Unconscious Similarities of Couples and How that Impacts Closeness

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Introduction

When it comes to the relationships of close friends and romantic couples, do opposites really attract? Is it possible for two people with totally different personalities, values, and beliefs to find common ground and make it work? This age-old question has implications for relationship satisfaction and overall well-being.

Personality Similarity in Couples

Despite the common trope that opposites attract, friends and romantic partners are often characterized by similar personalities according to Youyou et al. (2017). The results of the likes-based and language-based personality assessment model show significant positive correlations across all five personality traits, with even stronger evidence in the language-based results. The resulting conclusion suggests that couples are more similar to each other than they are to strangers.

The personality similarities of couples have been demonstrated to have significance for the relationship quality (Brandstätter et al., 2018). This study examined the similarity of personality profiles in relation to relationship satisfaction, mediated by the perceived positivity of personality traits. They concluded that similar personalities were consistently predictive of relationship satisfaction in dyads. As shown in the study, personality similarity proved to be a consistently better predictor of relationship satisfaction, particularly when positively perceived (Brandstätter et al., 2018).

Linguistic Similarities of Couples

In addition to having akin personalities, couples can also unconsciously use similar language. In fact, Ireland et al. (2011) demonstrated that language style matching (LSM), which is based on the shared use of functional words like pronouns and articles, predicted when people

would match during speed dating and the likelihood that a relationship would last. LSM represents underlying interpersonal processes, like engagement, that increase the initiation and maintenance of romantic relationships.

The communication accommodation theory (CAT) explains these linguistic similarities of couples. According to the theory, as relationships between conversation partners develop, their verbal and nonverbal behaviors adjust to ease communication (Brinberg & Ram, 2021). The broad metric used to understand similarities within speech is linguistic alignment, which is made up of three more specified measurements including: syntactic alignment, semantic alignment, and cosine similarity. Syntactic alignment captures the shared communication styles of conversation partners, like LSM does. Semantic alignment is when partners talk about the same concepts and is assessed using latent semantic analysis (LSA). Lastly, cosine similarity undergoes conversation partners' shared or overlapped vocabulary use. Each of these metrics reflects various dimensions of conversation partners' relationship (i.e., closeness and separateness). Couples' language usage has been reliably used to understand relationship outcomes, but a novel way to use couples' linguistic similarities is as context for when physiological linkage occurs.

Couples Are Physiologically Linked

As surprising as it may sound, couples can unknowingly mirror each other's physiology, a process known as physiological linkage. Physiological linkage in couples occurs when both individuals' response systems, including the sympathetic and parasympathetic nervous systems, activate or deactivate their physiology in similar ways, causing the rising and falling of physiological measures such as heart rate, cortisol, and respiratory sinus arrhythmia between couples to coordinate. Couples likely experience physiological linkage because of humans'

social nature. According to the Family Systems Theory, the social networks that people are embedded in have the potential to support or harm their well-being. People interact with others and regulate their emotions, behavior, and physiology in the context of these relationships. Sometimes the presence of others can help one to balance their emotions, behavior, and physiology (e.g., stress buffering), but other times relationships can contribute to dysregulation of one's responses (e.g., conflict) (Cox & Paley, 1997). There is clear evidence for physiological linkage across a broad spectrum of physiological measures, and it's related to measurements of interpersonal functioning within romantic relationships, most commonly relationship satisfaction (Timmons et al., 2015).

Physiological Linkage: Good or Bad?

Although physiological linkage has been associated with various measurements of interpersonal functioning, there is no consensus on whether physiological linkage is good or bad for individual and relationship health. According to Timmons et al. (2015), previous research has been conflicted about the implications of physiological linkage, which may be due to a lack of distinction between the types of linkage, varying methodologies to determine linkage, and overlooking the context in which linkage occurs. Therefore, much of the work in this field is currently directed towards elucidating the nuances of physiological linkage.

The Significance of Physiological Linkage is Context-Dependent

It's likely that physiological linkage's significance for relationships is context-dependent, meaning that linkage is neither wholly good or bad. For example, Timmons et al. (2023) found that linkage varied as a result of emotional context and the timescale that was used to analyze linkage. When couples felt closer to each other during a given hour, their physiology exhibited enhanced levels of linkage during the same time frame. In contrast, couples who experienced

more physiological linkage across a whole day were less satisfied with their relationship, potentially representing the detrimental effects of couples who frequently reciprocate each other's negative affect. Therefore, physiological linkage must be examined in specific contexts to illuminate its significance. One such context from which physiological linkage could be examined is the behavioral similarities of couples, specifically linguistic similarities.

Couples' Language Usage as Context for Physiological Linkage

Physiological linkage has had minimum coverage when being examined in the context of shared language usage. One such study conducted by Seider et al. (2009) explored the functional use of "we" vs "me/you" pronouns and language usage's relationship with closeness and emotional distance amongst marital couples. Language usage provided the context from which researchers could infer when conflict was occurring. Therefore in additional analyses, they investigated how language usage was associated with the couples' cardiovascular activity, especially in times of conflict. It is suggested that the use of "we" or "me/you" language promotes an unconscious coupling of their identities which corresponds to an increase in physiological linkage. For instance, the greater use of "we" pronouns between a couple is associated with lower cardiovascular activity and vice versa, ultimately emphasizing the relation's closeness. Consequently, coinciding linguistic similarities, extending beyond just the use of "we" and "me/you," could be informative when investigating fluctuations in the strength of physiological linkage.

Current Study

Therefore, our research aimed to establish if partners are (1) more similar physiologically and linguistically over the course of a day than would be expected of strangers. We looked specifically at physiological linkage in electrodermal activity (EDA) and shared usage of

pronouns ("we" vs. "you") as well as the influence of emotional words (positive vs. negative). In accordance with previous research, we hypothesized couples would be more similar physiologically and linguistically than would be expected of strangers. Additionally, (2) we examined how physiological linkage could be understood in the context of couples' similar language usage on an hourly basis. We hypothesized that the strength of physiological linkage in couples will change depending on the hourly linguistic context. Furthermore, (3) we examined how physiological linkage could be understood in the context of couples' similar language usage and closeness on an hourly basis. We hypothesized, when couples use more of "we" and they feel closer during a given hour, then the strength of hourly physiological linkage will increase. Lastly, (4) in contrast, we hypothesized that when couples use "you" more frequently and feel less close during a given hour, then the strength of physiological linkage will increase.

Methods

Participants

109 couples consisting of 106 opposite-sex couples and three same-sex, female couples (totaling 218 people altogether) were recruited to participate in a mobile data collection study between the years of 2014 and 2017. Majority of participants were recruited throughout Los Angeles via online flyers and advertisements whereas 23 couples were recruited from a previous longitudinal study analyzing development and family aggression.

Participants were required to be between the ages of 18 and 25 (M_{age} = 22.6; SD = 2.4), able to write and read in English, and were in a relationship with their dating partners for at least 2 months before beginning the study ($M_{relationship\ length}$ = 30.0 months; SD = 24.4). The ethnic/racial composition of the sample consisted of 27.5% White Non-Hispanic/Non-Latinx, 23.9% White Hispanic/Latinx, 16.1% African American/Black, 12.8% Asian, 0.5% Native Hawaiian or Pacific

Islander, 15.6% multiracial, and 3.7% other. Overall, 44.0% of the couples lived together; 54.1% were enrolled as either part-time or full-time students; and 73.5% were employed on a part-time or full-time basis (Timmons et al., 2023).

Equipment

Smartphones

Nexus 5 Android smartphones were used to send hourly notifications to participants to complete surveys. All applications on the Nexus 5 Android were password-protected in order to prevent participants from changing the phone's settings or leaving extra data behind (i.e., photos or videos). After each participant was finished using the smartphone, the Android's data was cleared to avoid future couples from accessing previous participants' data (Timmons et al., 2023).

