Second Language Learning via synchronous computer-mediated communication

Dr Marije Michel

Department of Linguistics and English Language

m.michel@lancaster.ac.uk

Second Language Acquisition (SLA)
Task-based language teaching (TBLT)

- SLA as a cognitive phenomenon
- SLA as a socio-cultural phenomenon   Hulstijn et al., (2014)

- SLA by means of tasks (Ellis & Shintani, 2013 p. 135)
"TBLT aims to develop learners' communicative competence by engaging them in **meaning-focused communication** through the performance of tasks"

  - Fluency in the communicative process
 - Linguistic competence
  - Interactional competence

"A key principle of TBLT is that even though learners are primarily concerned with constructing and comprehending messages, they also **need to attend to form** for learning to take place."

Language is the **means** to achieve a non-linguistic goal. (Ellis, 2003)

SCMC
Synchronous Computer Mediated Communication

- Synchronous Computer Mediated Communication
  - Is a pervasive means of communication
  - Often happens in a language other than the mother tongue (L2)
- Little is known about how SCMC adds to SLA (Kern et al. 2008; Chapelle 2009; Sauro 2011; Ziegler 2016)
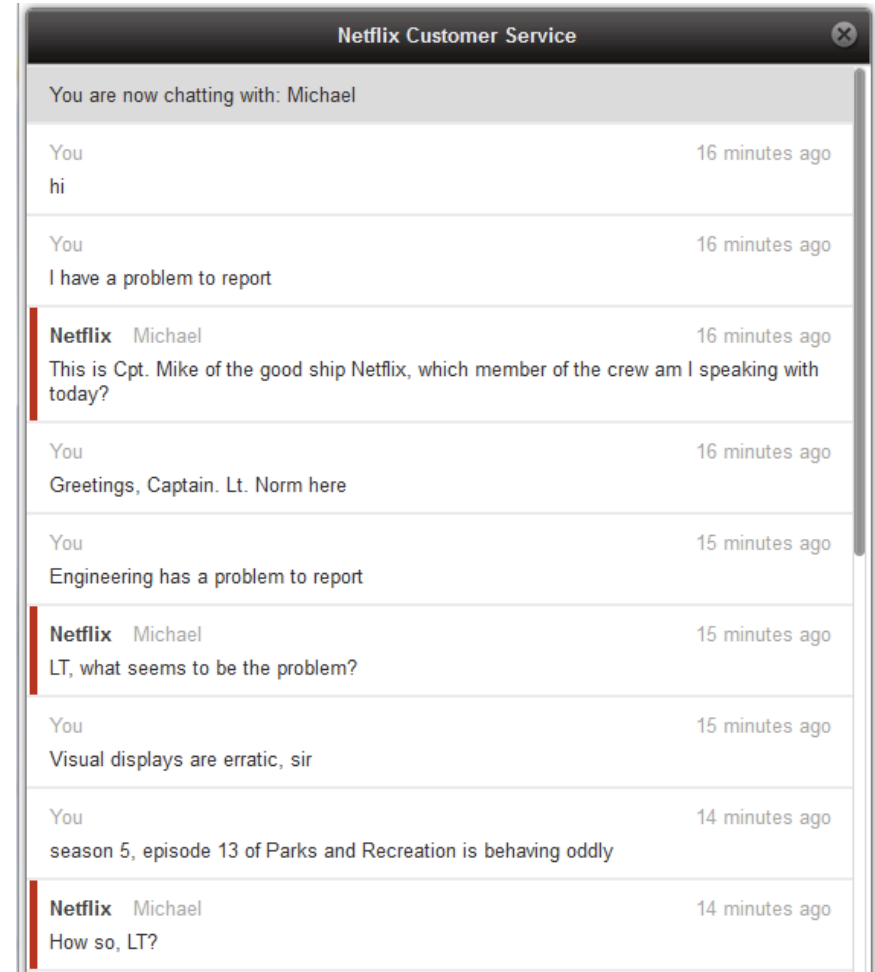
SCMC – an example

Time	ID	Text
6:52:04	P6	hello. my name is Nassaji
6:52:20	P1	hi I am Carol. nice to meet you Nassaji
6:52:34	P6	nice to meet you Carol
6:52:54	P1	I come from China and I am 23 years old. what about you
6:53:28	P6	I'm from Saudi Arabia and I'm 28
6:53:54	P1	wow. so let me guess. you are a girl like me \ /
6:54:28	P6	NO LOL I'm a guy
6:54:55	P1	haha sorry about that
6:55:12	P6	no it's fine
6:55:17	P1	so how long have you been in American
6:55:19	P6	don't worry
6:55:34	P1	I just arrived here two months ago
6:55:41	P6	I've been here for 10 months
6:55:50	P6	how about you?
6:55:58	P1	longer than me ^ ^

SCMC
Synchronous Computer Mediated Communication

- Interaction in slow motion — Beauvois (1992)

- Conceptually spoken but in written modality — Pelletieri (2000)

