

# Reciprocal language style matching in psychotherapy research

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## Abstract

Successful coordination of language, that is language style matching (LSM; Gonzales, Hancock, & Pennebaker, 2010) indicated by interdependent use of function words, might be of particular relevance to the psychotherapy process. Empirically, two previous psychotherapy studies indicate that LSM may provide a deeper understanding of the quality of the therapeutic alliance. Theoretically, this process of implicit linguistic coordination may be conceptualised as interpersonal synergy (Riley, Richardson, Shockley, & Ramenzoni, 2011). To illustrate the potential of LSM in psychotherapy research, patterns of LSM per 5 min segments and reciprocal LSM per speaking turn were assessed in a seven-session treatment demonstration of a narcissistic client. First, LSM predicted observed frequency of ruptures but did not predict observed working alliance in the corresponding 5 min segments. Second, LSM in these 5 min segments showed a quadratic trajectory of change within session and a stable pattern between sessions. Reciprocal LSM per speaking turn showed that within the majority of this treatment, the client followed the therapist's language style; however, this influence appeared to be bidirectional during the time of a physical altercation in session five. LSM may thus provide a novel way to study some of the more elusive aspects of the therapeutic interaction.

## KEYWORDS

alliance, interpersonal synergy, process research, speaking turn, synchrony

## 1 | LANGUAGE STYLE MATCHING

Whenever people interact, they are inclined to spontaneously synchronise their physiological and behavioural responses (e.g., Repp & Su, 2013; Yang, 2007). Through this process of temporal coordination, people become adapted to each other's rhythms and cycles of behaviour. Behavioural synchrony has an important interpersonal function: it increases liking, compassion and rapport (e.g., Vacharkulksemsuk & Fredrickson, 2012); increases their willingness to coordinate actions with others; and increases their capacity for doing so (Koole & Tschacher, 2016). Though interpersonal coordination is ubiquitous, people tend to synchronise more readily in positive relationships, with people with whom they wish to develop positive

relationships (Miles, Lumsden, Richardson, & Macrae, 2011) and with those with whom they have self-disclosed (Vacharkulksemsuk & Fredrickson, 2012). This phenomenon of behavioural synchrony has also been shown to exist in psychotherapy (see research on matching of emotional facial expressions; Blairy, Herrera, & Hess, 1999; movement and physiological synchrony; Ramseyer, 2019; and vocal prosody; Del Giacco, Salcuni, & Anguera, 2019). Moreover, people also spontaneously synchronise their word use in conversations with strangers and friends (Bodie, Cannava, Vickery, & Jones, 2016). This language coordination occurs not only for *what* someone is saying (content words like nouns and verbs) but also for *how* someone is saying it (function words, e.g., pronouns, articles, prepositions) (Ireland & Pennebaker, 2010). In order to quantify dyadic language

coordination in psychotherapy, we propose the use of language style matching (LSM; Gonzales, Hancock, & Pennebaker, 2010). In contrast to other verbal synchrony measures, such as latent semantic analysis that uses semantic categories (LSA; Landauer, Foltz, & Laham, 1998), or alignment analysis based on phrases (Du Bois, 2007), LSM is indicated by an interdependent use of function words.

Language style matching might be of particular relevance to psychotherapy for several reasons: first, function words occur at extremely high frequencies in most conversations, accounting for 60% of the words that are spoken (Ireland & Pennebaker, 2010). This means that even in therapy sessions in which relatively little is said by the client or therapist, a verbal synchrony measure of LSM can be applied. Second, in contrast to content words that are heavily constrained by situational factors, LSM reflects a personal style (trait) of speaking. The nature of function words implies that dyads that use these words similarly may also be similar in terms of an array of stable personality traits and more transitory behavioural differences. This means that function words might be better indicators of individual differences than are content words in the majority of situations in which language use might be studied to assess personality (Fast & Funder, 2008).