Q Sensor

Q sensors were used to collect EDA due to its small size and wireless biosensor being easily able to be worn on the inside of the wrist. EDA was collected from the inside of the wrist rather than more sensitive areas like the fingertips or palms, because it still produces similar measures produced in a lab setting that are also connected to psychological and physiological functioning seen in natural settings (e.g., Poh et al., 2010, 2012; Timmons et al., 2017). Additionally, they were worn on participants' nondominant hand in order to reduce voluntary or involuntary movements by the participant that may affect the placement of the Q sensor or skew the data otherwise. Because of the long duration of the sampling period, Q sensors were set to 8 Hz to prolong enough battery life and data storage (Timmons et al., 2023).

Audio Recordings

Within each Nexus 5 Android, a microphone was embedded inside in order to record 3 minute audio clips that were collected every 12 minutes. Therefore, a total of 6 minutes were recorded for every 12 minutes per couple, given that both partners (male and female) were being recorded for 3 minutes each. Participants were directed to mute their microphones whenever they were around anyone who was not participating in the study for privacy reasons (Timmons et al., 2017).

Measures

Hourly Feelings of Closeness

Through the Survelytics application found on each of the smartphones used, participants completed short, hourly surveys that assessed their feelings of closeness with their romantic partners. Each partner was prompted to rate the extent to which they felt "close and connected with my romantic partner" on a scale from 0 (*not at all*) to 100 (*extremely*) during the past hour. Along with each individual's mood towards their partner, other mood affecting items were included in the surveys as potential covariates, like physical activity, phone communication, and consumption of alcohol, caffeine, tobacco, or other drugs.

Hourly EDA

MATLAB was used to process the downloaded skin conductance level measured in microsiemens from the Q sensors through computer scripts which rid of motion artifacts from the EDA signals. Before EDA data was finalized, research assistants looked over the signals to revise any necessary artifacts and coded time periods noted for deletion as missing data. Because this EDA data was collected outside of a normal laboratory setting, the distributions of EDA as well as its minimum and maximum values were analyzed to determine that said values were within range given external influences and increased variability of ambulatory methods. For

instance, outliers above the upper expected value of EDA were withdrawn from the dataset before analysis. Instruction to remove equipment when showering, bathing, or participating in other activities that may damage the sensor was implemented. Besides the previously mentioned activities, Q sensors were to remain on participants' persons at all times. Anytime participants removed the sensor, they were to identify when and for what reason they were taking off the equipment. Other instances in which participants removed the sensor included the feeling of embarrassment of wearing the equipment, or that it was uncomfortable. Periods in which couples were not wearing their sensors were deemed missing data. Overall, participants wore the sensors 85.0% of the time that they were awake, thus, suggesting a high agreement to the study's protocol. Finalized EDA was then averaged per hour in accordance with the hourly self-reported surveys of closeness and hourly language usage.

Hourly Language Usage

Audio recordings were transcribed and processed using Linguistic Inquiry and Word Count (LIWC) software (Timmons et al., 2017). In order to break down continuous recordings of speech into speech and nonspeech, a program called voice-activity (VAD) was used. For each of those speech segments, speaker clustering and gender identification were used to automatically assign gender. Both preset dictionary representations and preset LIWC categories were used to count the numeric frequencies of personal pronouns (like "I" and "we") and words relating to positive and negative emotions (like "love" and "nice" vs "hurt" and "nasty"). All of these aspects were processed individually by partner, and although audio recordings took place every 12 minutes, language frequencies were averaged per hour.

Procedures

Individuals who responded to the advertised study were required to partake in general eligibility screening before being invited to their first laboratory visit. Once invited, couples individually completed questionnaires examining satisfaction in their current relationship via computers with privacy screens. Additionally, couples participated in further discussions about their relationship and other study procedures. During their second visit, participants were invited back to the lab on a separate day in which they were equipped with wireless biosensors (Q sensors) for their wrist and smartphones to keep track of their hourly self-reports regarding the quality of their interactions with each other during at home procedures that occurred during waking hours, or at least from 10:00 am to 3:00 am depending on the couple and individuals' routine. The first survey was conducted within the lab with the help of an experimenter to help familiarize participants with the equipment. From there on, participants were instructed to complete the rest of the surveys separately and not to discuss said surveys with each other. After leaving the laboratory, they were directed to spend at least 5 hours together (they could be non-consecutive) during that day. Participants then returned to the laboratory the next day to return equipment, complete another questionnaire, and discuss their reactions to the study, specifically recalling activities done during each hour of data collection. Responses to questionnaires and phone surveys were uploaded to a secure server. For those who completed the at-home procedures of the study, each participant received $100 (Timmons et al., 2023).

Overview of Analyses

The data was processed and analyzed in R Version 4.2.2 (R Core Team, 2022) and . Processing the data involved accounting for missing data, ensuring that the null values were not included in analyses. Then, we conducted preliminary analyses to a) obtain descriptive statistics on our 3 key variables and b) determine any confounding variables for hourly EDA and language

usage. For the descriptive statistics, we report on the total hours of data collection, average hours of observation per couple, and proportion of usable data for EDA measurements, audio recordings, and hourly surveys. To detect confounds that could influence hourly EDA measurements, we tested time, physical activity, and consumption of drugs, alcohol, or caffeine as level-1 predictors of EDA. To detect confounds that could influence hourly word usage, we tested couples being together and interacting as level-1 predictors of word usage (we, you, positive, and negative).We controlled for any confounding variables while testing our hypotheses, but these controls aren't included in the models below for parsimony.

To assess our hypotheses, we used a two-level model with repeated observations nested in people. We used the package "lme4" to construct these models within R (Bates et al., 2015). Hourly female EDA, hourly language usage (we, you, positive, and negative words), and hourly feelings of closeness were used as level-1 predictors of hourly male EDA. Furthermore, the intercepts were set to random while all other effects were fixed to maintain the simplicity of our model. Please note that although the models below use female EDA to predict male EDA, this was an arbitrary decision. Physiological linkage is a process of covariation rather than of one partner affecting the other.

Our first hypothesis was that couples will be more similar physiologically and linguistically over the course of a day than would be expected of strangers. We tested if couples experience physiological linkage by using hourly Female EDA as a level-1 predictor of hourly male EDA. The equation for this model is:

Level 1: $Hourly\ Male\ EDA_{ij} = B_{0j} + B_{1j}\,(Hourly\ Female\ EDA_{ij}) + e_{ij}$

Level 2: $B_{0j} = \lambda_{00} + u_{0j}$

$B_{1j} = \lambda_{10}$

For the second part of that hypothesis, we used a similar model to test if couples use shared language on an hourly basis. Hourly Female word usage was a level-1 predictor of hourly male word usage in these models. A separate model was tested for each linguistic category of interest, including the hourly usage of we, you, positive and negative words.