Argued benefits of SCMC for SLA

❑ **Online processing**

    ❑ **Slower speed** of typing and lag time between turns

❑ **Salience**

    ❑ **Permanence** of input

❑ **Monitoring**

    ❑ Increased online **planning time** before hitting the enter button

→ **SCMC allows enhanced attention to linguistic form**

e.g.. Lai & Zhao (2006), Sauro (2009), Sauro & Smith (2010)

Second Language Acquisition (SLA) and attention

"Attention is the process that encodes language input keeps it active in working and short-term memory retrieves it from long-term memory."
(Robinson, 2003: 631)
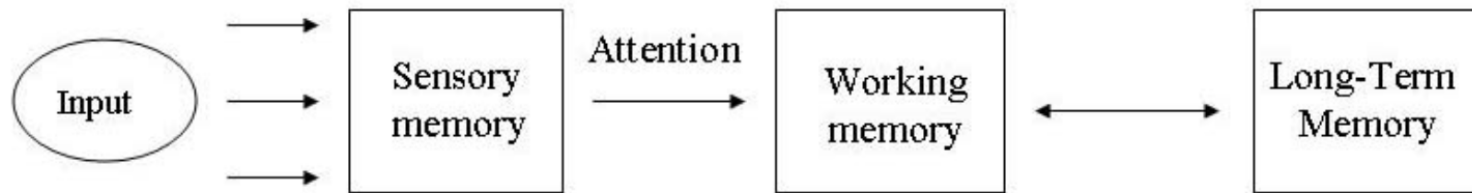
(Baddeley & Hitch, 1974)

"the concept of **attention is necessary** for virtually every aspect of Second Language Acquisition" (Schmidt, 2001: 15)

Alignment
(accommodation, convergence, priming, shadowing)

- Adopting and **re-using each other's language patterns** in the course of authentic interaction. (Trofimovich 2013)

- **Automatic, implicit** behavior

- Coordination at **any linguistic level:**

  lexical, syntax, pragmatics (Pickering & Garrod, 2004)

Alignment in L2 pedagogy

□ A driving force for the L2 production of **insalient** / **infrequent** / **avoided** / **advanced** (correct) L2 forms as alternative to salient / frequent / preferred and lower level (or incorrect interlanguage) forms:

 □ passive / active voice

 □ double dative constructions

 □ wh-questions with obligatory auxiliary verbs

 □ relative clauses

 □ word stress

Boston (2009), Kim & McDonough (2008), Marsden 2009, Marsden et al. (2013), McDonough (2006), McDonough & Chaikitmongkol (2010), McDonough & Mackey (2006, 2008), McDonough & DeVleeschauwer (2012), Shin & Christianson (2012), Trofimovich & McDonough (2011), Trofimovich et al. (2013)

Alignment in L2 SCMC

□ Collentine & Collentine (2013)

  □ SCMC interaction elicited more subjunctive mood in Spanish L2 than in L1 interactions

□ Stiefenhöfer & Michel (in prep), Michel & Stiefenhöfer (in prep)

Participants

❑ German teacher trainees of Spanish enrolled at Mannheim University

- Age: 21.9 (2.1)
- Level: B1 to C1 (CEFR)
- Length of studying Spanish: 4.8 years (SD = 1.8)
- Study 1: N= 36
- Study 2: N=44

❑ TARGET STRUCTURE

Subjunctive in Spanish → 'mood of doubt in subordination/ questions'

No estoy seguro de que a Rodrigo este final le guste.

No creo que la película realmente termine así.

Method & Procedure

Three 20 minutes chat tasks:
1. Pro-contra discussion
2. Interview about *Transparencia Mexicana*
3.1. Joint ranking of movie endings for *La Zona*
3.2. Joint choice of movie soundtrack and title

Task manipulation:
One chat partner receives input sentences

❑ '*…use at least 7 out of the 9 given sentences during your chat interaction.*'

Two conditions

priming/aligned: input sentences with subjunctives

control: input sentences with indicatives

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Study 1: Original Use Subjunctives

*08BPR: no creo que el dinero **sea** mas importante que la libertad claro

facilita las cosas pero de una forma más elevada no está vinculadas

las dos coasas cosas. → **given**

*29BNP: Hay pruebas para tu argumento?

*08BPR: claro, por ejemplo piensa en las personas que son más humildes que

nosotras, no tiene que ser que **séan** pobres de verdad, pero tu crees

en serio que son menos libres? → **original use**

con dinero te puedes construir una cerca alrededor de tu casao viajar

a donde **quieras** pero la libertad pura viene y depende de ti mismo!

