

Age-Differentiated Online Processing of Korean Conversational Emoticons: Eye-Tracking Evidence from Naturalistic Dyadic Interaction

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Background & Research Question: In digital communication, meaning is constructed through the dynamic interplay of linguistic and visual cues, with emoticons increasingly serving as integral components. KakaoTalk emoticons — widely used in South Korea — represent a particularly distinctive case: unlike emoji that merely supplement text, they can stand alone as autonomous utterances or interact with co-occurring text to construct meaning, requiring pragmatic inference beyond simple visual decoding. However, prior offline studies have documented age-related differences in emoticon processing, with older adults reporting lower usage and less accurate interpretation ([1], [2]). To examine whether these differences extend to online comprehension, the present study employs eye-tracking to investigate (i) age-related differences in the visual processing of KakaoTalk emoticons and (ii) their differential effects on interpersonal perception across age groups.

Method: Younger (20s; $n = 21$) and older (50s; $n = 24$) adults were paired and engaged in naturalistic scenario-based conversations via the KakaoTalk desktop application, with eye movements recorded simultaneously using an SMI RED500 (250 Hz). Conversations were conducted separately for family (e.g., scheduling a family meeting or celebrating a child's award in a contest) and workplace contexts (e.g., preparing for a meeting with an external client), each under a 2 (emoticon use: encouraged, freely selected from participants' own KakaoTalk collections vs. prohibited) $\times$ 2 (conversation type: neutral vs. emotional) counterbalanced design and analyzed at the turn-taking level. Following each conversation, participants rated perceived psychological distance (1 = close, 10 = distant) and emoticon appropriateness (1 = inappropriate, 7 = appropriate). Log-transformed fixation-based measures on emoticon AOIs and raw offline ratings were analyzed using LMERs, with Age (-0.5 = younger, 0.5 = older), Conversation Type (-0.5 = neutral, 0.5 = emotional) and Context (-0.5 = family, 0.5 = workplace) as fixed effects and participant as a random intercept.

Results: While fixation count showed no significant effects, fixation time showed a significant Age $\times$ Conversation Type interaction ($\beta = 0.38$, $t = 2.13$): younger adults spent less time fixating emoticons during emotional conversations, whereas older adults did not. Average fixation duration showed a significant three-way interaction ($\beta = -0.42$, $t = -2.34$). In the family context, older adults showed longer average fixation durations overall, with a significant Age $\times$ Conversation Type interaction ($\beta = 0.34$, $t = 2.91$): younger adults' fixation durations decreased during emotional conversations, whereas older adults' did not. No significant effects emerged in the workplace context. For psychological distance, older adults reported greater overall closeness ($\beta = -1.50$, $t = -3.79$), emotional conversations reduced perceived distance ($\beta = -0.45$, $t = -2.24$), and an Age $\times$ Context interaction ($\beta = -1.62$, $t = -3.78$) indicated that this age difference was larger in the workplace context. Although the reduction in perceived distance during emotional conversations was numerically greater for older adults in the family context, this was not statistically supported (family: $p = .167$; workplace: $p = .676$). Emoticon appropriateness ratings were higher in emotional conversations ($\beta = 0.47$, $t = 3.03$) and lower in workplace contexts ($\beta = -0.39$, $t = -2.31$), with no age-related effects.

Discussion & Conclusion: The present study provides novel evidence that age-related differences in emoticon processing emerge during online comprehension of naturalistic digital conversations. Critically, interpersonal outcomes remained age-invariant, suggesting that age differences in emoticon processing reflect processing efficiency rather than comprehension failure. One possible interpretation is that younger adults process emoticons more efficiently, requiring less visual engagement when emoticons are most communicatively functional. By contrast, for older adults, emoticons may constitute a later-acquired symbolic system requiring sustained visual analysis, although alternative accounts cannot be ruled out. These findings imply that offline measures may underestimate age-related differences in digital communication, even when communicative outcomes remain comparable across age groups.

Reference

- [1] Boutet, I., Goulet-Pelletier, J. C., Sutera, E., & Meinhardt-Injac, B. (2024). Are older adults adapting to new forms of communication? A study on emoji adoption across the adult lifespan. *Computers in Human Behavior Reports*, 13, 100379.
- [2] Chen, Y., Yang, X., Howman, H., & Filik, R. (2024). Individual differences in emoji comprehension: Gender, age, and culture. *Plos one*, 19(2), e0297379.

Table 1. Descriptive Statistics by Age Group and Conversation Type

Context	Measure	Younger adults		Older adults	
		Neutral	Emotional	Neutral	Emotional
Family	Eye-tracking				
	Fixation time	1317.95 (2490.14)	1037.83 (2225.42)	990.84 (1037.42)	1033.03 (1955.46)
	Fixation count	4.87 (5.95)	4.52 (6.46)	4.24 (3.75)	4.82 (4.89)
	Average fixation duration	219.94 (163.48)	173.15 (85.05)	225.26 (122.26)	265.62 (140.22)
	Offline ratings				
	Psychological Distance	3.15 (1.86)	3.08 (2.22)	2.85 (1.46)	1.95 (0.76)
	Emoticon Appropriateness	5.00 (0.71)	5.85 (1.14)	5.45 (1.61)	5.95 (1.05)
Workplace	Eye-tracking				
	Fixation time	1045.54 (1382.37)	867.17 (1522.92)	1028.01 (1236.48)	1284.55 (1390.91)
	Fixation count	5.86 (9.44)	4.37 (7.70)	4.13 (4.61)	4.36 (5.81)
	Average fixation duration	220.12 (113.10)	229.93 (160.61)	257.83 (154.11)	221.82 (109.52)
	Offline ratings				
	Psychological Distance	6.50 (1.37)	5.82 (1.38)	4.00 (1.75)	3.70 (1.72)
	Emoticon Appropriateness	4.81 (1.64)	5.24 (1.44)	5.25 (1.25)	5.50 (1.28)

Note. Values represent means with standard deviations in parentheses. All measures are reported in raw unit (ms for fixation time and average fixation duration).

Table 2. Linear Mixed-Effects Model Results for Significant Effects

Eye-tracking				Offline ratings			
	Estimate	S.E.	t-value		Estimate	S.E.	t-value
Fixation time				Psychological distance			
Conv	-0.18	0.09	-2.05 *	Age	-1.50	0.39	-3.79 ***
Age				Conv	-0.45	0.20	-2.24 *
* Conv	0.38	0.18	2.13 *	Context	2.24	0.21	10.44 ***
Average fixation duration (all)				Age			
Age *				* Context	-1.62	0.43	-3.78 ***
Context *	-0.42	0.18	-2.34 *				
Conv							
Average fixation duration (Family situation)				Emoticon appropriateness			
Age	0.21	0.09	2.30 *	Conv	0.47	0.16	3.03 **
Age				Context	-0.39	0.17	-2.31 *
* Conv	0.34	0.12	2.91 **				

Note. Eye-tracking measures were log-transformed, whereas offline ratings were analyzed using raw scores. Conv = Conversation Type. S.E. = standard error. * $p < .05$. ** $p < .01$. *** $p < .001$.