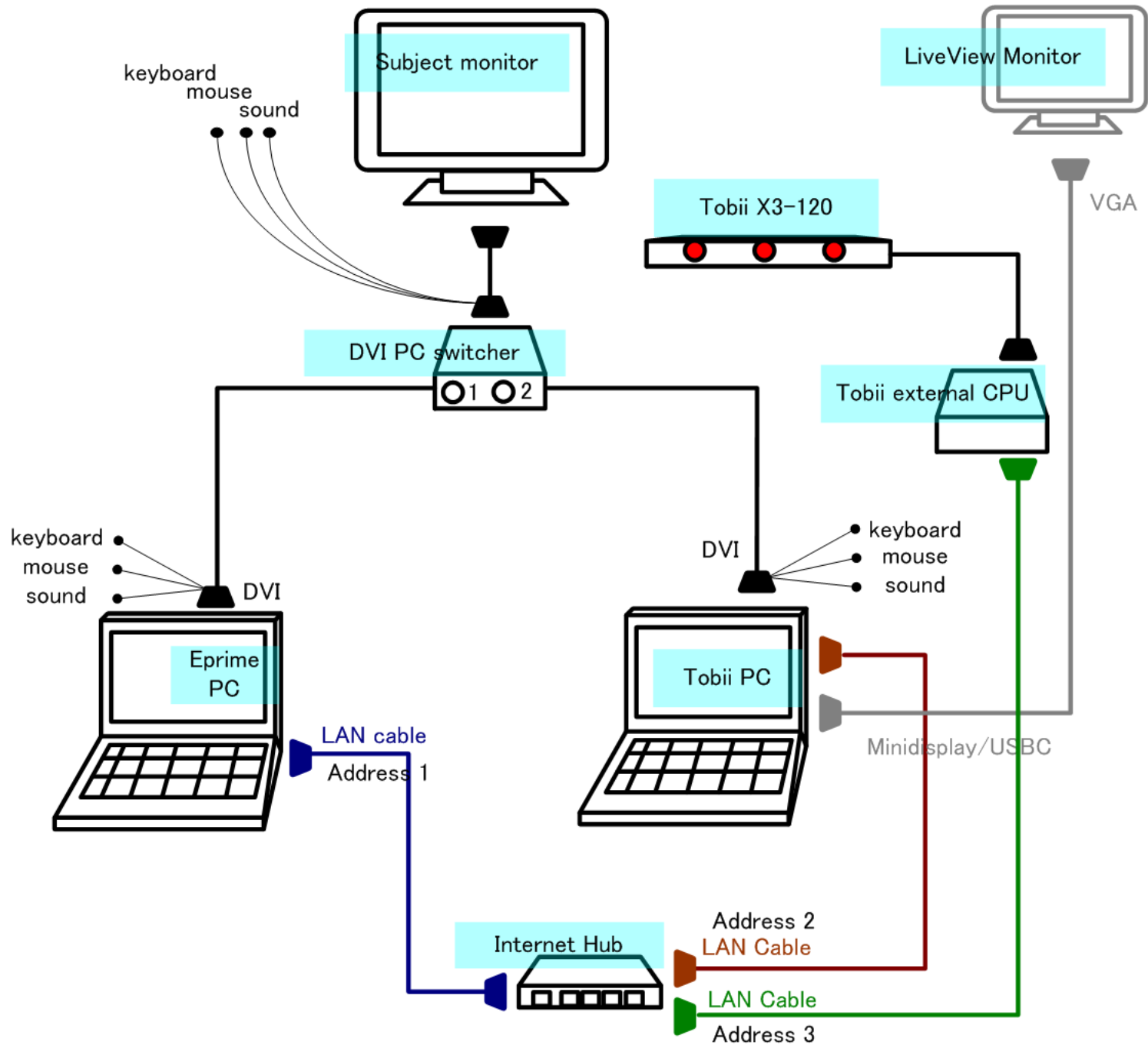
# Sub equipments

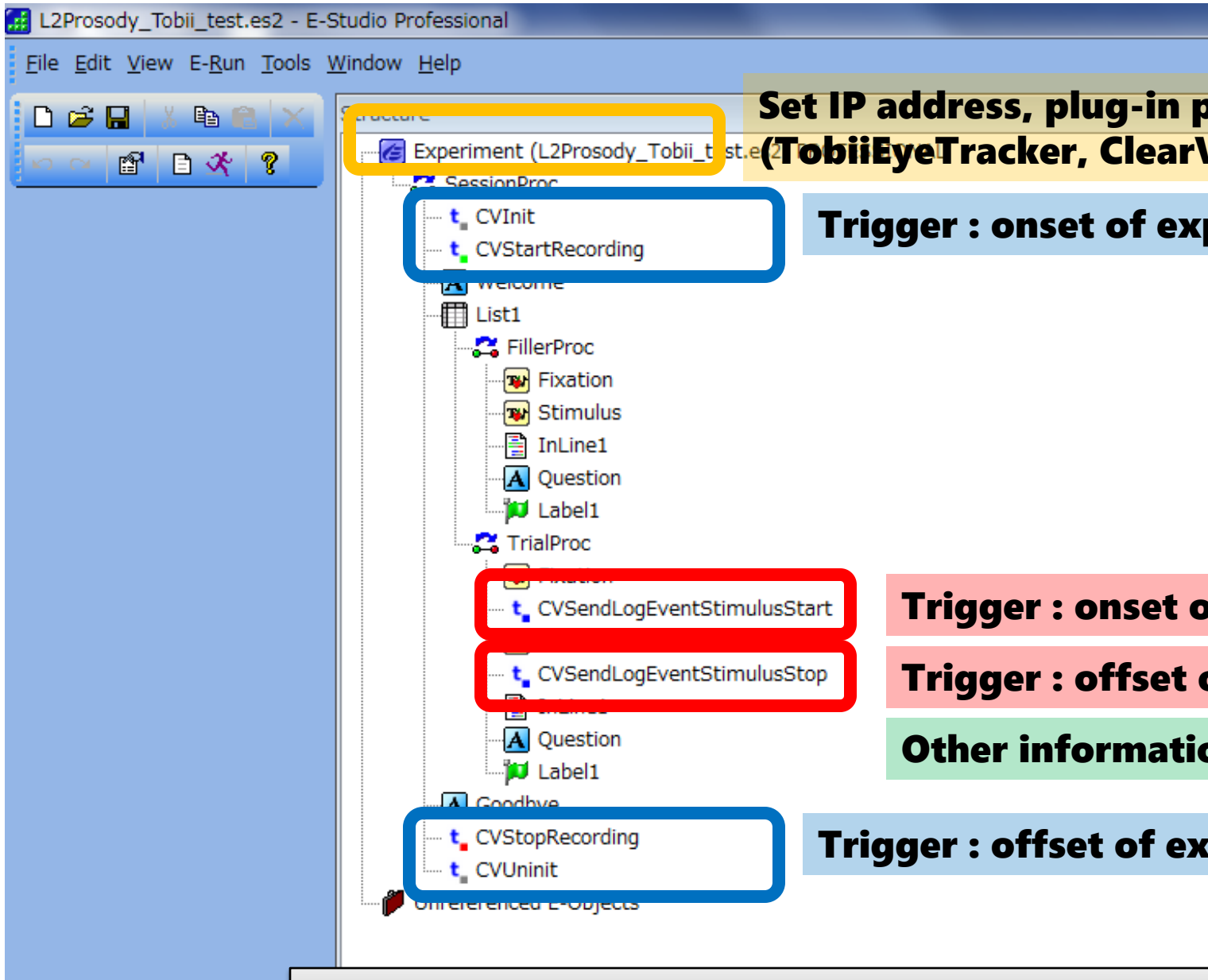


Monitor  
switcher

Internet  
hub

Tobii  
CPU





**Set IP address, plug-in package (TobiiEyeTracker, ClearView)**

**Trigger : onset of experiment**

**Trigger : onset of trial**

**Trigger : offset of trial**

**Other information...**

**Trigger : offset of experiment**

c. "SceneStart [ListNo] [Condition] [ItemNo][SoundFile] [PictureFile]"<sup>19</sup>

# **EXPERIMENT DEMO**



# Reference

- Heider, Paul M., Jeruen E. Dery, Douglas Roland (2014). The processing of it object relative clauses: Evidence against a fine-grained frequency account. *Journal of Memory and Language*. 75, 58-76.
- Cooper, Roger M. (1974). The Control of Eye Fixation by the Meaning of Spoken Language: A New Methodology for the Real-Time Investigation of Speech Perception, Memory, and Language Processing. *Cognitive Psychology*, 6, 84-107.
- Ito, Kiwako, Shari R. Speer. (2007). Anticipatory effects of intonation: Eye movements during instructed visual search. *Journal of Memory and Language*, 58, 541-573.
- Hirose, Yuki, Reiko Mazuka. (2015). Predictive processing of novel compounds: Evidence from Japanese. *Cognition*, 136, 350-358.
- Chen, T.-Y., Hirose, Y., & Ito, T. (2016). Mandarin Chinese Tone 3 Sandhi as a prosodic cue in the lexical processing. *AMLAP*.