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Articles

Perception of movement mimicry and working alliance in a psychotherapy session: the role of observer characteristics and task instruction

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Abstract

Background: In psychotherapy, the mirroring of nonverbal behaviour (mimicry) has been linked to more favourable patient evaluations of the therapeutic relationship. Because video recordings are commonly used in clinical supervision, it is important to understand how nonverbal mimicry is perceived by third-party observers. Across two experiments, we investigated the accuracy of mimicry perception and examined associations with observer characteristics (emotional competence and mindfulness) as well as task instructions.

Method: In Experiment 1, 132 participants (70% female; mean age = 30.12 years, SD = 11.92; 80% psychology students) were randomly assigned to view a video of a patient–therapist interaction that either included 10 instances of movement mimicry or a digitally edited version in which these instances were removed. Participants were instructed to watch the video attentively but were not informed about the presence of mimicry. In Experiment 2, 94 participants (56% female; mean age = 24.97 years, SD =7.64; 80% psychology students) viewed the mimicry video with explicit instructions to attend to nonverbal behaviour.

Results: Experiment 1 indicated that the presence of mimicry did not affect observers' ratings of the working alliance. The number of perceived instances of mimicry varied substantially across participants and was positively associated with self-reported emotion regulation abilities. Observers underestimated the number of mimicry instances in the mimicry video. In Experiment 2, participants slightly overestimated mimicry. In this experiment, perceived mimicry frequency was positively correlated with working alliance ratings.

Conclusion: These findings highlight the importance of both observer characteristics and task instructions in the assessment of nonverbal mimicry in psychotherapy contexts. However, the observed effects were small and based on a specific instance of mimicry within a single dyad evaluated by psychology students. Future research should seek to replicate these findings using a broader range of interaction dyads (e.g., patients with different mental disorders), as well as evaluators with varying levels of expertise and professional backgrounds (e.g., psychotherapists).

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1. Introduction

Observing dyadic interactions - pairs of individuals engaged in communication - is critical across a variety of contexts, particularly when understanding relationship dynamics and communication patterns is essential. Such observations are relevant in educational settings (teachers and students), organizational contexts (managers and employees), commercial interactions (salespeople and customers), and clinical settings (patients and psychotherapists).

In psychotherapy, interactions between therapists and patients involve both verbal and nonverbal communication. Nonverbal behaviors can become synchronized, meaning they are temporally coordinated regardless of the specific postures or gestures expressed. When a nonverbal behavior becomes coordinated both temporally and structurally (e.g., a therapist imitates a hand movement of the patient), this phenomenon is referred to as mimicry (Salazar Kämpf & Exner, 2025). Evidence from systematic reviews and meta-analyses indicates that higher levels of nonverbal synchrony (Atzil-Slonim et al., 2023; Gregorini et al., 2025; Koole & Tschacher, 2016; Ramseyer & Tschacher, 2011) as well as mimicry are associated with more favorable patient evaluations of the therapeutic relationship (Geerts et al., 2006; Salazar Kämpf et al., 2021).

These findings may be interpreted in light of different models, including embodied (grounded) cognition, mirror neuron and action-observation frameworks, as well as predictive processing accounts (Barsalou, 2008; Gallese et al., 2004; Niedenthal, 2007; Lobb et al., 2024; Friston, 2010; Kilner et al., 2007; Perrella, 2017). From an embodied cognition perspective, perceiving others is not a purely visually inferential process but is grounded in the observer's own sensorimotor systems, such that observed movements are internally mapped onto bodily states and action representations (Barsalou, 2008; Niedenthal, 2007). Closely related, mirror neuron and action-observation frameworks propose that observing another person's movements activates corresponding motor representations in the observer, thereby supporting action understanding, affective resonance, and interpersonal attunement (Chartrand & Bargh, 1999; Gallese et al., 2004; Rizzolatti & Craighero, 2004; Schmidt et al., 2021). Similarly, predictive processing models propose that social perception depends on the continuous generation and updating of predictions about others' actions, intentions, and emotional states based on prior experience and incoming sensory information (Friston, 2010; Kilner et al., 2007). Within this view, congruent movement patterns may reduce prediction error, increase processing fluency, and thereby foster impressions of connection, and mutual understanding. Together, these accounts offer complementary mechanisms through which movement coordination within a dyad may directly shape understanding, rapport, and social connectedness.