Our second hypothesis was that the strength of hourly physiological linkage changes depending on the linguistic context. Our 4 contexts of interest include hourly usage of we, you, positive and negative words. We constructed a separate model for each linguistic context. For example, to test how hourly usage of we influences physiological linkage, we used hourly female EDA, hourly female usage of we, and hourly female EDA × hourly female usage of we as level-1 predictors of hourly male EDA. For the remaining three models related to this hypothesis, "we" is exchanged for the remaining hourly linguistic variables. These equations represent the model described above:

Level 1: $$Hourly\ Partner\ EDA_{ij} = B_{0j} + B_{1j}(Hourly\ Own\ EDA_{ij}) + B_{2j}(Hourly\ Own\ We\ Usage_{2ij}) + B_{3j}(Hourly\ Own\ EDA \times Hourly\ Own\ We\ Usage_{3ij}) + e_{ij}$$

Level 2: $$B_{0j} = \lambda_{00} + u_{0j}$$

$$B_{1j} = \lambda_{10}$$

$$B_{2j} = \lambda_{20}$$

$$B_{3j} = \lambda_{30}$$

Our third hypothesis was that when couples feel a sense of togetherness, conceptualized as a higher hourly usage of we and feelings of closeness, then the strength of hourly physiological linkage will increase. To test this hypothesis, we used hourly female EDA, hourly female we usage, hourly female closeness, hourly female EDA × hourly female we usage,

hourly female EDA × hourly female closeness, hourly female we usage × hourly female closeness, and hourly female EDA × hourly female we usage × hourly female closeness as level-1 predictors of hourly male EDA. These are the corresponding equations for this model:

Level 1: $Hourly\ Male\ EDA_{ij} = B_{0j} + B_{1j}(Hourly\ Female\ EDA_{ij})$

$+ B_{2j}(Hourly\ Female\ We\ Usage_{2ij})$
$+ B_{3}j(Hourly\ Female\ Closeness_{3ij})$
$+ B_{4j}(Hourly\ Female\ EDA \times Hourly\ Female\ We\ Usage_{4ij})$
$+ B_{5j}(Hourly\ Female\ EDA \times Hourly\ Female\ Closeness_{5ij})$
$+ B_{6j}(Hourly\ Female\ We\ Usage \times Hourly\ Female\ Closeness_{6ij})$
$+ B_{7j}(Hourly\ Female\ EDA \times Hourly\ Female\ We\ usage \times Hourly\ Female\ Closeness_{7ij})$
$+ e_{ij}$

Level 2: $B_{0j} = \lambda_{00} + u_{0j}$

$B_{1j} = \lambda_{10}$

$B_{2j} = \lambda_{20}$

$B_{3j} = \lambda_{30}$

$B_{4j} = \lambda_{40}$

$B_{5j} = \lambda_{50}$

$B_{6j} = \lambda_{60}$

Our fourth hypothesis was that when couples use “you” more frequently and feel less close during a given hour, then the strength of physiological linkage will increase since the couples may be experiencing conflict, causing both partners to be physiologically activated. To test this hypothesis, we used hourly female EDA, hourly female you usage, hourly female closeness, hourly female EDA × hourly female you usage, hourly female EDA × hourly female closeness, hourly female you usage × hourly female closeness, and hourly female EDA ×

hourly female you usage × hourly female closeness as level-1 predictors of hourly male EDA. The equations for this model are the same as for hypothesis three, but "you" replaces "we."

We ran our analyses with same-sex couples included and excluded and decided to include them as long as they didn't affect the size, significance, or direction of the relationships seen. Lastly, we ran follow-up analyses to determine if racial background or relationship length moderated the relationships observed.

Results

Preliminary Analyses

The data was derived from a sample size of 218 participants (108 couples), and 1560 observations. Preliminary analyses were performed to examine the key variables and account for any missing data found, and these results can be viewed in Table 1. The majority of data was not missing for the 13 hour period of data collection for each couple. Female participants (P1) wore the Q sensors for 88% of the time and male participants (P2) wore the equipment for 82% of the time which was acquired as usable EDA data. For audio recordings that measured language usage, 72% of the data was usable for women and 71% for men. Female participants completed 86% of the mobile surveys that indicated closeness and male participants completed 87% of said surveys. In total, the number of hours with complete data for EDA and survey data was 2,099. The amount of missing data varied across variables due to the different equipment used to measure EDA/skin conductance levels (Q sensors), language usage (audio recordings from smartphones), and closeness (mobile surveys). Participants may not have worn their Q sensors due to showering, engaging in potentially damaging activities, or were uncomfortable/embarrassed wearing the Q sensors. Audio recordings may have been limited due to muting their smartphone's microphones when around others not participating in the study.

Mobile surveys may not have all been completed due to forgetfulness or technical errors. To retain as much data as possible during analysis, we constructed models using separate datasets containing only the key variables for that hypothesis. This is why the sample sizes for each hypothesis vary below.

Additionally, descriptive statistics for all key variables are presented in Table 1 below. For the most part, the mean and standard deviation for variables are similar across partners. For example, female hourly usage of "we" (M = 1.25; SD = 1.19) was similar to male hourly usage of "we" (M = 1.27; SD = 1.25). We saw similar average hourly usage of each linguistic category across males and females. However, skin conductance levels had slight discrepancies between male (M = 6.59; SD = 7.99) and female (M = 4.54; SD = 7.27) partners since male EDA was generally higher than female EDA. The largest and most significant correlation between partners was skin conductance level (r=.349, p<.001), but hourly word usage of the same kind of word across partners also demonstrated relatively high correlations. For example, when one partner used more of "you" during an hour, then their partner did too (r=.126, p<.001). Partner 1 and 2's feelings of closeness also had a strong, significant correlation (r=.339, p<.001). All correlations between the key variables were analyzed and presented in Table 2.

Lastly, we used multilevel models to determine the covariates of our key outcomes, EDA and hourly word usage. We tested caffeine consumption, alcohol consumption, physical activity, being together, and interacting across both partners individually as level-1 predictors of EDA. Only physical activity was a significant predictor for both partners' EDA, and this was controlled for in hypothesis 1a, 2, 3, and 4. For linguistic usage, we only tested being together and interacting as confounding variables. Interacting was the only covariate, but only for couples' usage of "you," so this was controlled for in hypothesis 1b.

Table 1

Descriptive Statistics for the Main Study Variables

	mean	sd	min	max	missing	valid proportion
Fscl	4.54	7.27	0	57.27	195	0.88
Mscl	6.59	7.99	0	58.72	275	0.82
FWe	1.25	1.19	0	7.14	437	0.72
FYou	4.3	2.39	0	17.86	437	0.72
FPosemo	3.48	2.11	0	25	437	0.72
FNegemo	1.75	1.48	0	17.14	437	0.72
FClose	69.12	31.31	0	100	221	0.86
MWe	1.27	1.25	0	12.5	455	0.71
MYou	4.24	2.4	0	24	455	0.71
MPosemo	3.53	2.27	0	21.62	455	0.71
MNegemo	1.91	1.63	0	13.64	455	0.71
MClose	70.95	29.56	0	100	203	0.87

Note. F=female, M=male, scl=skin conductance level, we=hourly we usage, you=hourly you usage, posemo=hourly positive emotion word usage, negemo=hourly negative emotion word usage, close=hourly feelings of closeness

Table 2

Correlations Between All Main Study Variables

	Fscl	Mscl	FWe	FYou	FPosemo	FNegemo
Fscl						
Mscl	0.349**					
FWe	-0.023	-0.039				
FYou	-0.024	0.034	-0.156**			
FPosemo	0.022	-0.018	-0.032	0.092*		
FNegemo	0.037	0.04	-0.145**	-0.033	0.019	
FClose	0.074*	-0.087*	0.125**	-0.058	0.06*8	0.075*
MWe	0.003	0.053	0.287**	-0.041	-0.018	-0.08*
MYou	-0.019	0.079*	-0.1*	0.126**	0.049	0.144**

MPosemo	0.026	-0.053	0.067*	0.036	0.199**	0.006
MNegemo	-0.03	0.037	-0.039	0.04	-0.073*	0.274**
MClose	0.079*	0.038	0.039	0.008	0.057	0.015

Note. F=female, M=male, scl=skin conductance level, we=hourly we usage, you=hourly you usage, posemo=hourly positive emotion word usage, negemo=hourly negative emotion word usage, close=hourly feelings of closeness; * indicates p<.05, ** indicates p<.001

Table 2

Correlations Between All Main Study Variables (cont.)