→ **original use**

Study 1: Original Use Subjunctives
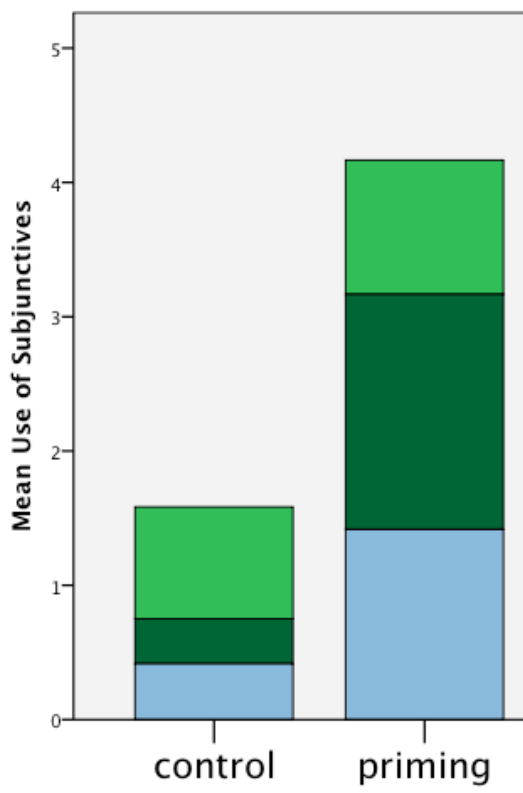
ANOVA

Task 1: $F_{(2, 51)}= 0.16$, p = .940

Task 2: $F_{(2, 41)}= 9.77$, p = .064

Task 3: $F_{(2, 45)}= 6.54$, p = .061

Total: $F_{(2, 50)}= 27.76$, p = .098

Study 1: Accuracy
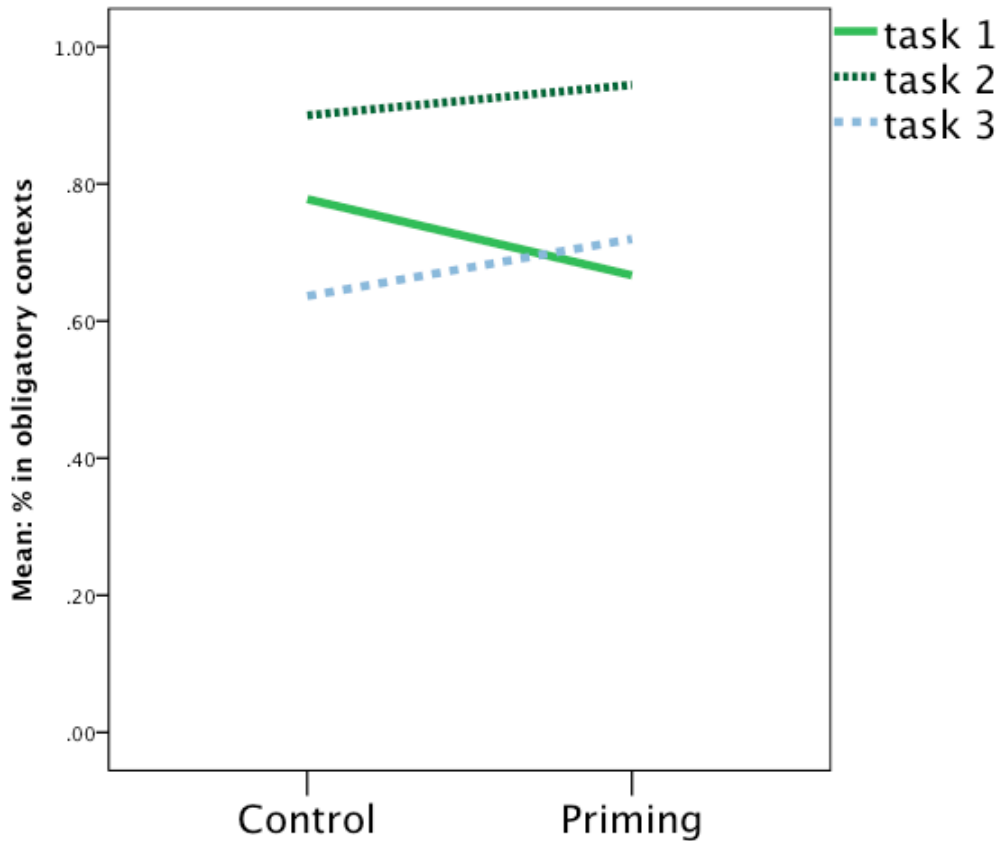
❑ High accuracy

❑ Priming ≥ Control

❑ task differences (task 2)

❑ many participants did not create any obligatory contexts

❑ no statistically significant differences

Study 2: Overview of Subjunctive Use

Condition		Original	Obligatory Contexts
priming	Sum	**89**	**88**
	Min	0	0
	Max	6	6
control	Sum	76	80
	Min	0	0
	Max	7	5

❑ Higher numbers in priming condition.

Study 2: Percentage of Participants Showing Subjunctives

	Condition	Use	Obligatory context
TOTAL	Priming	**69**	64
	Control	50	63
TASK 1	Priming	**73**	59
	Control	55	**80**
TASK 2	Priming	**73**	**82**
	Control	65	70
TASK 3	Priming	**60**	**50**
	Control	30	40

- ❑ In priming condition, more participants used at least one subjunctive and created at least one obligatory context (except Task 1).