Compared to patients' ratings, the perception of nonverbal mimicry by third-party observers remains underexplored. Prior studies suggest that shifts from synchronous to asynchronous behavior may lead observers to evaluate dyads less positively in terms of affiliation and effectiveness (Marques-Quinteiro et al., 2019). Conversely, Genschow and Alves (2020) reported that observers evaluated mimickers negatively, perceiving them as more submissive, indicating that mimicry does not uniformly enhance perceived interpersonal qualities. This inconsistent finding may reflect effects of leader–follower dynamics, in which the person who adapts their behavior can be perceived either as socially attuned and cooperative or as lower in status and more subordinate, depending on the interactional context (Kavanagh et al., 2011).

To address this research gap, the present study investigated the effects of nonverbal mimicry on third-party evaluations of a patient-therapist interaction. In a first experiment, participants were asked to attentively watch a video excerpt from an initial psychotherapy session in which the patient engaged in 10 discrete nonverbal mimicry behaviors (e.g., mirroring of a hand gesture). This video was digitally edited to remove these mimicry instances (control video). Participants were randomly assigned to either the mimicry or no-mimicry condition and were asked to rate the perceived quality of the therapeutic alliance.

Based on the findings of the first experiment, in which participants were not informed about movement mimicry and showed low overall accuracy in detecting it, a second experiment was conducted. In this follow-up study, participants were instructed to pay attention to the verbal and nonverbal behaviors of the patient and therapist before viewing the mimicry video. In addition, control variables potentially related to estimation errors in mimicry were assessed, including perceived activity level and the likability of the observed interaction partners. We examined whether higher levels of perceived overall motor activity might inflate synchrony estimates, as observers could mistakenly equate the amount of movement with coordination. Furthermore, Melton et al. (2023) found that the likability of an interaction partner was associated with perceived—but not objective—movement synchrony.

Given evidence that synchronization serves as a positive interpersonal signal, we hypothesized that higher frequency of mimicry (objective, perceived) would be associated with more favorable evaluations of the therapeutic relationship (Chartrand & Lakin, 2013; Koole & Tschacher, 2016; Mogan et al., 2017; Da Silva & Wood, 2024; Gregorini et al., 2025). In addition, we explored whether participants' self-reported sensitivity to nonverbal cues, emotional competence, and mindful attention were related to their perception of mimicry in the interaction.

2. Materials and Methods (Experiment 1)

2.1. Participants

Participants (n = 132; 93 females, 39 males; mean age = 30.12 years, SD = 11.92; 80% psychology students) were randomly assigned to one of two groups that either watched a video showing a brief patient-therapist interaction with 10 instances of movement mimicry or without mimicry. The groups did not differ in mean age ($t(130) = 0.62$, $p = .66$) and male-female ratio ($Chi^2 = 0.53$, $p = .47$).

2.2 Procedure

Participants were asked to attentively watch a 15-minute video excerpt of an initial psychotherapy session, adopting the perspective of a supervisor in order to answer questions about it. Participants were not informed about movement mimicry. The videos were presented on a computer screen (single testing). In the video, the therapist introduced herself as a psychotherapist. The female patient described experiencing depressive symptoms - such as persistent sadness, loss of interest or pleasure in activities, low energy, reduced appetite and sleeping problems - which interfered with her daily functioning. In the mimicry video, the patient responded with 10 similar head and body movements, such as hair stroking, leg crossing in response to the therapist's movements. This video was edited to create a second version with no mimicry. For editing, we used DaVinci Resolve to remove the patient's imitated movements by masking the corresponding half of the video with a looping segment in which the patient remained passive (i.e., non-reactive to the therapist's movements). All edited segments (average duration: 4 s per segment) contained no verbal interaction. The cut and pasted video segments had the same duration. Thus, immediacy (the timing of the verbal exchange) was not changed. Smooth cuts were applied for all transitions to remove any movement artifacts. A pilot test had indicated that participants were not able to notice the editing. The two depicted individuals provided their written consent for the videos to be used for research purposes.