	FClose	MAllWe	MAllYou	MPosemo	MNegemo	MClose
Fscl						
Mscl						
FWe						
FYou						
FPosemo						
FNegemo						
FClose						
MWe	0.004					
MYou	-0.017	-0.178**				
MPosemo	0.05	0.071	0.03			
MNegemo	-0.017	-0.085	0.073*	-0.12**3		
MClose	0.339**	-0.022	-0.064*	0.052	-0.036	

Note. F=female, M=male, scl=skin conductance level, we=hourly we usage, you=hourly you usage, posemo=hourly positive emotion word usage, negemo=hourly negative emotion word usage, close=hourly feelings of closeness; * indicates p<.05, ** indicates p<.001

Hypothesis 1a: Physiological Linkage in Couples on an Hourly Basis

Firstly, we tested whether couples are more similar physiologically and linguistically over the course of a day than would be expected of strangers. We broke this hypothesis into two parts. Part 1a examined physiological similarities. We used hourly female EDA as a level-1 predictor of hourly male EDA. Then part 1b examined linguistic similarities, and we used hourly female

linguistic usage as a level-1 predictor of hourly male linguistic usage. Physical activity, a covariate of EDA, was controlled for when testing physiological linkage. Results for hypothesis 1a showed that there is a significant and positive association between male and female skin conductance levels on an hourly basis ($\beta = 0.31$, $p < .001$). See Table 4 for the complete model results. As observed in Figure 1, our results did align with our hypothesis that couples are more similar physically over the course of a day than expected of strangers because as partner 1's EDA increases, so does partner 2's.

Figure 1

Illustration of Physiological Linkage for EDA

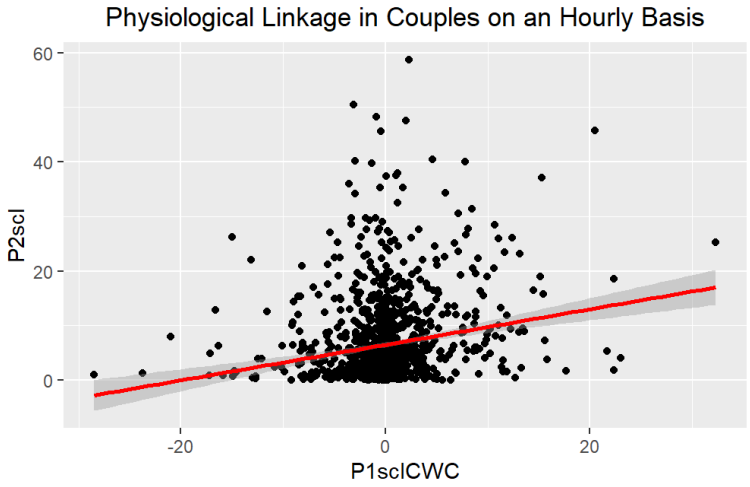


Table 4

Multilevel Model of Physiological Linkage in Couples on an Hourly Basis

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			37.802	6.148
Residual				25.86	5.085
Number of obs: 1039, groups: ID, 108					
Fixed effects					
	β	*SD*	*df*	*t*	*p*

(Intercept)	6.58210	0.61788	105.65317	10.653	< 2e-16
FsclCWC	0.312995	0.03956	928.72369	7.911	7.23e-15
FPhysicalActivityCWC	0.38441	0.23334	928.72369	1.647	0.0998

Note. F=female, scl=skin conductance level, CWC=centered within cluster

Hypothesis 1b: Linguistic Similarities in Couples on an Hourly Basis

Our hypothesis that couples are more similar linguistically throughout the day was analyzed by using female hourly usage of "we", "you", positive emotional words, and negative emotional words as level-1 predictors of hourly male linguistic usage within the same category. When testing "you" usage, we controlled for the covariate, interacting. Results showed a significant, positive association for each linguistic category. Specifically, "we" usage demonstrated a stronger positive relationship between partners compared to "you" usage (β = 0.24, $p < .001$; $\beta = 0.07$, $p = .03$). Table 5 shows the complete model results for "we" usage and Table 6 shows the complete model results for "you" usage. Similarly, negative emotional words showed a stronger positive association compared to its counterpart, positive emotional words, as well ($\beta = 0.20$, $p < .001$; $\beta = 0.15$, $p < .001$). Table 7 has the complete model results for positive emotional words and Table 8 has the complete model results for negative emotional words. Figure 2 exhibits how as partner 1's linguistic usage of any of the key words increases, so does partner 2's usage, thus, supporting our hypothesis that couples display more linguistic similarities on an hourly basis than that of strangers..

Figure 2

Illustration of Linguistic Similarities for "We", "You", Positive Emotional Words, and Negative Emotional Words

Table 5

Multilevel Model of Couples' Usage of "We" on an Hourly Basis

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			0.2094	0.4576
Residual				1.2074	1.0988
Number of obs: 1053, groups: ID, 107					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	1.25975	0.05639	97.84880	22.342	< 2e-16
FWeCWC	0.23516	0.03219	940.54069	7.081	2.79e-12

Note. F=female, we=hourly we usage, CWC=centered within cluster

Table 6

Multilevel Model of Couples' Usage of "You" on an Hourly Basis

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			0.7273	0.8528
Residual				4.7161	2.1717
Number of obs: 1053, groups: ID, 107					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	4.24593	0.10750	103.32059	39.498	< 2e-16**
FYouCWC	0.07207	0.03334	945.80420	2.162	0.030874*
InteractingCWC	-0.40715	0.12115	945.80420	-3.361	0.000808**

Note. F=female, you=hourly you usage, CWC=centered within cluster

Table 7:

Multilevel Model of Couples' Usage Positive Emotion Words on an Hourly Basis

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			0.8478	0.9208
Residual				3.7127	1.9268
Number of obs: 1053, groups: ID, 107					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	3.46031	0.10824	102.56904	31.97	< 2e-16
FPosemo	0.14906	0.03491	944.60955	4.27	2.15e-05

Note. F=female, posemo=hourly positive emotion word usage, CWC=centered within cluster

Table 8:

Multilevel Model of Couples' Usage of Negative Emotion Words on an Hourly Basis

Random effects			
Groups	*Name*	*Variance*	*SD*
ID	(Intercept)	0.5848	0.7647
Residual		2.0262	1.4234
Number of obs: 1053, groups: ID, 107			
Fixed effects			

	β	*SE*	*df*	*t*	*p*
(Intercept)	1.96095	0.08688	100.51015	22.570	< 2e-16
FAllNegemo	0.20469	0.03448	941.72584	5.936	4.1e-09

Note. F=female, negemo=hourly negative emotion word usage, CWC=centered within cluster

Hypothesis 2: The Effect of Linguistic Context on Hourly Physiological Linkage

The second hypothesis was that the strength of hourly physiological linkage in couples changes depending on the linguistic context. This hypothesis was broken into part a, b, c, and d corresponding to the hourly usage of "we," "you," positive emotion words, and negative emotions words. We constructed a separate model for each linguistic context. For example, to test how hourly usage of "we" influences physiological linkage, we used hourly female EDA, hourly female usage of we, and hourly female EDA ✕ hourly female usage of we as level-1 predictors of hourly male EDA. For the remaining three models related to this hypothesis, "we" is exchanged for the remaining hourly linguistic variables. Furthermore, we included physical activity as a level-1 predictor in all of these models to control for its potential confounding effects since it's a covariate of EDA. The results follow. For part a, there was not a significant interaction effect between EDA, usage of "we", and closeness. The complete results of the multilevel model can be seen in Table 9. We also conducted simple slope analyses, and when partner 1 uses more of "we" during a given hour, there is a stronger positive relationship between their EDA and partner 2's EDA (β= .3477, p< .001). On the other hand, when partner 1 uses less of "we" during a given hour, there is a weaker positive relationship between their EDA and partner 2's EDA (β= .3334, p< .001). Reference Figure 3 to see the simple slopes depicted graphically.