Michel (submitted)
Alignment in German in a UK classroom

- 16 14 year old girls learning German in the UK

- 3 chat interactions via SCMC

- Target: word order in complex German sentences

- Hardly any alignment – when you look numbers, but…

Task 2: Interview about media use

Turn	Time	Name	Chat conversation
1	[10:34:24]	Tina:	ich glaube dass das gefährlich ist
			I think that it is dangerous
2	[10:34:46]	Gabi:	nein, es ist sehr sicher
			no, it is very safe
3	[10:35:47]	Tina:	du magst soziale networe? es ist wichtig, weil es ein interview ist
			you like social networks? it is important, because it is an interview.
4	[10:36:18]	Tina:	*networke
5	[10:37:41]	Gabi:	ja, ich liebe soziale networke weil ich mit meine freunde chatte.
			yes, I love social networks because I chat with my friends

Task 3: Joint decision on activities for visitors

Turn	Time	Name	Chat conversation
1	[09:23:51]	Irene:	Wir mussen etwas finden, so dass es allen gefällt.
			We have to find something, such that all like it.
2	[09:25:40]	Nina:	ya, ich mag das Beatles Museum, denn wie es allen *gefällt.
			yes, I like the Beatles Museum, because as all like it.
3	[09:27:59]	Nina:	ich schlage vor dass, wir die Kathedrale gehen.
			I suggest that, we go the cathedral.

Focus Group Interview (N=4)

P1:   And when you see your answer. **When you see their answer you can use that.** when like, say if you're asking the questions and they're answering it. **You can use that like what they said. And work on it.**

R: *Like you would copy it at bit?*

P3 & 4: yeah, change it…

R: So you said you learned some new vocabulary. Do you think you learned something from each other?

P2:   eh how like other people kind of write in German. **How they structure their sentences. […]**

P3:   like to see how different people would say the things… like because **you'd see** how they'd say it and then you'd see how you would write them and compare them and **see which way is better** so to think

Interim summary

Interim summary

❏ Priming conditions seem to

  ❏ Elicit more use

  ❏ Elicit more accurate use

  ❏ Elicit more obligatory contexts

  ❏ Activate all students to use (avoided) structure

  ❏ Support experience of learning

  ❏ But: based on chat log analyses

Findings based on CHAT LOG analyses

Time	ID	Text
6:52:04	P6	hello. my name is Nassaji
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Findings based on CHAT LOG analyses

Time	ID	Text
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Using chat logs alone is taking a
very static approach
to explaining a
very dynamic process.

Time	ID	Text
6:55:34	P1	I just arrived here two months ago
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Michel & Smith (in prep)

Bryan Smith
Arizona State University

Smith (2010, 2012), Smith & Renaud (2013)

Eyetracking SCMC?

Time	ID	Text
6:52:04	P6	hello. my name is Phoebe
6:52:20	P1	hi I am Carol. nice to meet you Phoebe

**How can we measure
eye gaze data in SCMC?**

Spontaneously **C**reated. **M**oving **C**onstantly

Time	ID	Text
6:55:34	P1	I just arrived here two months ago
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What is eyetracking?

= colloquial term for
eye-movement recordings
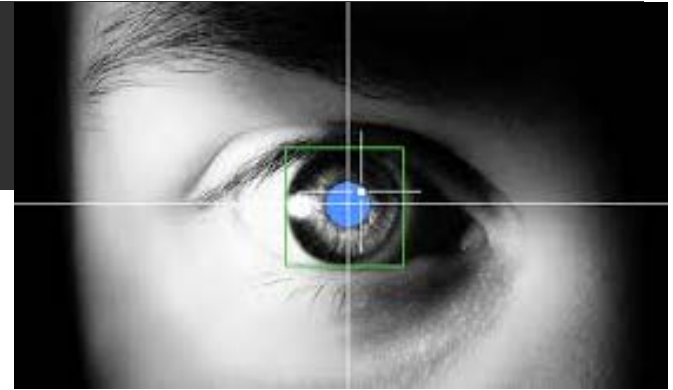
Why do applied researchers record eye movements?

Assumption is that eye movements (an index of **overt attention**) provide information about ongoing cognitive processing (**covert attention**).

= eye-mind link
(Reichle et al., 2006)

What does it look like?

EyeLink 1000
Reading research;
Auditory language
processing

SMI RED 250
Testing research; Web-based
research; Auditory language
processing
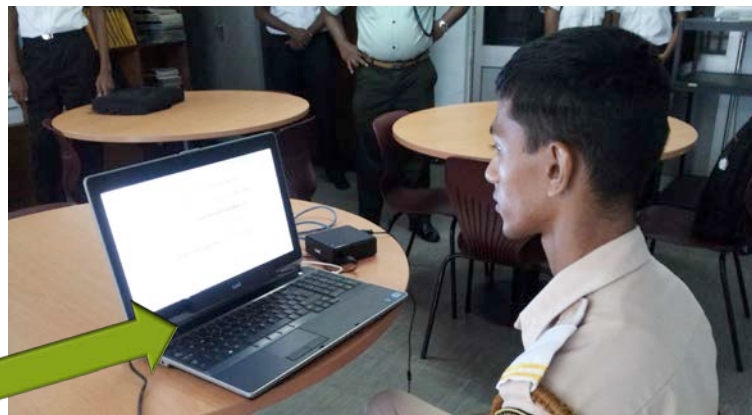
Tobii X2-60
Mobile