Moreover, what is arguably most relevant in a conversation between a client and therapist is not what they say per se, but how they say it (Beebe & Lachmann, 2003; Reyes et al., 2008). Linguistically, function words convey the relationship between content words, in order to keep track of the shared social knowledge and clarify what the other is referencing (Cannava & Bodie, 2017). Within the context of psychotherapy, LSM is therefore thought to reflect relational information by capturing how the client and therapist automatically coordinate their use of function words, develop a shared understanding and solve mutual tasks (Fusaroli, Rączaszek-Leonardi, & Tylén, 2014). For example, when a client says: "They told me this when I was almost 5 years old," the function words in the sentence (*they* and *this*) only make sense for a therapist who has prior knowledge of the group (*they*) and the object (*this*) in question, and the function words (*when* and *almost*) are used in the context of the client and therapist working towards increasing insight into the client's (*me* and *I*) past interpersonal experiences. A therapist might then respond by acknowledging the shared knowledge and therapeutic task: "Was that just before you moved?," by using the function words (*that*, *just*, *before* and *you*). In this example, the function word usage for the client is 6 out of 11 words (54%), whereas for the therapist, it is 4 out of 6 words (67%), which would result in an LSM score of 0.65. If the therapist had answered "This seems to be an unsatisfactory experience" (*this*, *to be* and *an*) (57% function words), it would have resulted in a higher LSM score of .97.

Thus, speaking about a topic in the same way might suggest that a client and a therapist are actively engaged, are listening to one another and are seeking to understand one another (see also Niederhoffer & Pennebaker, 2002). Put differently, LSM is said to reflect a similar thinking style, irrespective of whether the process was triggered by need for affiliation and resulted in greater closeness or was elicited by an engaging fight and resulted in a stalemate. The

psychological synchrony that LSM represents can encompass both of these possibilities (Ireland & Pennebaker, 2010).

## 1.1 | Language style matching and therapy process

Theoretically, LSM is reflective of the theory of interpersonal synergy (Riley, Richardson, Shockley, & Ramenzoni, 2011). This means that LSM is dynamic, in that it develops and changes over the course of each speaking segment, session and treatment depending on the function of the interaction. The level of LSM is thought to map directly onto the coordination of psychological states (Ireland & Pennebaker, 2010) and may be considered an implicit aspect of Bordin's (1979) working alliance.

As of yet, only three empirical studies have reported on the application of LSM in the therapeutic relationship (Aafjes-van Doorn, Porcerelli, & Müller-Frommeyer, 2020; Borelli et al., 2018; Lord, Sheng, Imel, Baer, & Atkins, 2015). These studies reported that the extent to which the therapist and the client are matched in their language style is associated with therapist empathy and treatment outcome, suggesting that LSM may provide a deeper understanding of a quality of the therapeutic interaction. In line with the alliance fluctuations between and within sessions (Eubanks, Muran, & Safran, 2018; Kramer, de Roten, Beretta, Michel, & Despland, 2009), LSM might not remain constant over time. Moreover, clients might match to the therapist's language style (Danescu-Niculescu-Mizil, Lee, Pang, & Kleinberg, 2012), therapists might match to the client (Baldwin, Wampold, & Imel, 2007), or they might adapt to each other in a bidirectional manner (Bucci & Maskit, 2007).

## 2 | METHODS

### 2.1 | Two LSM Metrics

The similarity in the use of function words across interactions per session or per 5 min segment can be calculated with the original LSM metric (Ireland & Pennebaker, 2010) which is illustrated in Equation 1. To capture the accommodation of function words unfolding over adjacent speaking turns, a reciprocal LSM metric has been developed (rLSM; Müller-Frommeyer, Frommeyer, & Kauffeld, 2019). Both LSM metrics are based on computerised text analyses performed using verbatim session transcripts that have been manually edited according to the guidelines put forth by Pennebaker, Booth, Booth, Boyd, and Francis (2015) for the software Linguistic Inquiry and Word Count (LIWC; Pennebaker, Boyd, Jordan, & Blackburn, 2015). To assess LSM per 5 min segment, the transcripts for each segment were first separated by speakers. Then, the words uttered by each speaker in each 5 min segment were analysed using LIWC resulting in one score per function word category per speaker per 5 min segment. For the calculation of rLSM, the original structure of the transcripts was maintained for each of the sessions and transcripts were segmented by speaking turn. LIWC analysis resulted in one score

per function word category per speaking turn. The LIWC is the basis for the calculation of both scores that are derived as follows. The LSM metrics represent the degree to which two people are producing similar rates of function words (pronouns, articles, prepositions, auxiliary verbs, adverbs, conjunctions and negations), and provide a relative score, controlling for differences in the number of words used by each speaker (Gonzales et al., 2010; Ireland & Pennebaker, 2010). Similar to the original LSM metric, the rLSM per speaking turn for each client–therapist interaction yields a range of 0 to 1 and follows Equation 1:

$$rLSM_{FW} = 1 - \frac{|FW_{Client} - FW_{Therapist}|}{FW_{Client} + FW_{Therapist} + 0.0001} \quad (1)$$