Table 9

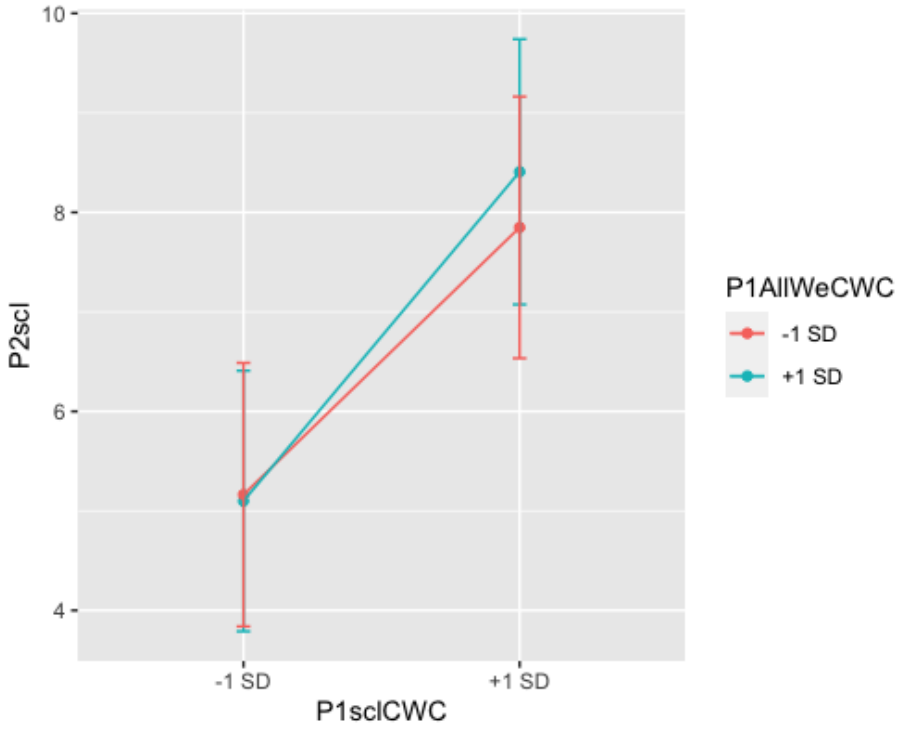
Multilevel Model of Linkage in EDA Moderated By Hourly Usage of "We"

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			34.53	5.876
Residual				26.22	5.121
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)		6.061e-01	1.042e+02	10.845	<2e-16
FsclCWC		4.376e-02	7.339e+02	7.568	1.14e-13
FWeCWC		1.694e-01	7.340e+02	0.029	0.977
FPhysicalActivityCWC		2.780e-01	7.340e+02	1.382	0.168
FsclCWC:FWeCWC		4.466e-02	7.484e+02	0.262	0.794

Note. F=female, scl=skin conductance level, we=hourly usage of we, CWC=centered within cluster

Figure 3

Linkage in Hourly EDA Moderated by Hourly Usage of We



For part b, there was not a significant interaction effect between EDA, usage of "you", and closeness. The complete results of the multilevel model can be viewed in Table 10. Using a simple slope analysis, we found that when partner 1 uses less of "you" during a given hour, there was a stronger positive relationship between their EDA and partner 2's EDA (β= .3835, p< .001). However, when partner 1 uses more of "you" during a given hour, a weaker positive relationship was found between their EDA and partner 2's EDA (β= .3102, p< .001). These relationships are graphically represented in Figure 4.

Table 10

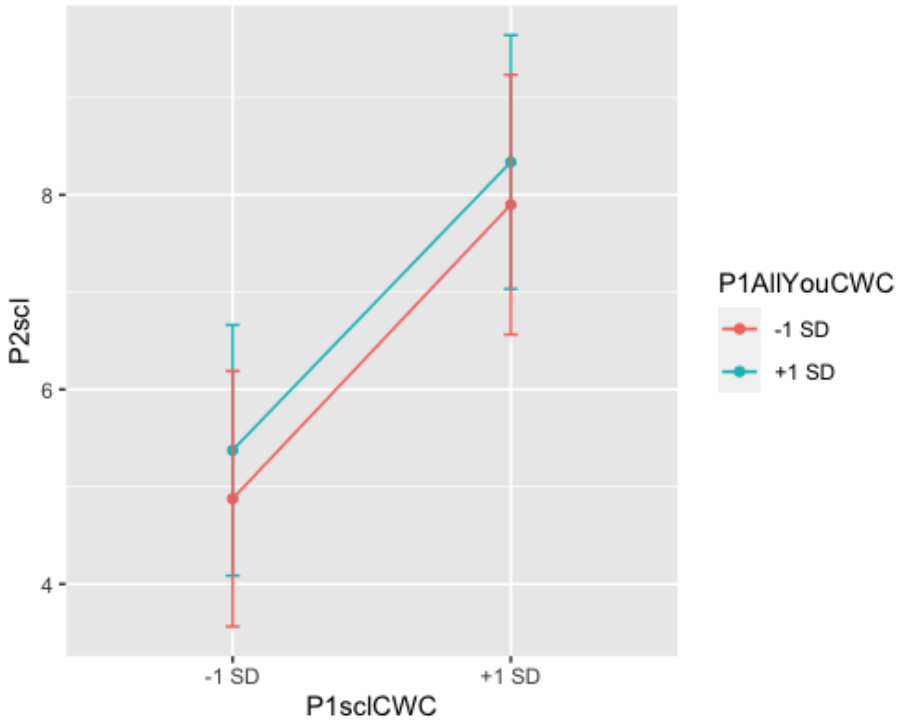
Multilevel Model of Linkage in EDA Moderated By Hourly Usage of "You"

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			34.61	5.883
Residual				26.08	5.107
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	6.56870	0.60636	104.15463	10.833	<2e-16
FsclCWC	0.33730	0.04404	734.15551	7.659	5.94e-14
FYouCWC	0.14335	0.08658	734.17454	1.656	0.0982
FPhysicalActivityCWC	0.37412	0.27616	733.90984	1.355	0.1759
FsclCWC:FYouCWC	-0.01683	0.02050	746.98635	-0.821	0.4120

Note. F=Female, scl=skin conductance level, you=hourly usage of you, CWC=centered within cluster

Figure 4

Linkage in Hourly EDA Moderated by Hourly Usage of You



For part c, hourly usage of positive emotion words replaces the interchangeable variable. No significant interaction effect was found between EDA, usage of positive emotion words, and closeness. The full results of the multilevel model are in Table 11. The results from the simple slope analyses show that there is a weaker positive relationship when less positive emotion words were used during a given hour (β= .3835, p< .001), while a stronger positive relationship was found when more positive emotion words were used during a given hour (β= .4101, p< .001) between partner 1's EDA and partner 2's EDA. These relationships are displayed in Figure 5.

Table 11

Multilevel Model of Linkage in EDA Moderated By Hourly Usage of Positive Emotion Words

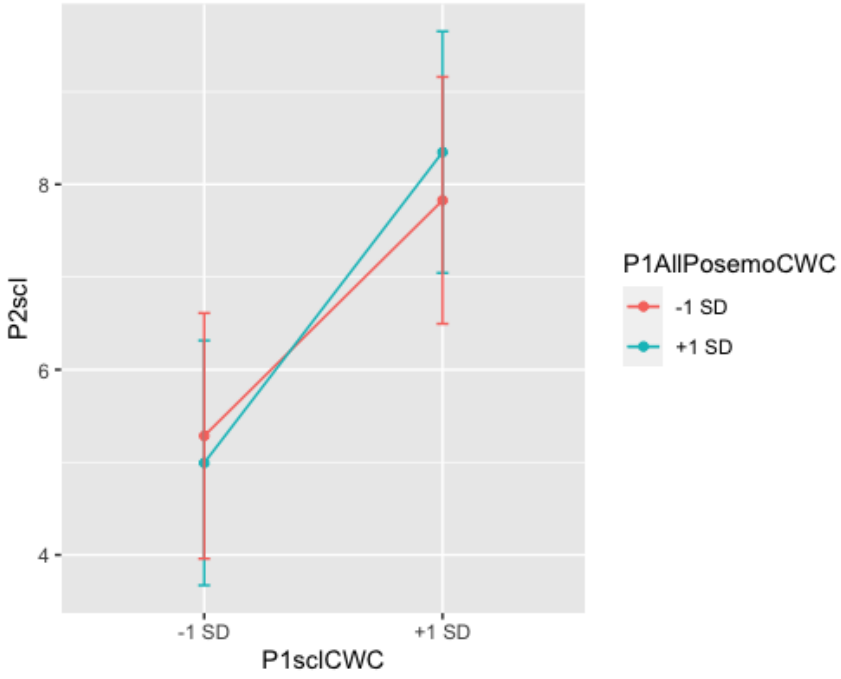
Random effects			
Groups	*Name*	*Variance*	*SD*