Eye tracking SCMC: Screen recording with gaze path
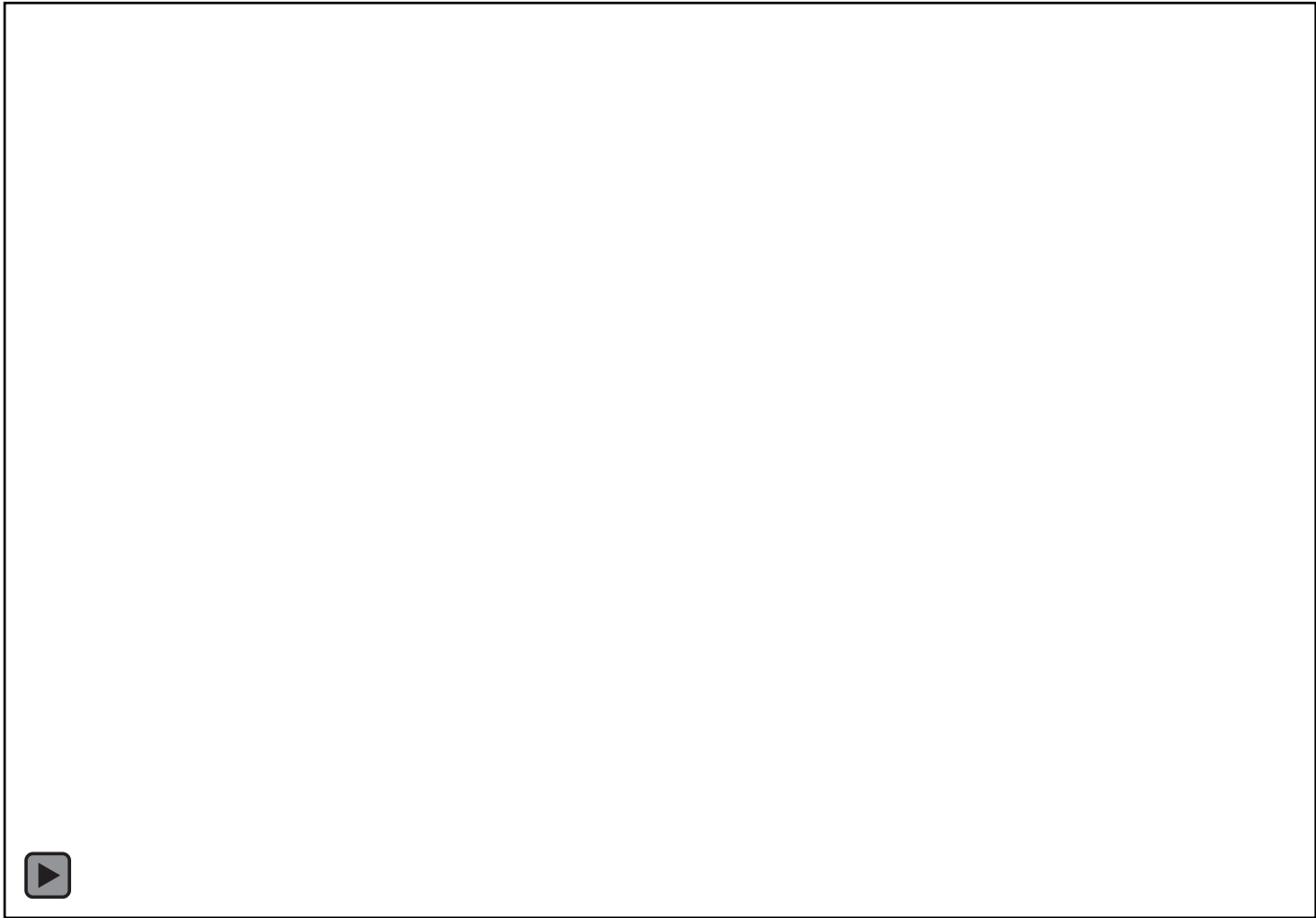
Eye tracking measures: Fixations

- **Fixations**
  - Count
  - Duration

How can we measure
eye gaze data in **SCMC**?

Spontaneously **C**reated. **M**oving **C**onstantly

Participant6 Lancsar
im trying to find the groups

Participant1 LancsAr
yeah according to the ending part

Participant6 Lancsar
right

I think I am not able to find the

via Skype ▾

Eye fixation
(duration, in ms)

7:25 PM

Area of Interest (AoI)

Send SMS from Skype

(Holmqvist et al., 2011; Godfroid, Winke & Gass, 2013; Rayner 1998, 2009)

Research Questions

RQ1   To what extent does **alignment** occur in task-based NNS/NNS **SCMC**?

