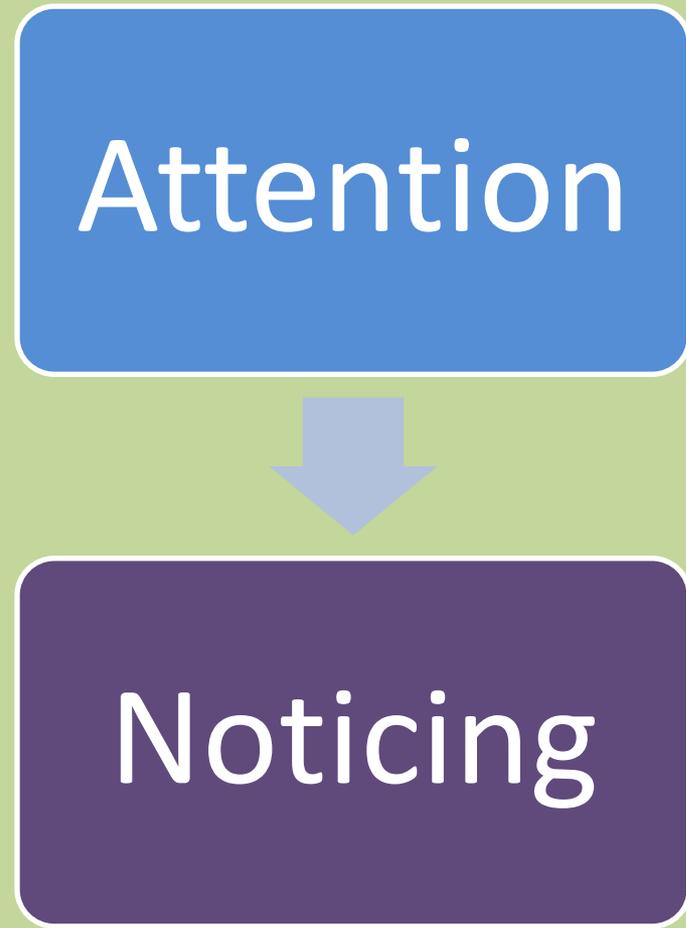


Relationship between learner-generated noticing of written second language input and working memory capacity

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Noticing



Noticing: first view

- “conscious registration of attended specific instances of language” (Schmidt, 2010, p. 5)
 - Understanding
- “the brain registering new materials, with some fleeting **awareness** at the point of encounter that there is something new, even if there is no understanding of how the element works” (Ortega, 2009, p. 63)

Noticing: second view

- “detection plus rehearsal in short-term memory, prior to encoding in long-term memory”
(Robinson, 1995, p.269)
- “a cognitive process in which the amount of attention paid to a new language element in the input exceeds a critical threshold, which causes the language element to enter working memory and become the object for further processing”
(Godfroid et al., 2013, p. 493)

Working Memory

- “the relatively small amount of information that one can hold in mind, attend to, maintain in a rapidly accessible state, at one time” (Cowan, 2005, p.1)
- reading comprehension (Daneman & Carpenter, 1980) and language comprehension (King & Just, 1991)
- Central executive (shifting, updating, inhibition) & Phonological loop

Eye-tracking in noticing studies

- Noticing studies: think aloud, highlighting, note taking
- Several shortcomings of the traditional methods
- Eye-tracking (Godfroid et al., 2013; Godfroid & Uggem, 2013; Nezami, 2012; Smith, 2012; Smith & Renaud, 2013; Winke, 2013; and Winke, Gass & Sydorenko, 2013)

Methodology

- Participants
 - 15 participants: first language Chinese
 - pre-intermediate to intermediate
- Process
 - 2 sessions: pre-test and WM tests, eye-tracking and post-test
- Pre/Post tests
 - Pre-test: sentence reconstruction & grammaticality judgment items
 - Post-test: comprehension questions

- Input text
 - A story with two target constructions
 - causative 'had' and past perfect – 9 examples each
 - unenhanced
- Eye-tracking
 - Total reading time
 - difference between expected total reading time and observed total reading time
- WM tests
 - Phonological loop: forward digit span
 - Central executive: Plus-minus (shifting), Keep-track (updating), Stroop (inhibition)

Results

- Noticing
 - increase of the total reading time with the number of exposures
 - the difference between expected and observed total reading time also indicates an increase in both structures
 - significant difference between the expected and observed total reading time is mainly evident in the items that occurred later in the text
 - Hernández (2008), Reinders and Ellis (2009), Trahey and White (1993), White (1998), Williams and Evans (1998) and Jourdenais et al. (1995) - input flood increases learners' attention to the target features

- total reading time and the difference between expected and observed total reading time on certain items in both target structures show a decrease
 - repeated earlier
 - items with more syllables and items with fewer syllables

Learners are likely to pay more attention to language features that frequently occur in the input even in unenhanced conditions

Noticing Understanding

- Post-test - none of the participants provided correct answers

Noticing at the level of perception had possibly occurred on this occasion, but not noticing at the level of awareness