ID	(Intercept)			34.48	5.872
Residual				26.12	5.111
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	6.55711	0.60551	104.36991	10.829	<2e-16
FsclCWC	0.32572	0.04382	734.29923	7.434	2.95e-13
FPosemoCWC	-0.09919	0.10199	734.24473	-0.973	0.331
FPhysicalActivityCWC	0.39263	0.27676	734.10740	1.419	0.156
FsclCWC:FPosemoCWC	0.03976	0.02704	757.81374	1.471	0.142

Note. F=female, scl=skin conductance level, posemo=hourly positive emotion word usage, CWC=centered within cluster

Figure 5

Linkage in Hourly EDA Moderated by Hourly Usage of Positive Emotion Words



The last and final section of hypothesis 2, part d, analyzes how the hourly usage of negative emotion words moderates physiological linkage. Once again, no significant interaction effect was found between partner 1's hourly EDA and usage of negative emotion words. Testing

this analysis using simple slopes, a stronger positive relationship was found when partner 1 uses more positive emotion words during a given hour (β= .3283, p< .001). On the flip side, when partner 1 uses less negative emotion words during a given hour, a weaker positive relationship was found between their EDA and partner 2's EDA (β= .3283, p< .001). These relationships are displayed in Figure 6.

Table 12

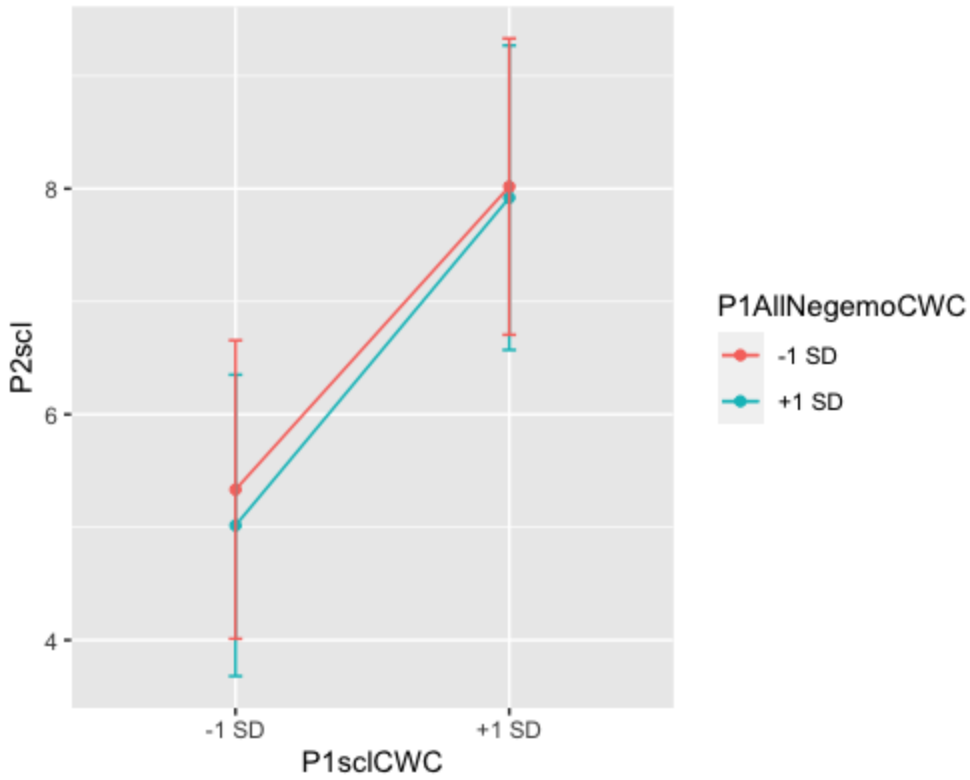
Multilevel Model of Linkage in EDA Moderated By Hourly Usage of negative Emotion Words

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			34.53	5.876
Residual				26.21	5.119
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	6.57246	0.60595	104.17009	10.846	<2e-16
FsclCWC	0.33274	0.04409	734.22845	7.547	1.32e-13
FNegemoCWC	-0.07353	0.13305	733.91439	-0.553	0.581
FPhysicalActivityCWC	0.37775	0.27699	733. 94550	1.364	0.173
FsclCWC:FNegemoCWC	0.01179	0.03209	755. 61258	0.368	0.713

Note. F=female, scl=skin conductance level, negemo=hourly negative emotion word usage, CWC=centered within cluster

Figure 6

Linkage in Hourly EDA Moderated by Hourly Usage of Positive Emotion Words



Hypothesis 3: Physiological Linkage within the context of hourly "we" usage and closeness

Our third hypothesis was that when couples use more of "we" and feel closer during a given hour, then the strength of physiological linkage between partners will increase. Hourly female EDA, hourly female we usage, hourly female closeness, female EDA × hourly female we usage, hourly female EDA × hourly female closeness, hourly female we usage × hourly female closeness, and hourly female EDA × hourly female we usage × hourly female closeness were used as level-1 predictors of hourly male EDA to test this hypothesis. Results showed that there was no significant interaction effect between hourly usage of "we", closeness, and EDA within this dataset (β=0.003, p=.0692). To see the complete model results, reference Table 13. Our results did not fully align with our hypothesis, and you can see this depicted in Figure 7. When partner 1 felt less close during an hour, there was a stronger relationship between their EDA and partner 2's EDA when they used more of "we" (β=0.4133, p<.001) in comparison to

when they used less of "we"(β=0.2924, p<.001). This was in line with our expectations, but the relationships exhibited when partners felt more close defied our expectations. When partner 1 felt closer during an hour, there was a stronger relationship between their EDA and partner 2's EDA when they used less of "we" (β=0.4325, p<.001) than when they used more of "we" (β=0.2935, p<0.001). We had expected partners to exhibit more physiological linkage when they felt closer and used "we" more frequently during an hour, but this is not supported by our results.