Language style matching and rLSM scores are first calculated per function word category and then averaged across categories to account for differences of LSM within each category (Müller-Frommeyer et al., 2019). These scores for each pair of successive speaking turns represent the time series of rLSM within a session. Additionally, scores can be assigned to individual speakers, thereby deriving a time series for the therapist and a time series for the client, representing how much the therapist matches the client and vice versa.

## 2.2 | Example application in psychotherapy research

The application of LSM can be illustrated in the therapeutic process of the fictional treatment of Alex from the TV Series “In Treatment” (produced by Garcia, 2008), also examined in a previous publication (Zalman, Aafjes-van Doorn, & Eubanks, 2019). This seven-session snapshot of an imperfect psychotherapy process is available to the general public and could facilitate learning in psychotherapy training settings. Although fictional (developed by the screenwriter together with licensed psychologists; Baht, 2010), the experiences of Alex poignantly capture subtle and less subtle therapeutic interactions between client and therapist.

### 2.2.1 | Client, therapist and treatment

The client, Alex, an African American married male, worked as a combat pilot in the US Navy. He was involved in a failed operation in Iraq, dropping a bomb that killed 16 civilians, and sought therapy following this traumatic event. He displayed a relatively high level of functioning and a narcissistic personality (Zalman et al., 2019). Alex’s therapist, Dr. Paul Weston, a white married male psychologist in his early 50s, used a psychodynamic Rogerian therapy approach (Greenberg, 2011).

During the seven-session treatment, the therapist helps Alex to examine his desire to excel and to never disappoint others, and his relationship with his wife, father and son. Over the course of treatment, the relationship between Alex and his therapist appears to

intensify to the point that the therapist receives personal insults and ultimately physically attacks Alex at the end of session five. They reflect on this violent incident in session six, and in session seven, Alex announces that he wants to terminate therapy and return to work (for a more detailed description of the treatment process, see Zalman et al., 2019).

### 2.2.2 | Research questions and additional measures

This brief paper aims to demonstrate the potential of LSM in psychotherapy research. To give researchers and practitioners an idea of what kind of research questions may be answered using LSM, we examined the following:

RS1): How does LSM relate to observer-coded measures of quality of working alliance and frequency of ruptures in this treatment? Given the conceptual convergence of LSM with aspects of the alliance, we hypothesised that the trajectory of change in LSM would positively predict observer-rated measurements of alliance (WAI-O) and negatively predict the frequency of rupture markers (3RS) (H1).

RS2): How does LSM as a proxy of interpersonal synergy change over time within session and over treatment? Considering the expected alliance fluctuations between and within sessions indicated by recent empirical studies (Adler, Shahar, Dolev, & Zilcha-Mano, 2018; Kramer et al., 2009), it was hypothesised that overall LSM and rLSM would show a stable, linear or quadratic pattern over time (H2).

RS3): Within the treatment of this narcissistic client, does the therapist adapt his language style to the client, or does the client follow the therapist’s language style? Given that the question of who matches to whom has not yet been empirically addressed, no directional hypothesis was suggested. In order to explore these three questions, we examined the LSM per 5 min segments and the rLSM per speaking turn.

#### *Alliance*

The Segmented Working Alliance Inventory Observer Version (SWAI-O; Berk, Safran, Muran, & Eubanks, 2013) is an observer-based inventory used to assess change in alliance for every 5 min segment within a session (e.g., Adler et al., 2018). The SWAI-O consists of 12 items, which are rated on a 7-point Likert scale (1 = never to 7 = always, where 4 represents an assumed good alliance), and is divided into two subscales reflecting the agreement on task and bond.<sup>1</sup> The alliance ratings showed good to excellent inter-rater reliability (SWAI-O Mean: ICC(2,2) = .95; SWAI-O Task: ICC(2,2) = .78; SWAI-O Bond: ICC(2,2) = .85) (Koo & Li, 2016).