Before viewing the video, participants reported sociodemographic information (age, sex). Ratings for the therapeutic relationship comprised 10 statements: "The patient and therapist have a good therapeutic relationship, have a good basis for conversation, work well together, understand each other, the patient feels appreciated by the therapist, the patient believes that the therapist likes her, the patient trusts the therapist's ability to help her, the patient and the therapist trust each other, find each other likable, and respect each other". The selection of items was based on Rogers' core conditions for a positive patient–therapist relationship (empathy, authenticity, and acceptance; Rogers, 1951) and the Working Alliance Inventory (WAI-SR; Munder et al., 2010; Wilmers & Munder, 2016). The WAI-SR has been validated in both psychotherapy outpatients and inpatients and has demonstrated good psychometric

properties (Cronbach's α > .80). Because the original questionnaire was designed as a patient self-report measure, the items were adapted for a third-person observational perspective. The adapted 10-item scale, labeled "working alliance," demonstrated excellent internal consistency in the present sample (Cronbach's α = .95).

At the end of the experiment, participants also provided a rating concerning the perceived number of imitated movements in the video. In addition, they completed the following questionnaires/tests:

a) Profile of Nonverbal Sensitivity (PONS, Rosenthal et al., 1979): Participants are shown 40 images (PONS-Still) and must decide which of the two given response options best reflects the emotion or intention depicted in the image (based on facial expression, body posture, etc.). The test aims to assess sensitivity to nonverbal signals. Since this test had insufficient reliability in the present sample (Cronbach's α < .30) it was excluded from the analysis. We acknowledge that the stimulus material, which is now over four decades old, may be outdated. Indeed, some participants informally commented on the "old-fashioned" appearance of the images, suggesting that the material may not fully capture the construct in a contemporary and ecologically valid context. (However, there is no modern replacement of the PONS).

b) The Emotional Competence Questionnaire (ECQ; Rindermann, 2009; Cronbach's α in the present sample = .93) has four scales (recognizing one's own emotions, recognizing emotions in others, regulation and control of one's own feelings, emotional expressivity). Participants respond to 62 items (e.g., When I feel upset, I can usually calm myself down fairly quickly) on a five-point scale ranging from 0 ("does not apply at all") to 4 ("applies completely). Mean scores are computed, with higher scores reflecting greater EC.

c) Mindful Attention and Awareness Scale (MAAS, Michalak et al., 2008¸ Cronbach's α in the present sample = .87): Participants assess their mindfulness in daily life using 15 items (e.g., I notice that I do things without paying attention to them; inverted) on a six-point scale ranging from 0 ("almost never") to 5 ("almost always). A sum score is calculated, with higher scores reflecting greater mindfulness.

2.3 Statistical analyses

Group ratings were compared via t-tests. We report Cohen's d as effect size measure. Moreover, correlation analyses were performed separately for the mimicry and no-mimicry group. A hierarchical regression analysis was computed to predict perceived instances of movement mimicry in the video based on the control variables age, sex and group entered in block 1 and the questionnaire scores (four subscales of the ECQ, MAAS) entered in block 2. Prior to the hierarchical regression analysis, assumptions of multiple linear regression were examined and met (linear relationship between predictors and the outcome, homoscedasticity, normality of

residuals, no multicollinearity, no significant outliers). Predictors were considered statistically significant when observed p-values were below .05.

3. Results (Experiment 1)

Descriptive statistics and the results of the t-tests are presented in Table 1.

The two groups (mimicry vs. no-mimicry) did not differ in overall self-reported emotional competence and mindfulness. The therapeutic alliance was rated as above average by participants in both groups, with no significant between-group differences (Table 1).

The number of perceived mimicry occurrences differed significantly between groups (Table 1). One-sample t-tests indicated that participants in the mimicry condition significantly underestimated the number of mimicry instances ($M = -3.48$, $t(63) = -4.94$, $p < .001$, $d = .62$), whereas participants in the no-mimicry condition significantly overestimated them ($M = 3.16$, $t(67) = 5.72$, $p < .001$, $d = .69$).

In both groups, the number of perceived mimicry instances was not correlated with evaluations of the working alliance (no-mimicry: $r = -.02$; mimicry: $r = .01$).

Table 1.

Means (standard deviations) [95% confidence intervals] for the assessed variables

	No Mimicry (n = 68)	Mimicry (n = 64)	t(p)	Cohen's d
	Ratings			
Perceived mimicry (n)	3.16 (4.56) [2.06-4.26]	6.52 (5.58) [5.12-7.93]	3.79 (<.001)	0.67
Working alliance	62.07 (18.81) [57.51-66.62]	66.24 (19.25) [61.39-71.08]	1.37 (.174)	0.24
	Questionnaires			
ECQ recognition own	2.76 (0.57) [2.61-2.89]	2.63 (0.73) [2.44-2.81]	- 1.16 (.250)	- 0.20
ECQ recognition others	2.83 (0.46) [2.71-2.93]	2.88 (0.55) [2.74-3.01]	0.60 (.550)	0.10
ECQ regulation	2.61 (0.68) [2.44-2.77]	2.65 (0.59) [2.49-2.79]	0.42 (.679)	0.07
ECQ expression	2.26 (0.63) [2.11-2.41]	2.03 (0.70) [1.85-2.21]	- 2.03 (.045)	- 0.35
MAAS_Mindfulness	45.62 (11.47) [42.84-48.39]	43.98 (11.70) [40.82-46.68]	- 0.85 (.420)	- 0.14

