Attentional orienting and disfluency-related memory boost are intact in adults with moderate-severe traumatic brain injury

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Traumatic brain injury (TBI) is associated with a range of cognitive-communicative deficits that interfere with everyday communication and social interaction (MacDonald, et al., 2017). Considerable effort has been directed at characterizing the nature and scope of cognitive-communication disorders in TBI, yet the underlying mechanisms of impairment are largely unspecified. The present research examines sensitivity to a common communicative cue, disfluency, and its impact on memory for spoken language in TBI. Disfluencies not only guide online processing (Bailey & Ferreira, 2003; Arnold, et al., 2004), but also have downstream consequences, improving long-term memory for the gist of spoken narratives (Fraundorf & Watson, 2011), and for individual words preceded by disfluency (Corley et al., 2007). For example, Corley et al. (2007) presented participants with spoken sentences, some of which included a disfluency (*um*) before the final word. A recognition memory test for the final words showed significantly better recognition of the probes that were preceded by disfluency compared to the probes from the fluent sentences. The locus of this disfluency-memory boost is hypothesized to be the attentional orienting properties of disfluency (Collard et al., 2008). Given associations between moderate-severe TBI and attentional impairment (Stierwalt, & Murray, 2002) we test for the presence and magnitude of the disfluency-memory boost in TBI.
Method: 53 participants (Ps) with moderate-severe TBI and 53 non-injured comparison Ps listened to a series of 80 English sentences as in Corley, et al. (2007). Some had penultimate disfluencies: *My sister had a skiing accident and she broke her [um] leg.* A subsequent recognition memory test probed memory for the critical words in the sentences (e.g., *leg*). Ps saw 160 words (½ old, ½ new) and indicated if they had heard that word in the sentences.
Results: The binary memory data (old/new responses to, e.g., “leg”) were analyzed with GLMM in R (Bates, et al., 2025; R Core Team, 2020), with a random effects structure determined using the *buildmer* package (Voeten, 2020). Ps with TBI successfully distinguished old and new probe words ($b = 1.57$, $z = 7.73$, $p < .0001$) at a similar level to non-injured comparison Ps (group interaction *ns,* $b = -.17$, $p = .27$), demonstrating intact memory for the previously-heard words. In addition, Ps with TBI showed significantly better recognition of words from disfluent vs. fluent sentences ($b = 0.57$, $z = 2.41$, $p = 0.02$) at a similar level to non-injured comparison Ps (group difference *ns,* $b = -0.002$, $p = .98$). In other words, Ps with TBI were 4.76 times more likely to respond “old” if they had actually heard the probe (vs. not heard it), and 1.79 times more likely to respond “old” if the probe was preceded by disfluency (vs. if the probe came from a fluent sentence). In sum, both groups showed a clear disfluency-related memory boost, replicating prior findings with healthy young adults.
Conclusions: We examined the impact of a common feature of every-day language, disfluency, on memory for spoken words in persons with and without moderate-severe TBI. Individuals with TBI experienced a *boost* to memory for words following disfluency similar to non-injured comparison Ps and likely the result of attentional orienting cued by the disfluency. This notable preservation of cognitive function in TBI speaks to the importance of examining natural language forms when attempting to understand how brain injury impacts communication. The findings advance mechanistic accounts of cognitive-communication disorder by revealing that, when isolated for experimental study, Ps with moderate-severe TBI are sensitive to attentional orienting cues in speech. Thus, some aspects of cognitive-communication disorders may not emerge from an inability to perceive and use individual cues, but rather from disruptions in managing (i.e., attending, weighting, integrating) multiple cognitive, communicative, and social cues in complex and dynamic interactions. This hypothesis warrants further investigation.

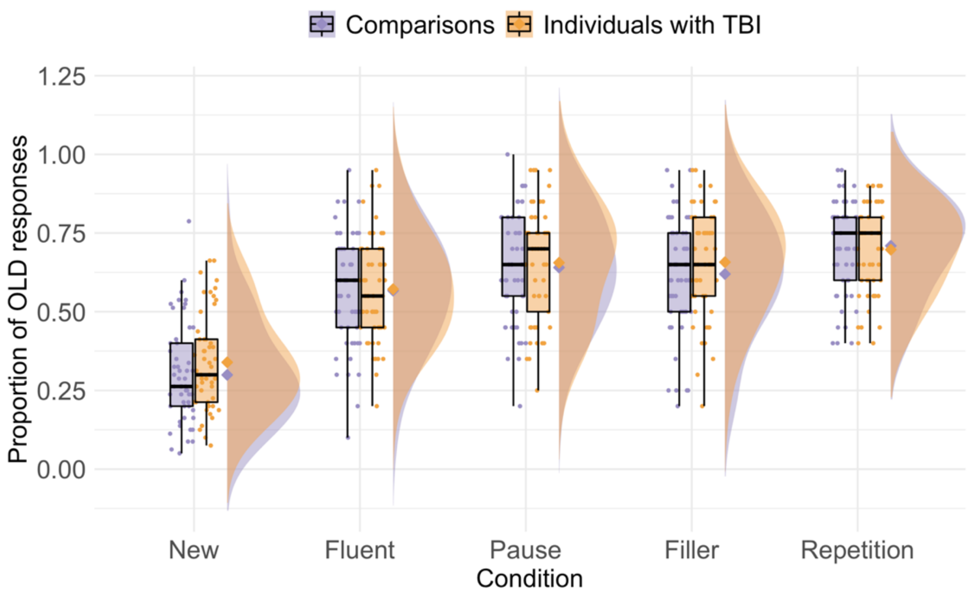

Figure. Memory results. Data points represent by-participant rates of responding "old". Boxplots indicate inter-quartile range based on by-participant means, with the median indicated in bold. By-participant means for each group are denoted by the diamond shapes to the right of the boxplots. The distributions represent probability density functions for the by-participant mean responses in each group.

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