#### *Ruptures*

The Rupture Resolution Rating System (3RS; Eubanks, Muran, & Safran, 2015) is an observer-based coding system of alliance ruptures and resolution strategies rated per 5 min segments. Ruptures

can range from subtle tension (e.g., client passively accepting interpretation) to a more explicit tension (e.g., client rejecting the necessity of a given task). The 3RS has demonstrated good inter-rater reliability for the frequency of rupture markers (Eubanks, Lubitz, Muran, & Safran, 2019). The rupture ratings showed excellent inter-rater reliability ( $ICC(2,2) = 1$ ) (Koo & Li, 2016).

### 2.2.3 | Results

The seven sessions had an average of five 5 min segments per session (ranging from 4 to 6) and an average of 116 speaking turns per session (min = 83, max = 157). The mean LSM per 5 min segment was  $M = .78$  ( $SD = .11$ ; min = 0.51 and max = 0.96). The mean rLSM across all speaking turns in the seven sessions was  $M = .51$  ( $SD = .02$ ) and ranged from 0.000001 to 1. The LSM data were not normally distributed.

First, in line with recommendations for the multilevel modeling of case study data (Shadish, Kyse, & Rindskopf, 2013), linear mixed-effect models were calculated to assess whether LSM predicted ratings on the 3RS, and the SWAI-O in the corresponding 5 min segments, including session as random effect. We tried to use maximal random effects structure as per current best practice when possible (Barr, 2013). Results showed that LSM positively predicted ruptures on the 3RS ( $B = 6.78$ ,  $SE = 2.61$ ,  $t = 2.59$ ,  $p = .007$ ). However, LSM only marginally predicted the SWAI-O total score ( $B = -1.53$ ,  $SE = 1.15$ ,  $t = -1.34$ ,  $p = .095$ ) and its subscale bond ( $B = -1.68$ ,  $SE = 1.06$ ,  $t = -1.58$ ,  $p = .064$ ) and did not show a relationship to the subscale task ( $B = -1.39$ ,  $SE = 1.34$ ,  $t = -1.03$ ,  $p = .154$ ).

This suggests that in this treatment, LSM was not predictive of overall alliance (but high LSM was marginally predictive of low alliance bond), and segments with high levels of LSM were observed to have high frequencies of ruptures (contrary to H1). See Figure 1 for a visual illustration of the patterns of change in LSM, alliance and ruptures over the treatment.

Second, we investigated LSM for each 5 min segment. Using linear mixed-effect models, we examined the within-session trajectories of LSM change for a linear (steady increase or decrease) and a quadratic pattern (low-high-low trend or high-low-high trend) and included session as random effect. The results indicated no linear trend ( $B = -0.02$ ,  $SE = 0.01$ ,  $t = -1.56$ ,  $p = .13$ ), but did show a quadratic trend for LSM change within sessions ( $B = -0.004$ ,  $SE = 0.002$ ,  $t = -2.45$ ,  $p < .05$ ), which indicates a low-high-low (inverted U-shaped) pattern of LSM throughout a session. Simple regression analyses revealed that LSM change between sessions did not show a linear ( $B = -0.002$ ,  $SE = 0.005$ ,  $t = -0.41$ ,  $p = .70$ ) or quadratic trend ( $B = -0.0004$ ,  $SE = 0.0008$ ,  $t = -0.53$ ,  $p = .61$ ) in the data, suggesting a stable LSM pattern between sessions over time. Thus, in line with the empirical literature on alliance trajectories, a stable pattern was identified between sessions, and a quadratic pattern of LSM fluctuations was identified within sessions (confirming H2).