Note. n = number of perceived imitated movements; ECQ: Emotional Competence Questionnaire; MAAS: Mindful Attention and Awareness Scale.

The hierarchical regression analysis showed that the model significantly predicted perceived mimicry, explaining a total of 18.5% of the variance ($F(8,130) = 3.46$, $p < .001$). The experimental condition (group), entered in the first block, was a significant predictor on its own and accounted for 11.5% of the variance, indicating that group assignment had a meaningful effect on how much mimicry was perceived. Adding individual difference measures (ECQ and MAAS) in the second block significantly improved the model, increasing the explained variance by an additional 7%. Within these variables, the ECQ emotion regulation subscale emerged as a significant predictor of perceived mimicry, suggesting that participants with higher self-reported emotion regulation skills perceived more mimicry behavior.

4. Materials and Methods (Experiment 2)

4.1 Participants

A total of 94 participants (53 females, 41 males; mean age = 24.97 years, SD =7.64, 80% psychology students) participated in the study.

4.2 Procedure

The procedure followed that of Experiment 1; however, only the mimicry video was presented. Participants were explicitly instructed to pay attention to the verbal and nonverbal behavior of both the patient and the therapist.

4.3 Statistical analyses

A regression analysis was computed to predict perceived instances of movement mimicry in the video based on the assessed control variables (sex, age, liking of the patient, liking of the therapist, perceived activity level of the patient, perceived activity level of the therapist).

5. Results (Experiment 2)

Participants reported a mean of 11.48 instances of perceived mimicry (SD = 5.98) and rated the therapeutic relationship as above average in quality (Table 3). The two variables were positively correlated ($r = .25$, $p = .016$; determination coefficient: $r^2 = .06$).

The regression model was not statistically significant ($F(6,93) = 1.94$, $p = .083$), and none of the individual predictors (liking of the therapist:, liking of the patient, activity level of the therapist, activity level of the patient) reached statistical significance (all $p > .057$).

A computed one-sample t-test indicated that participants overestimated the number of mimicry instances in the video ($t(93) = 2.39$, $p = .019$, $d = .25$). The estimation error in experiment 2 was significantly lower ($M = 1.48$) than the error of the mimicry group in experiment 1 ($M = -3.48$; $p < .001$).

Table 3.

Means (standard deviations) [95% confidence intervals] for the assessed variables

	M (SD)	95% CI
Perceived mimicry (n)	11.48 (5.98)	10.25-12.70
Working alliance	65.78 (22.64)	61.13-70.41
Liking of therapist	73.61 (21.85)	69.13-78.08
Liking of patient	71.94 (22.19)	67.39-76.48
Activity level of therapist	59.07 (23.74)	54.21-63.93
Activitiy level of patient	34.78 (22.83)	30.09-39.45

Note. n = number of perceived imitated movements.

6. Discussion

The present research examined nonverbal mimicry and perceived working alliance in a psychotherapeutic context from the perspective of third-party observers.

Contrary to our expectations, in the first experiment, mimicry did not influence evaluations of the therapeutic relationship. Previous research suggests that observers tend to perceive a stronger working alliance and greater social closeness between individuals who move synchronously compared to those who move asynchronously (Hove & Risen, 2009; Marques-Quinteiro et al., 2019). Similarly, nonverbal mimicry is considered an interpersonal cue indicative of relationship quality in general (Da Silva & Wood, 2024) and within the context of psychotherapy (Geerts et al., 2006; Salazar Kämpf et al., 2021). However, these findings rely exclusively on the reports of those who mimic and those who are mimicked, while the perspective of external observers remains largely unexplored.