Noticing and Working memory

- The eye-tracking data and WM capacity scores did not show any significant correlations

It is possible that conscious noticing had not taken place on this occasion even though the total reading time increased with time

- Holmqvist et al. (2011) - there is no guarantee that WM registration occurs even though participants look at the objects on the screen on the eye-tracker
- Implicit learning DeKeyser (1995, p. 380) - learning that takes place “without concurrent awareness of what is being learned” - no heavy demand on the WM

Eye-tracking in noticing

- increased fixation duration with more exposure indicated possible noticing
- eye-tracking data do not provide any direct evidence that conscious noticing has taken place and also they do not provide any insights into the kind of cognitive processes involved in input processing

Conclusions

- More exposure of unenhanced input may be necessary for meaningful noticing to take place
- Noticing at the level of perception seemed to have occurred – this does not rule out the possibility that WM capacity can play an effective role
- Eye-tracing data may not be sufficient to measure noticing, especially the cognitive processes involved

References

- Cowan, N. (2005). *Working memory capacity*. New York: Psychology Press.
- DeKeyser, R. M. (1995). Learning second language grammar rules: An experiment with a miniature linguistic system. *Studies in Second Language Acquisition*, 17, 379-410.
- Godfroid, A., Boers, F., & Housen, A. (2013). An eye for word: Gauging the role of attention in incidental L2 vocabulary acquisition by means of eye-tracking. *Studies in Second Language Acquisition*, 35(3), 483-517.
- Godfroid, A. & Uggen, M.S. (2013). Attention to irregular verbs by beginning learners of German: An eye-movement study. *Studies in Second Language Acquisition*, 35(2), 291-322.
- Hernández, T.A. (2008). The effect of explicit instruction and input flood on students' use of discourse markers on a simulated oral proficiency interview. *Hispania*, 91, 665-75.
- Holmqvist, K., Nystrom, M., Andersson, R., Dewhurst, R., Jarodzka, H. & De Wuijter, J. (2011). *Eye tracking: A comprehensive guide to methods and measures*. Oxford: Oxford University Press.
- Jourdenais, R., Ota, M., Stauffer, S., Boyson, B. & Doughty, C. (1995). Does textual enhancement promote noticing? A think aloud protocol analysis. In R. Schmidt (Ed.) *Attention and awareness in foreign language learning* (pp. 183-216). Honolulu Hawaii: University of Hawaii Second Language Teaching and Curriculum Centre.
- King, J. & Just, M. (1991). Individual differences in syntactic processing: The role of working memory. *Journal of Memory and Language*, 30, 580-602.
- Nezami, S.H. (2012). *A study of errors, corrective feedback and noticing in synchronous computer mediated communication*. (Unpublished thesis). Linköping University, Sweden.
- Ortega, L. (2009). *Understanding second language acquisition*. London: Hodder Education.

- Reinders, H. & Ellis, R. (2009). The effects of two types of input on intake and the acquisition of implicit and explicit knowledge. In R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philp & H. Reinders (Eds.), *Implicit and explicit knowledge in second language learning, testing and teaching* (pp. 281–302). Bristol: Multilingual Matters.
- Robinson, P. (1995). Attention, memory and the noticing hypothesis. *Language Learning*, 45 (2), 283–331.
- Schmidt, R. (2010). Attention, awareness, and individual differences in language learning. In W. M. Chan, S. Chi, K. N. Cin, J. Istanto, M. Nagami, J. W. Sew, T. Suthiwan, & I. Walker, *Proceedings of CLaSIC 2010, Singapore, December 2-4* (pp. 721-737). Singapore: National University of Singapore, Centre for Language Studies.
- Smith, B. (2012). Eye tracking as a measure of noticing: A study of explicit recasts in SCMC. *Language Learning & Technology*, 16(3), 53-81.
- Smith, B. & Renaud, C. (2013). Eye tracking as a measure of noticing corrective feedback in computer-mediated instructor-student foreign language conferences. In K. McDonough and A. Mackey (Eds.), *Interaction in diverse educational settings* (pp. 147-165). Philadelphia: John Benajamins.
- Trahey, M. & White, L. (1993). Positive evidence and preemption in the second language classroom. *Studies in Second Language Acquisition*, 15, 181–203.
- White, J. (1998). Getting the learner's attention: A typographical input enhancement study. In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 85–113). Cambridge: Cambridge University Press.
- Williams, J. & Evans, J. (1998). What kind of focus and on which forms? In C. Doughty & J. Williams (Eds.), *Focus on form in classroom second language acquisition* (pp. 139–155). Cambridge: Cambridge University Press.
- Winke, P.M. (2013). The effects of input enhancement on grammar learning and comprehension: A modified replication of Lee (2007) with eye-movement data. *Studies in Second Language Acquisition*, 35(2), 323-352.
- Winke, P., Gass, S., & Sydorenko, T. (2013). Factors influencing the use of captions by foreign language learners: An eye-tracking study. *The Modern Language Journal*, 97(1), 254–275.

Thank you!