RQ2   What **insights** can we gain through the use of **eye tracking technology** that chat logs and screen recordings alone cannot

Aims

☐ Theoretical: Add to work on alignment and SCMC

☐ Methodological: Broaden our methodological approaches

Participants

- 14 MA students of TEFL/TESOL/Linguistics at Lancaster University (UK) and at Arizona State University (USA)

- Varied background: 8 Chinese, 2 Arabic, 1 Thai, 1 Nepali, 1 Taiwanese, 1 Mexico

- Proficiency in writing
  - IELTS at entry to study: 5.5 – 7 (M=6.6; SD=0.5)
  - Self-assigned CEFR: B2/C1
- Age: 22-35 (M=25.86; SD= 4.80)
- Gender: 10 females, 4 males
- In ESL context (in months):   M=4.75; SD= 4. 55

→ 6 of them eye tracking

Design

❑ 7 SCMC sessions of peer text-chat interaction (ASU – LU)

❑ 45 minutes each with same chat partner each week

❑ **Discuss with each other** the content of a CALL study: 20 mins

❑ Individually **write a part of an abstract**: 15 mins

Pre-test: Write an abstract for a CALL study (based on outline)

Session 1: Social chat
→ get to know your partner (and the system)

Experimental sessions 1 – 6:

Week 1 & 2:	Discuss and write the **beginning** of an abstract
Week 3 & 4:	Discuss and write the **middle** of an abstract
Week 5 & 6:	Discuss and write the **ending** of an abstract

Post-test: Write an abstract for a CALL study
(based on the same outline)

Task

	Study Keywords	Research Questions
Beginning	Academic Writing, Blogs, Dialogic Interaction, Identity, Reflective Learning, Writing Strategies	• What kinds of writing-related topics students blog about • Relationship between students' collaborative dialogues on blogs and their ability to process and reconstruct knowledge about academic writing • Relationship between students' collaborative dialogues on blogs and negotiation of their academic identities and construction of authorship
Middle	Seven academically advanced graduate students undertaking Master's level study in TESOL and Linguistics participated in this case study. Learners wrote weekly blogs on topics related to issues of academic writing. Open-coding and content analysis were conducted to inductively identify salient themes and patterns regarding students' learning and perception of their writer identities.	
Ending	The results suggest that the blog activity not only encourages students to actively and reflectively engage in knowledge sharing, knowledge generation, and the development of numerous strategies to cope with difficulties encountered in the learning process. Blogs also endow students with a sense of authorship as the writers of blog entries and, at the same time, provide a space for them to sort out what being an author entails, their purposes of writing, and their authority in writing.	

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Example:
Alignment at lexical level "Perhaps"

"Vocab"

Looking at interlocutor's input while writing "find the group(s)" 36

Several visits to "add to our discussion" just before writing own version.37

Findings based on explorations
(in line with O'Rourke 2012)

Participant 1

- **Uses everything** (task material, models, partner's output) that is available to check own contributions
- Does **a lot of editing before transmission**, in particular **after partner's contributions appears**.
- Deletes her own contributions to keep flow of interaction going

Participant 2

- Hit & Peck writer
- Focuses on own contributions: **checks her own writing**
- Short/less useful contributions of partner are ignored.

Participant 3

- **Finishes** own writing, presses enter key, **then reads partner's output**
- Alignment at lexical/spelling level

Conclusion based on qualitative explorations

- ◻ Yes – eye tracking is able to provide information about the focus of attention during SCMC interactions that can be related to alignment at word, multi-word and structural level.

Quantitative analysis on lexical alignment: Compare *possible primes* vs. *baseline*

- Step 1. Identifying Possible Primes

- Step 2. Draw AoI around Possible Primes and baseline

- Step 3. Compare eye gaze data on Possible Prime vs. baseline

Step 1. Identifying *Possible Primes*

Corpus-based Ngram analysis to find **any shared 3-to-10-grams** (group of words) between two chat partners

Time	ID	chat log	3-to-10-gram
07:27	P6	we dont know **the researchers name**	the researchers name
07:28	P1	i was wandering whether **the researchers name** is needed because usually we will mention that but in my examples there not	the researchers name
07:29	P1	and do you have different opinion about the nature and justification of the study	of the study
07:31	P6	this case study addresses listening comprehension and vocabulary acquisition by integrating **writing and pictorial annotations**	writing and pictorial annotations
07:32	P1	what do you think	do you think
07:33	P1	i think the word multimedia annotations is better than **writing and pictorial annotations**	writing and pictorial annotations

Step 2. Draw AoIs

→ Dynamic AoIs for moving targets

How can we measure
eye gaze data in SCMC?

Spontaneously Created. Moving Constantly

- Around Possible Primes until…
  - … same lexical Ngram was used by partner

    OR

  - … Possible Prime was off the screen

- Around Baseline
  - All turns in three complete interactions
    (one for each participant)
  - Until off the screen

Step 3. Compare Gaze data for Possible Primes vs. Baseline

◻ Total Fixation Duration

◻ Fixation Count

◻ Adjust for size: number of characters (letters with spaces)

Total Fixation Duration   **Fixation Count**
Letters with Spaces   **LWS**

Results

- Baseline data

- Possible Primes

Results: All Possible Primes
Mean (SD); N=6

- ◘ 82 Possible Primes of 3-to-10grams in 3 x 6 conversations
  8759 words; per pair: M = 2920; SD = 586