Table 13

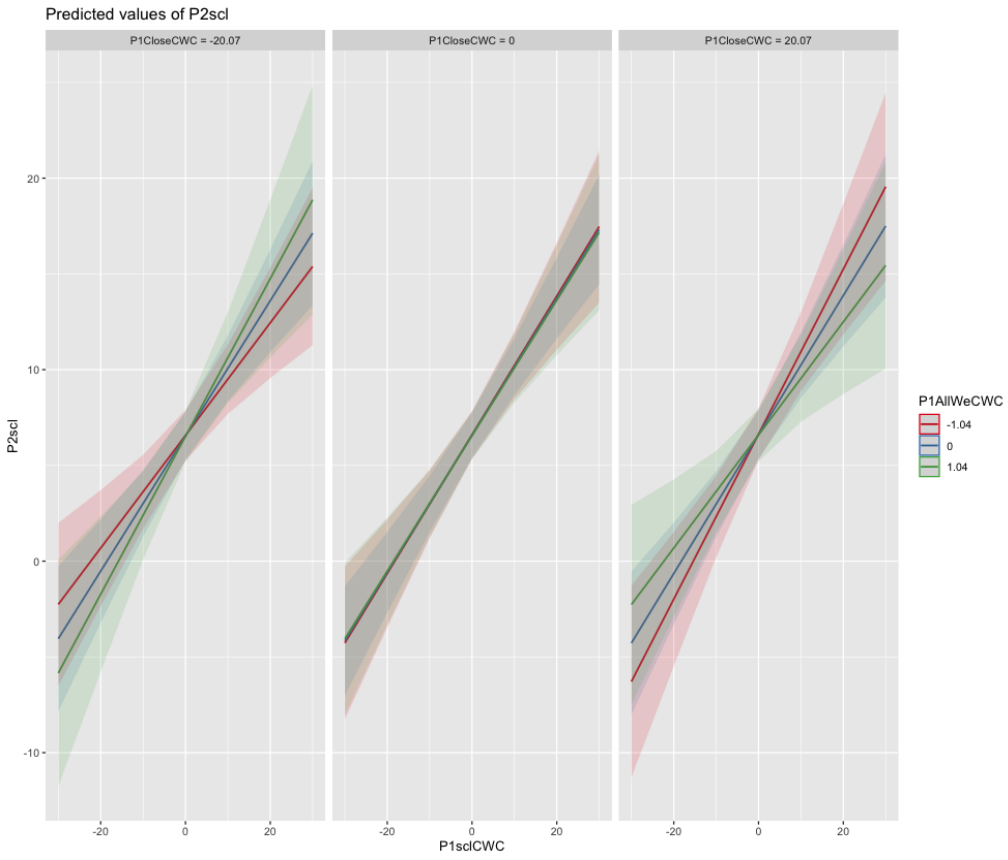
Multilevel Model of Linkage in Hourly EDA Moderated by Hourly Usage of We and Own Feelings of Closeness Toward Dating Partners

Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			34.37	5.862
Residual				26.19	5.117
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	6.578e	6.048e-01	1.02e+02	10.877	<2e-16
FsclCWC	3.484e-01	4.428e-02	7.303e+02	7.849	1.49e-14
FWeCWC	-6.866e-03	1.726e-01	7.309e+02	-0.040	0.9683
FCloseCWC	1.895e-03	8.919e-03	7.303e+02	0.212	0.8318
FPhysicalActivityCWC	4.125e-01	2.789e-01	7.302e+02	1.479	0.1396
FsclCWC:FWeCWC	5.938e-04	4.541e-02	7.437e+02	0.013	0.9896
FsclCWC:FCloseCWC	4.000e-04	2.048e-03	7.480e+02	0.195	0.8453
FWeCWC:FCloseCWC	1.108e-03	9.170e-03	7.575e+02	0.121	0.9039
FsclCWC:FWeCWC:FCloseCWC	-3.055e-03	1.679e-03	7.440e+02	-1.820	0.0692

Note. F=female, scl=skin conductance level, we= hourly usage of we, close=hourly feelings of closeness, CWC=centered within cluster

Figure 7

Linkage in Hourly EDA Moderated By Hourly Usage of We and Own Feelings of Closeness Toward Dating Partners



Hypothesis 4: Physiological Linkage within the context of hourly "you" usage and closeness

Our fourth hypothesis was that the strength of physiological linkage would increase when couples used "you" more frequently and felt less close during an hour. We used hourly female EDA, hourly female you usage, hourly female closeness, hourly female EDA × hourly female you usage, hourly female EDA × hourly female closeness, hourly female you usage × hourly female closeness, and hourly female EDA × hourly female you usage × hourly female closeness as level-1 predictors of hourly male EDA. Results showed that there was no significant interaction effect between hourly usage of "you", closeness, and EDA within this dataset

(β=.0008, p=.319). To see the complete model results, reference Table 14. We conducted a simple slopes analysis and determined that when partner 1 felt less close during an hour, there was stronger physiological linkage when partner 1 used less of "you" (β=0.3888, p<.001) than when they used more of "you" (β=.03037, p<.001). This was not in line with what we were expecting because we thought couples would exhibit my enhanced linkage when they felt less close and used more of "you." When partner 1 felt more close during an hour, there was stronger physiological linkage when they used more of "you" (β=0.4111, p<.001) than when they used less of "you" (β=0.3516, p<.001). This was more in line with what we were expecting for how the usage of "you" would impact physiological linkage, but the results didn't align with our hypothesis overall. To see a graphical representation of the simple slopes, reference Figure 8.

Table 14

Multilevel Model of Linkage in Hourly EDA Moderated by Hourly Usage of You and Own Feelings of Closeness Toward Dating Partners

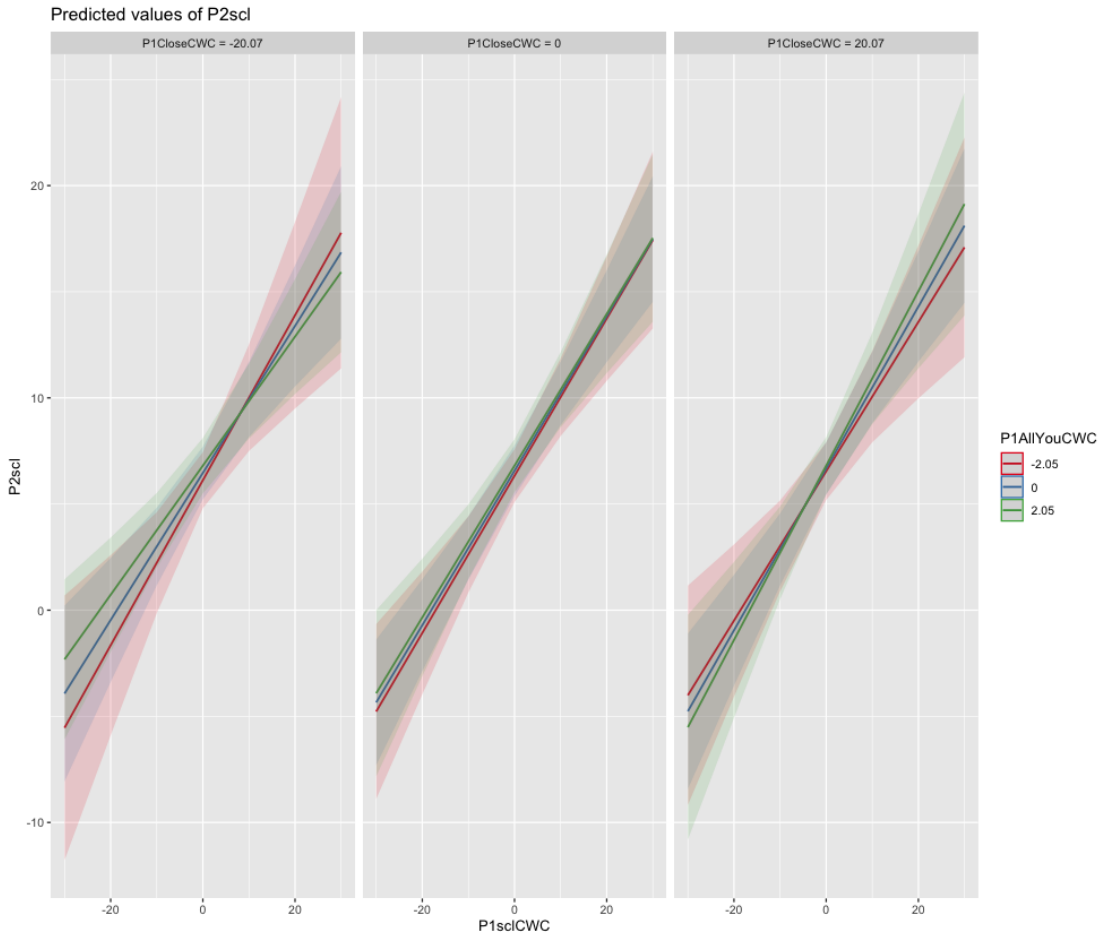
Random effects					
Groups	*Name*			*Variance*	*SD*
ID	(Intercept)			34.61	5.883
Residual				26.09	5.108
Number of obs: 843, groups: ID, 106					
Fixed effects					
	β	*SE*	*df*	*t*	*p*
(Intercept)	6.569e+00	6.064e-01	1.042e+02	10.832	<2e-16
FsclCWC	3.530e-01	4.643e-02	7.321e+02	7.602	8.94e-14
FWeCWC	1.154e-01	9.046e-02	7.323e+02	1.275	0.203
FCloseCWC	5.427e-03	8.893e-03	7.305+e02	0.610	0.542
FPhysicalActivityCWC	4.238e-01	2.782e-01	7.304e+02	1.523	0.128
FsclCWC:FWeCWC	-6.653e-04	2.260e-02	7.435e+02	-0.029	0.977
FsclCWC:FCloseCWC	1.128e-03	3.888e-03	7.503e+02	0.534	0.593
FWeCWC:FCloseCWC	-3.050e-03	2.111e-03	7.582+e02	-0.784	0.433

