

# Do people repeat themselves more in monologue or dialogue?

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## 1 Repetition and Language Processing

Repetition is believed to be important for spoken language processing because it simplifies production and comprehension; recycled lexical, syntactic and semantic materials make fewer demands on the cognitive environment (Pickering and Garrod, 2004). Dialogue, in particular, appears to be a particularly demanding form of language use. For example, the average offset between the end of a question and the start of an answer is 250ms, far less than the 600ms it takes to name an object. One explanation of how we cope with these demands has been to propose that dialogue is an especially repetitive form of language use and that this repetition facilitates processing (Tannen, 2007; Pickering and Garrod, 2004; Pickering and Ferreira, 2008).

The evidence that dialogue is repetitive comes primarily from laboratory-based, task oriented dialogues and also from samples of dialogue intentionally selected for examples of repetition such as Tannen's 2007 study. However, corpus studies of everyday conversation have suggested that general levels of repetition in dialogue are low. For example, people only repeat 3% more of each others words than would be expected by chance and systematically diverge in their use of syntax (Howes et al., 2010; Healey et al., 2014; Green and Sun, 2021).

Although repetition can speed up processing it ultimately leads conversations into a dead end. Conversations move forward when people respond to each other's contributions by e.g. appraising, amending, answering, proposing and counter-proposing to build on on each other's contributions (Healey et al., 2014). This leads to the hypothesis that dialogue should be less repetitive than forms of language, such as monologue, that do not require the integration of other people's contributions. A previous comparison of repetition in monologue and dialogue provides initial support for this view (Healey and Purver, 2018). Here we extend this analysis in two ways. First to a direct comparison of self-repetition across pairs of sentences in dialogue and monologue and second to include measures of semantic similarity as well as lexical and syntactic similarity.

## 2 Method

The samples of monologue and dialogue are drawn from the Diachronic Corpus of Present-Day Spoken English (DCPSE). The DCPSE includes a variety of genres ranging from formal and informal conversations to broadcast interviews, speeches and sports commentaries. The sample of monologues consists of all files in which only one person spoke, the sample of dialogues consists of all files in which only two people spoke (we ignore multi-party conversations here). This produces 300 sample dialogues with an average length of 92.2 sentences and 106 monologues with an average length of 76.5 sentences. No speakers appear in both the monologue and the dialogue samples.

The analysis presented here uses the sentence coding provided by the DCPSE annotators. In the dialogue case this can involve multiple sub-turns that make up one sentence. Lexical, syntactic and semantic similarity scores are calculated between each sentence and the preceding sentence produced by the same person. In the monologue case these are always adjacent but in the dialogue case always interleaved with another participant's sentence.

Following Healey et al. (2014), the lexical and syntactic similarity calculation is based on the number of matches between sentences, using a standard kernel normalisation for length of sentence (see (Moschitti, 2006)):

$$N_{AB}/\sqrt{N_{AA} \times N_{BB}}$$

Here,  $N_{AB}$  represents the number of matching elements between turn/sentence  $A$  and turn/sentence  $B$  (words for lexical similarity; syntactic production rule subtrees for syntactic similarity), and  $N_{AA}$  the number of matches when  $A$  is matched against itself. For the semantic similarity calculation we use SBERT that encodes the meaning of sentences in a 768 dimension vector space (Reimers and Gurevych, 2019). We compare sentences using cosine similarity between their vector representations.

### 3 Results

The pattern of results for each of the three comparisons are illustrated in Figure 1. Across all three measures there are lower levels of similarity in dialogue than monologue. Three GLMM analyses with Mode (Dialogue vs. Monologue) as a fixed factor and lexical, syntactic and semantic similarity between pairs of sentences as the dependent variable indicate that these differences are reliable. Lexical: ( $F_{(1,403)} = 8.31, p = 0.004$ , Fixed coefficient for Dialogue = -0.018), Syntactic: ( $F_{(1,403)} = 282.4, p < 0.000$ , Fixed coefficient for Dialogue = -0.16) Semantic: ( $F_{(1,403)} = 82.7, p < 0.000$ , Fixed coefficient for Dialogue = -0.057).