- ◘ 9 (11%) low quality data   → 73 (89%) PP to draw AoIs

- ◘ 14 (17%) no fixations   → 59 (72 %) PP for gaze analysis

ID	Total Fixation Duration	TFD div. by LWS	Fixation Count	FC div. by LWS
P1	1.466 (1.939)	0.084 (0.084)	6.0 (7.1)	0.353 (0.316)
P2	3.038 (4.950)	0.199 (0.306)	13.0 (18.1)	0.867 (1.108)
P3	2.516 (3.058)	0.151 (0.134)	11.9 (12.1)	0.746 (0.516)
P4	1.527 (2.439)	0.147 (0.313)	7.7 (10.9)	0.700 (1.389)
P5	0.419 (0.062)	0.037 (0.008)	3.5 (0.7)	0.307 (0.080)
P6	0.928 (1.120)	0.068 (0.061)	4 (4.3)	0.285 (0.218)
Tot	**1.649 (2.993)**	**0.114 (0.199)**	**7.7 (11.6)**	**0.543 (0.801)**
	per word	0.551	*per word*	2.6

Results: All Possible Primes
Mean (SD); N=3

63 cases examined (across 3 participants)
40 baseline AOIs and 23 potential alignment AOIs

Descriptive Statistics

	Baseline or Alignment	Mean	Std. Deviation	N
TFD divided by LWS	Baseline data	.038770	.0445211	40
	Alignment data	.096913	.1982530	23
	Total	.059997	.1264506	63
FixCount divided by LWS	Baseline data	.173032	.1285577	40
	Alignment data	.450957	.8766972	23
	Total	.274497	.5489240	63

Results continued

Regression analysis shows that TFD/LWS does not discriminate very well between baseline and potential alignment.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-1.451	.3275	-2.093	-.810	19.641	1	.000
TFDoverLWS	-2.303	2.9980	-8.179	3.573	.590	1	.442
FCoverLWS	4.426	1.1483	2.175	6.676	14.855	1	.000
(Scale)	1						

Dependent Variable: Baseline or Alignment
Model: (Intercept), TFDoverLWS, FCoverLWS

Results continued

When FC/LWS is placed into the model as a sole predictor of baseline or alignment, then we see it is a very powerful predictor!

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	FCoverLWS	3.960	1.810	4.788	1	.029	52.446	1.511	1820.327
	Constant	−1.456	.484	9.035	1	.003	.233		

a. Variable(s) entered on step 1: FCoverLWS.

This means that Fixation Count (number of fixations on a target) is quite a strong predictor of potential alignment, whereas Total Fixation Duration is not. **How many times one views a target matters**, but how long one views a target does not.

Results: Observed vs. predicted probabilities (Fixation Count/LWS)

Results continued

This table simply show the previous table in linear fashion
Here we consider the **A**s only.

Observed vs. Predicted

		Observed		Predicted			
41	S	A	.507	A		.493	.986
42	S	A**	.283	B		.717	1.591
43	S	A**	.291	B		.709	1.560
44	S	A**	.311	B		.689	1.488
45	S	A	.608	A		.392	.804
46	S	A**	.220	B		.780	1.883
47	S	A	.628	A		.372	.770
48	S	A**	.240	B		.760	1.778
49	S	A	1.000	A		.000	.000
50	S	A**	.266	B		.734	1.662
51	S	A**	.219	B		.781	1.887
52	S	A**	.466	B		.534	1.071
53	S	A**	.367	B		.633	1.313
54	S	A	.765	A		.235	.554
55	S	A**	.386	B		.614	1.262
56	S	A**	.277	B		.723	1.617
57	S	A	.835	A		.165	.445
58	S	A**	.266	B		.734	1.662
59	S	A**	.406	B		.594	1.209
60	S	A**	.310	B		.690	1.491
61	S	A	.507	A		.493	.986
62	S	A**	.386	B		.614	1.262
63	S	A**	.495	B		.505	1.009

a. S = Selected, U = Unselected cases, and ** = Misclassified cases.

Identified Primes

- *"oral cmc and ftf"*   (P2 reading P5):   TFD = 17s 918ms; FC = 67

- *"I am not"*   (P4 reading P3): TFD = 7s 826ms; FC = 35

- *"better than online"*   (P6 reading P1): TFD = 2s 320sm; FC = 12

Excluded Possible Primes

- *"better than online"*   (P1 reading P6): TFD = 83ms; FC = 1

- *"of the study"* (P2 reading P5): TFD = 180ms ; FC = 2

- *"like you said"* (P4 reading P3): TFD = 156ms; FC = 1

- and many instances of "I think xx"

Conclusion

- 53% of Possible Primes fewer/shorter fixations than baseline (misclassified)
- 36% of Possible Primes 'confirmed by eye gaze data'
    - per word   → almost 1s long
        - → more than 4 fixations

- Quantitative data give some support for lexical alignment during SCMC – but not at a large scale.

- **Eye tracking** gives us a **better picture** of what is actually happening than chat logs.