Third, using the rLSM metric, we tested who adapted their language style to whom in each speaking turn of this client-therapist

dyad. See Figure 2 for a visual illustration of the trajectories of rLSM change for the client and therapist per speaking turn. For this treatment, the client's level of rLSM was significantly higher than the therapist's level of rLSM within sessions ( $B = 0.09$ ,  $SE = 0.02$ ,  $t = 5.39$ ,  $p < .001$ ), as well as between sessions ( $B = 0.09$ ,  $SE = 0.01$ ,  $t = 7.44$ ,  $p < .001$ ), suggesting that Alex adapted his language style to his therapist's language style throughout treatment, possibly perceiving him as higher status (Danescu-Niculescu-Mizil et al., 2012).

### 2.3 | Case illustration

The LSM metrics might help clinicians to reflect on the therapeutic process in a particular difficult moment of a session when a change in the quality of the relationship occurs. In this fictional case, the therapeutic interaction escalated towards a physical altercation at the end of session five. See Figure 3 for a visual illustration of the patterns of low alliance, high LSM and high frequency of ruptures before, during and after the physical altercation at the end of session five. Moreover, the direction of rLSM in the speaking turns of these particular segments differed from the reciprocity pattern of the other segments in the treatment. Linear mixed-effect models for these 5 min segments showed that leading-following behaviours were more equal among the client and therapist; in that, there was no significant difference between speakers during this particular time ( $B = 0.01$ ,  $SE = 0.08$ ,  $t = 0.14$ , all  $ps > .05$ ). Thus, in these particular segments, symmetry (not leadership) was present, in line with the theory set out by Bucci and Maskit (2007).

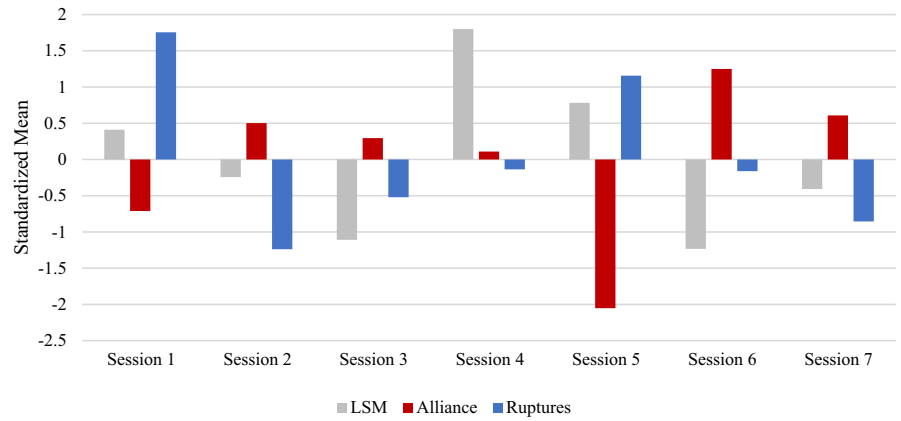
## 3 | DISCUSSION

### 3.1 | Potential of LSM for research and practice

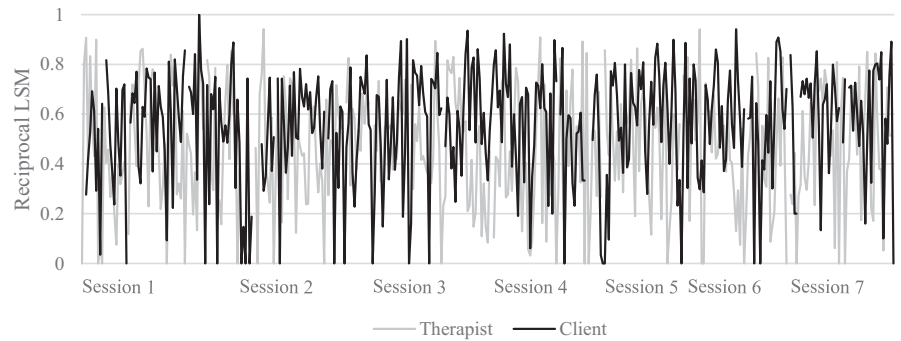
We found that LSM was not predictive of the working alliance and positively predicted the frequency of ruptures. Therefore, we tentatively conclude that LSM might reflect aspects of the therapist-client relationship that go beyond the working alliance and that are related to confrontation and withdrawal ruptures within sessions. Additionally, LSM appeared to remain stable over treatment but showed substantial change within sessions, starting low, reaching the maximum in the middle of the session and decreasing afterwards. Lastly, the client tended to adapt to his therapist's language style (rather than the other way around), possibly explained by a difference in status between therapists and clients (Danescu-Niculescu-Mizil et al., 2012).