A notable finding of Experiment 1 was the high interindividual variability in observers' perceptions of movement mimicry. The number of perceived imitated movements ranged from 1 to 25 for the mimicry video, though, 68% underestimated the number of mimicry instances. Thus, without specific instructions, nonverbal mimicry is not as easy to recognize as one might assume. Mimicry estimations were associated with the scores on a subscale of the emotional competence questionnaire: emotion regulation (Rindermann, 2009). Participants who reported higher emotional control perceived greater movement mimicry between the patient and therapist. It is possible that individuals with strong emotion regulation skills are more sensitive to subtle interpersonal signals, including body language (for a review on the sensorimotor control framework for understanding emotional communication and regulation, see Williams et al., 2020). However, it should be noted that the proportion of variance in mimicry perception

explained by emotional competence was small (7%), and individuals with better emotion regulation are not necessarily more "attuned" to mimicry. Other explanations, such as the influence of third variables, are also possible and should be examined in future studies.

In Experiment 2, explicit instructions to focus on the patient's and therapist's nonverbal behavior improved the accuracy of mimicry judgments. On average, participants reported observing 11.5 instances of imitation, compared with the actual number of 10. In addition, the expected association between the perceived frequency of movement mimicry and the quality of the therapeutic relationship was supported (Geerts et al., 2006; Salazar Kämpf et al., 2021). However, this relationship was small, with the coefficient of determination indicating only 6% shared variance. Participants who were directed to attend to nonverbal cues tended to slightly overestimate mimicry, whereas those instructed to watch the video more generally tended to underestimate the number of mimicry instances. Together, these findings suggest that task instructions systematically influence the perception of mimicry.

Finally, none of the included control variables (sex, gender, or perceived liking and activity level of the patient and therapist) were associated with mimicry judgments in Experiment 2. This suggests, consistent with Experiment 1, that additional factors have yet to be identified to explain variability in observers' perceptions of mimicry.

The findings of the two conducted experiments underline the need for further research into the factors that shape observer-based perceptions of mimicry. For example, specific attention needs to be directed toward leader–follower dynamics, contextual variables, the roles of interaction partners within a dyad, and their interaction goals. The meaning of mimicry may vary depending on these factors. For example, a previous study on interactions between two students indicated that the individual who engaged in mimicry was rated as submissive by observers (Genschow & Alves, 2020). However, mimicking behavior may not be evaluated negatively in a patient–therapist interaction, which is, by definition, asymmetrical. Future studies could also study additional personality traits (e.g., Big-Five) or involve experienced clinical psychologists, supervisors, or psychotherapists from different theoretical backgrounds (e.g., gestalt therapy, behavior therapy) to examine whether professional training influences perception of patient-therapist mimicry in treatments for different disorders.

Several limitations of the present experiments should be acknowledged. First, the findings are based on a single dyad consisting of a female patient presenting with depressive symptoms and a female therapist, which limits the generalizability of the results. Second, the observer sample was composed predominantly of psychology students, restricting the applicability of the findings to other observer populations. However, it should be noted that a large proportion of this group intends to pursue a career in psychotherapy following the completion of their studies. Third,

the study focused on a specific leader–follower dynamic in which the therapist's movements consistently preceded those of the patient. Reversing this dynamic may lead to different evaluations. Finally, evaluations for the therapeutic alliance were positive. Mimicry may play a more important role when ruptures in therapeutic interactions need to be overcome and to be repaired (Høgenhaug et al., 2024).

7. Conclusion

Across two experiments, we focused on movement mimicry in a patient–psychotherapist interaction. The findings revealed substantial interindividual variability in the perception of mimicry. In the absence of explicit instructions to attend to nonverbal cues, observers tended to underestimate mimicry, whereas specific instructions to focus on nonverbal behavior led to slight overestimation. Furthermore, mimicry perception was linked to individual characteristics, such as emotion regulation abilities. However, correlations were modest and do not justify a causal or functional interpretation. Nevertheless, the present results suggest that the recognition of nonverbal mimicry is neither automatic nor uniformly salient. By focusing on third-party observers, the present research extends existing work on nonverbal mimicry and encourages further research using more diverse interaction dyads (e.g., patients with different mental disorders) as well as evaluators with varying levels of expertise and occupational backgrounds.

Ethical approval

This study followed the declaration of Helsinki and was approved by the ethics committee of the University (GZ. 39/58/63 ex 2024/25, date of approval: 17.12.2024).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

Authors' Contribution

Conceptualization (AS, BP), writing of manuscript (AS), formal analysis (AS, BP) editing of manuscript (AP, BP, FO), video editing (FO).

AI Disclosure Statement

ChatGPT was used for language editing.

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