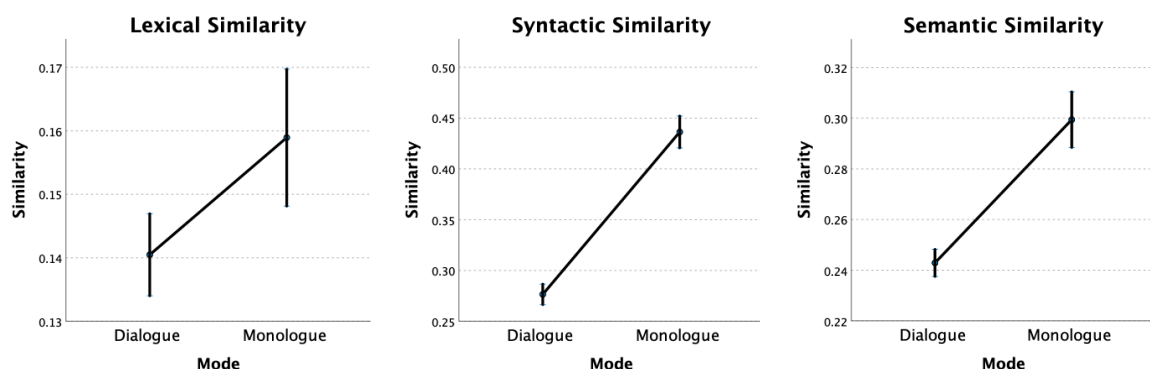


Figure 1: Lexical, Syntactic and Semantic Repetition across Sentences

#### 3.1 Conclusion

The results provide further evidence that the characterisation of dialogue as a highly repetitive form of language use is incorrect. There are specific circumstances in which repetition in dialogue is important e.g. reading back an address to confirm the details are correct, verbatim repetitions to clarify something that was said, and repetition of an earlier contribution to expand or elaborate on it. However, natural dialogue appears to be characterised by low average levels of repetition, substantially lower, in the data reported here, than in monologue.

This observation has implications for theories of language processing that seek to explain phenomena such as the speed of turn-changes in dialogue by reference to levels of repetition. Repetition fails to cover most of the observed data. As noted, previous analysis of other-repetition suggests that over 95% of what is said in ordinary dialogue does not repeat the other participants preceding turn and people systematically diverge in their use of syntax (Healey et al., 2014; Green and Sun, 2021). In addition, if repetition is attributed to mechanisms such as automatic priming (Pickering and Garrod, 2004; Pickering and Ferreira, 2008) this would inhibit people's ability to produce non-repeating elements and, given that these form the majority of what is said, should slow down production and comprehension.

Two possible confounds are present in the data. First, there are differences between the dialogues and the monologues in the genre's assigned by the DCPSE. Instances of monologues are almost exclusively associated with prepared speeches and spontaneous commentaries whereas the dialogues are drawn primarily from formal and informal conversations and broadcast interviews. This may correspond to differences in style or register that could themselves promote or reduce repetition e.g. for rhetorical effect. Resolving this issue would require a more controlled, experimental comparison of people producing monologues and dialogues in comparable contexts. Second, it may be that what is repeated in dialogue and monologue differs in its complexity and, therefore, its processing demands. For example, we might intuitively expect more complex syntactic constructions or use of lower frequency words in a prepared speech than in an informal dialogue. However, all things being equal, this would predict lower levels of repetition in monologue; the opposite of what we observe.

Although both monologue and dialogue involve extended linguistic performances dialogue is, arguably, a much more demanding task since it requires responding constructively and in real-time to a live interlocutor. The evidence from patterns of self-repetition support this suggestion and highlight the need for alternative explanations of language processing in dialogue.

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