Given that the research on LSM in psychotherapy is very preliminary, larger-scale research is needed to examine LSM in relation to existing self-report and observer-coded measures before firm conclusions can be drawn about the clinical utility of this approach. First, the practical advantages of a computerised methodology, including its reliability, objectivity and cost-effectiveness (Tausczik & Pennebaker, 2010), possibly make it a promising tool for psychotherapy research.

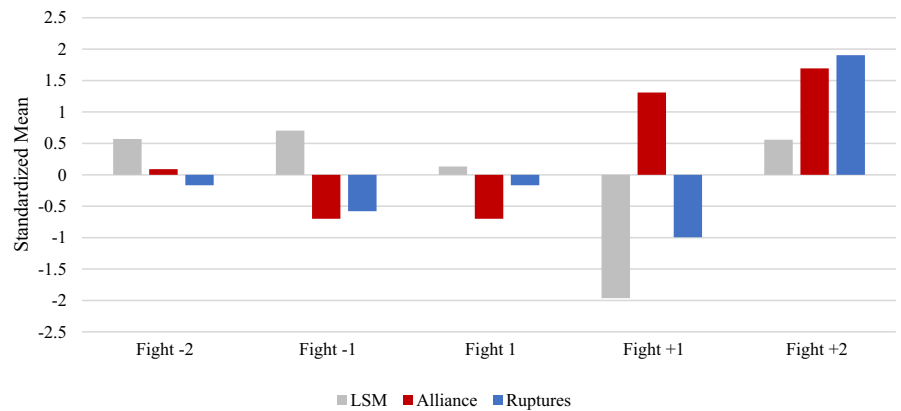
**FIGURE 1** Standardised language style matching (LSM), alliance and rupture scores for each of the seven sessions [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 2** Reciprocal language style matching (LSM) across all seven sessions



**FIGURE 3** Standardised language style matching (LSM), alliance and frequency of ruptures in the segments before, during and after the physical altercation (fight) in session 5 [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



Second, future research may explore if LSM levels in early sessions prove to have significant prognostic value, potentially predicting the self-reported working alliance and eventual treatment outcome, and signalling cases that are unlikely to do well. Also, the examination of LSM could potentially highlight relevant moments in therapy that were not noticed by the therapist. The LSM metric may translate intuitive processes into a measurable construct relevant for researchers, supervisors and therapists from a wide range of orientations.

### 3.1.1 | Current shortcomings and future research

First, the lack of published LSM benchmarks in psychotherapy is an important shortcoming in interpreting the rLSM results. Specifically,

our preliminary findings appear to challenge the assumption that high LSM scores reflect good therapeutic work. Larger-scale research could examine therapeutic situations in which LSM is expected to be relatively low (e.g., during confrontations) and explore how these LSM scores relate to alliance and ruptures. Also, leading versus following behaviours may have different therapeutic effects. Further research on leading and following patterns in (r)LSM may, for example, elucidate if synchrony influences the client's beliefs indirectly, by increasing receptiveness to the therapist's suggestions (Tanner & Chartrand, 2006).

Second, interpretation of LSM data is further complicated by possible differences in function word usage reflected by culture, race, age, educational level and upbringing. It is, for example, possible that people whose first language is not English use function



words differently (Santiago-Rivera & Altarriba, 2002) and that such differences between the therapist and client play a role in the subsequent achieved interpersonal synergy in treatment sessions.

Moreover, the basic tendency to synchronise with others does not only emerge in verbal ways. It might, for example, be beneficial to examine multimodal synchrony in psychotherapy, by investigating how facial expressions (Blairy et al., 1999), vocal rhythm coordination (Håvås, Svartberg, & Ulvenes, 2015), movement synchrony (Ramseyer, 2019), and physiological synchrony of heart rate and skin conductance (Marci, Ham, Moran, & Orr, 2007) and LSM interact and contribute to the therapeutic alliance.

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## END NOTE

<sup>1</sup> The SWAI-O does not include the third WAI-O subscale (agreement on goals), as this is not expected to change every 5 min.

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