

Language dynamics across the life span: The comprehension of verbal jokes

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Cognitive aging has attracted scholarly attention. Recently, it has been acknowledged that certain cognitive functions might be preserved or even improved as a function of age (Burko & Shafto, 2008; Diaz, Rizio, & Zhuang, 2016). A possible candidate for such a cognitive ability is text comprehension and situation model building (Radvansky & Dijkstra, 2007), prerequisites for the appreciation of verbal humor. The present study targets age-related differences in joke comprehension, an area not well studied yet (see Greengross, 2013, for review). Most verbal jokes are based on an incongruity whose resolution requires revising an initial interpretation (Attardo, 2001). This process puts demands on working memory and cognitive flexibility, and is expected to become more difficult with age (Ferstl, 2006). Using verbal jokes and non-funny revision texts, Hunger, Siebörger and Ferstl (2009) have been able to disentangle cognitive and affective aspects of joke comprehension (cf. Ferstl, Israel & Putzar, 2017). Here, we use the paradigm to evaluate the interplay between pragmatic knowledge use and cognitively demanding revision processes in older readers.

Methods. Short stories which require a linguistic revision but are not funny, and jokes, which require a revision and elicit an affective response, were compared to coherent and incoherent control stories with identical target sentences (8 trials in each of these four conditions, from Ferstl et al., 2017; see Table 1). In the context of a larger project on language dynamics across the life span (Hanulikova et al., 2019, in preparation), 100 participants were tested, half senior citizens ($M = 77.6$, $sd = 5.6$; range 70-92), and half non-student adults ($M = 35.9$, $sd = 4.5$; range 30-45). The groups were matched with respect to gender (2:1 female to male ratio) and educational level. For the joke comprehension experiment, the texts were presented sentence by sentence on a computer screen. The participants read the texts, rated their funniness (1 = not funny at all, to 9 = hilariously funny), and answered a 2-choice comprehension question. As a proxy of crystalline verbal intelligence, MWT-scores were assessed (Mehrfachwahl-Wortschatz-Test: "Multiple-choice vocabulary test"; Lehrl, 2005): 37 words of decreasing frequency had to be picked out of a set of four similar pseudo-words each (e.g., iar, ear, jear, chear, eah). As a test of verbal flexibility and processing speed, phonemic and semantic verbal fluency scores were obtained (cf. Troyer, Moscovitch & Winocur, 1997).

Results. Descriptive statistics are shown in Figure 1. As expected, the older participants had better vocabulary knowledge ($M = 33.5$, $sd=1.9$, range 26-36) than the younger participants ($M=30.7$, $sd = 2.8$ 22-35), but the fluency scores did not differ. None of these variables predicted responses, but reading times were shorter for participants with higher semantic fluency scores ($r = -.28$, $p = .005$ for trial reading times). All reading and processing times were considerably longer for older participants (p 's $< .001$). However, accuracy was worse only for the revision stories ($F(1,98) = 10.0$, $p = .002$). While both groups rated the jokes funnier than the other text types, this difference was less pronounced for the older participants. In a multiple regression, the only variable predicting this score was age, but not MWT, fluency, error rates or reading times.

Conclusions. These results indicate quantitative and qualitative differences between middle aged and older comprehenders. As expected, younger participants performed better on all time-sensitive measures. The facilitation effects for jokes reported previously were replicated in both groups. In addition, in line with a decline of executive functions, revision processes were more difficult for older comprehenders (Ferstl, 2006), and their subjective ratings of funniness indicated less discrimination between jokes and the other texts. Further research is needed to investigate individual variability and the interaction between linguistic revision processes – as postulated in incongruity theories of humor - and affective reactions. Importantly, the attenuated sensitivity to funniness in older comprehenders is relevant for humor based interventions in clinical and gerontological settings.

Table 1. Text examples for the comprehension task. The comprehension question for the joke story and its control texts was “Mark was a) a criminal, b) a womanizer”, for the revision story and its control texts: “The soup was cooked by .. a) the wife, b) the husband”

	Joke Story	Coherent Control	Incoherent Control
Context	Herbie to his pal Mark: „Why have all these women stopped chasing after you lately?“	Herbie to his pal Mark: „Great that you’ve managed to stay within the law lately.“	Herbie to Sally: “My car is in the shop, the brakes are broken.”
PunchLine	Mark: „Well, life as a pickpocket turned out to be risky in the long run.“		
	Revision Story	Coherent Control	Incoherent Control
Context	The chef to his wife: „Oh, too bad – the soup is way too salty!“	Charles to his wife: „Oh, not again – the soup is way too salty!“	Charles to the chef: “Oh, there is a red car over there.”
PunchLine	The wife: „I’m sorry, I’ll try to do better next time.“		

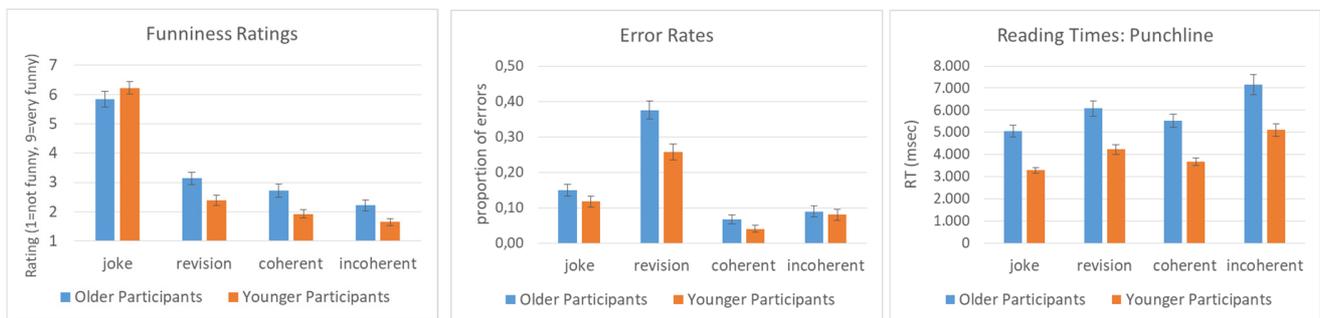


Figure 1. Funniness ratings, comprehension question accuracy and reading times for the punchlines as a function of text condition and age group. Jokes are rated funnier ($F(1,81)=484.2$, $p < .0001$), they are as easy to comprehend as the other stories ($F(1,81)=2.1$, n.s.), and they take less time to read ($F(1,81)=47.7$, $p < .0001$). Older participants find revision and control texts funnier than younger participants (group*texttype: $F(3,243) = 7.6$, $p < .0001$), they make more errors to comprehension questions after revision stories (group*texttype: $F(3,243) = 4.8$, $p < .003$), and they take much longer to read the stories (group: $F(1,81) = 28.2$, $p < .0001$).

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