- Fruitful **combination of corpus techniques** and **eye tracking**

- BUT: current method remains very laborious

Limitations and Future Directions

- Lexical alignment of 3-to-10-grams (excludes 1- & 2-grams)
- Further development of our methodology
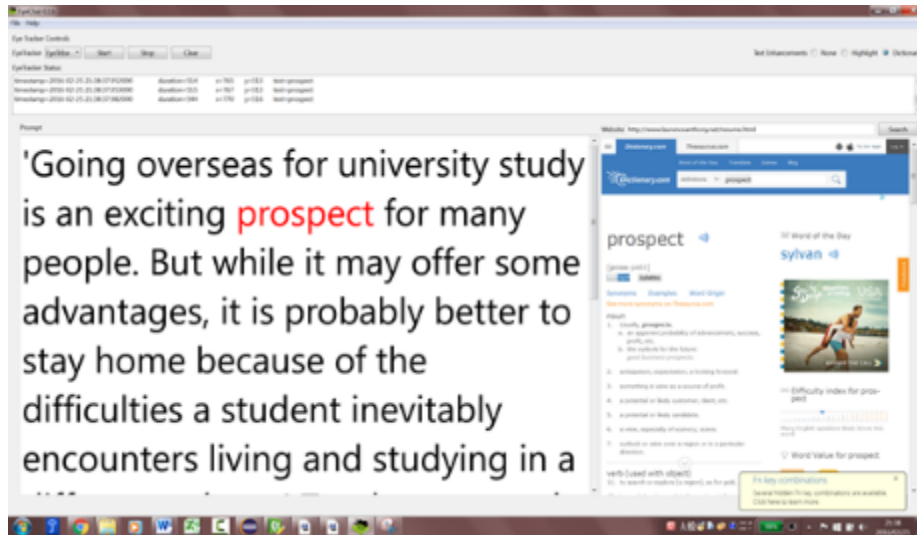- Using our structured approach to test for syntactic alignment

How can we measure
eye gaze data in SCMC?

Spontaneously Created. Moving Constantly
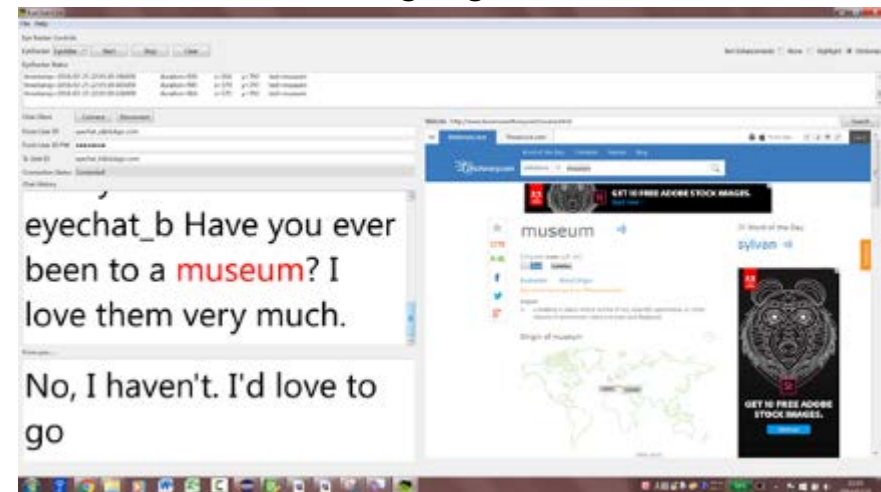
In development *EyeAnt*:
In collaboration with Laurence Anthony (Waseda University, Tokyo)

Text fixations highlighted and 'enhanced'

www.laurenceanthony.net

Chat fixations highlighted and 'enhanced'

Example Output:
Words that were fixated

word	duration	time_start	time_end	context
overseas	58	2462	2520	'Going overseas for university study is an e
Going	240	3163	3403	'Going overseas for university study is an e
overseas	292	3635	3927	'Going overseas for university study is an e
for	295	3927	4222	'Going overseas for university study is an e
university	392	4461	4853	'Going overseas for university study is an e
study	141	5084	5225	'Going overseas for university study is an e
for	30	6755	6785	prospect for many people. But while it ma
people	110	7424	7534	prospect for many people. But while it ma
advantages	1826	7534	9360	advantages, it is probably better to stay ho
it	230	9595	9825	advantages, it is probably better to stay ho
is	244	9825	10069	advantages, it is probably better to stay ho
better	60	10296	10356	advantages, it is probably better to stay ho
to	0	10587	10587	advantages, it is probably better to stay ho
stay	0	10827	10827	advantages, it is probably better to stay ho
advantages	0	12052	12052	advantages, it is probably better to stay ho
difficulties	61	12092	12153	of the difficulties a student inevitably enco
inevitably	0	13253	13253	of the difficulties a student inevitably enco
a	82	15380	15462	of the difficulties a student inevitably enco

Thank you

□ All participants

□ Student assistants: Michelle Chow, Pucheng Wang, Isabelle Morley

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□ Mark McGlashan, Lancaster University

□ Collaborators: Laura Stiefenhoefer, Bryan Smith and Laurence Anthony

Contact: m.michel@lancaster.ac.uk

@MarijeMichel