FsclCWC:FWeCWC:FCloseCWC	8.650e-04	8.680e-04	7.442e+02	0.997	0.319

Note. F=female, scl=skin conductance level, we= hourly usage of we, close=hourly feelings of closeness, CWC=centered within cluster

Figure 8

Linkage in Hourly EDA Moderated By Hourly Usage of You and Own Feelings of Closeness Toward Dating Partners



Discussion

It has been reliably demonstrated that couples experience physiological linkage and language style matching. While similar language usage has clear implications for relationship initiation and duration (Brinberg & Ram, 2021; Ireland et al., 2011), the implications of physiological linkage are less clear and may be dependent on the context in which people experience physiological linkage (Timmons et al., 2015). Therefore, we investigated physiological linkage from a new context-dependent perspective, specifically how romantic couples' hourly word usage and feelings of closeness informed the relationship between their physiology. Before we could examine the context-dependent relationship of physiological linkage, we had to determine if the couples within our dataset experienced physiological linkage. Consistent with the existing literature, we found that couples do exhibit physiological linkage and similar hourly word usage. However, the strength of hourly physiological linkage did not change depending on hourly word usage. Even when hourly feelings of closeness were used in combination with hourly word usage, there was no context-dependent relationship of physiological linkage.

Hypothesis 1a: Physiological Linkage in Couples on an Hourly Basis

Our first aim of the study was to investigate the relationship between couples' physiological and linguistic similarities throughout the course of a day. For hypothesis 1a, we hypothesized that couples would be more similar physiologically over the course of a day than would be expected of strangers. Potential covariates taken into account for physiology were physical activity, being together, interacting, caffeine consumption, and alcohol consumption; with only physical activity showing significance. Results for hypothesis 1a demonstrated that female's hourly EDA significantly predicted male's hourly EDA with physical activity being

controlled for as a confounding variable. Because the significant association between both partner's EDA was positive, this suggested that as female's EDA increases within a given hour, so does male's EDA. Our study reinforced previous physiological linkage research in which only hourly EDA was observed as a physiological indicator for couple similarities (Timmons et al., 2015).

Hypothesis 1b: Linguistic Similarities in Couples on an Hourly Basis

Similarly, hypothesis 1b predicted that couples would be more similar linguistically over the course of a day; specifically tracking couples' use of "we", "you", positive emotionality words, and negative emotionality words within a given hour. Being together and interacting were tested as potential confounds for each linguistic context, with interacting emerging as a covariate only for "you" usage. We imagine being together was not deemed a covariate since couples could be together but not converse, thus halting its influence over any language use. Results also revealed a positive significant association for all word usages between female and male participants with interacting controlled for "you" contexts. This proposed that as female's usage of "we" increased within a given hour, so did male's usage of "we." Moreover, this finding applied to couples' usage of "you", positive emotionality words, and negative emotionality words as well. With the addition of emotional word tracking, our results also supported LSM in which Ireland et al. (2021) claimed that couples' use of language began to mirror one another. Although our results from Hypothesis 1 don't necessarily extend our knowledge beyond what is already known in the pre-existing literature, it was necessary to establish that physiological linkage and language style matching occurred for the couples within our dataset before we could examine the context-dependent relationships of physiological linkage.

Hypothesis 2: The Effect of Linguistic Context on Hourly Physiological Linkage

The second hypothesis aimed to explore the effect of linguistic context on hourly physiological linkage in couples, with a focus on the usage of specific words or phrases (e.g., "we," "you," positive emotion words, and negative emotion words). This hypothesis was based upon preliminary evidence that language usage could be related to physiology. Seider et al. (2009) found that the usage of "we" was related to lower cardiovascular activity, so we thought it may be informative to examine more linguistic categories, such as the emotional context. Timmons et al. (2023) found that physiological linkage changed depending on the emotional context, such that physiological linkage increased during hours when partners felt close. Therefore, we thought that the use of "we" and "you" could represent a coupling of the partners' identities, and positive and negative words could provide more information about the emotional context. Unexpectedly, there was no interaction effect between any of the linguistic categories and EDA. We may not have seen any effect because aggregating word usage over an hour may be too broad to detect physiological changes. Perhaps analyzing physiological linkage within the context of conversational episodes would be more informative. This is an issue that BringBerg & Ram (2021) ran into as well, and they suggested analyzing conversational episodes. Although we weren't able to detect any changes in physiological linkage based on the linguistic context, this study contributes to our understanding of the interplay between communication and physiological linkage in romantic relationships, and we have provided a few promising avenues to explore physiological linkage within the linguistic context.

Hypothesis 3: Physiological Linkage Within the Context of Hourly "We" Usage and Closeness

This hypothesis built upon Hypothesis 2 because we examined the coinciding influence of hourly word usage and feelings of closeness on the strength of physiological linkage. We

thought that hourly word usage and feelings of closeness would be more informative about the interpersonal processes that were occurring, thereby providing more detail about the context in which physiological linkage occurs. We hypothesized that when couples used more of "we" and felt closer during a given hour, then the strength of physiological linkage between partners would increase. This was based upon prior studies that demonstrated greater "we" usage–potentially representing an unconscious coupling of romantic partner's identities and consequent feelings of closeness–was associated with lower cardiovascular activity for both partners (Seider et al., 2019). Contrary to our expectations, there was no significant interaction effect between hourly usage of "we", closeness and EDA within this dataset. One potential reason for this is that we did not use the proper physiological measure to detect fluctuations in physiological linkage within this context. Couples can be linked across multiple different physiological markers, and each of these physiological markers can be regulated by the sympathetic or parasympathetic nervous system. For example, heart rate, which has been associated with "we" usage, is regulated by the sympathetic and parasympathetic nervous system, whereas EDA is only regulated by the sympathetic nervous system. Perhaps the increased usage of "we" and feelings of closeness only influence the physiological processes regulated by the parasympathetic nervous system. Therefore, future studies should use a different measure to examine the influence of hourly "we" usage and feelings of closeness on physiological linkage. This highlights the importance of researching physiological linkage not just within different contexts, but also using different physiological measures to see if different relationships appear.

Hypothesis 4: Physiological Linkage Within the Context of Hourly "You" Usage and Closeness

Our fourth hypothesis was similar to Hypothesis 3 in that we examined another context we thought would influence the strength of physiological linkage. We hypothesized that when couples use "you" more frequently and feel less close during a given hour, then the strength of physiological linkage will increase. This was based on prior research that physiological linkage could increase in both positive and negative contexts, such as when couples feel an increased sense of connectedness or when they are fighting (Timmons et al., 2015). Our results did not reveal a significant interaction effect between hourly usage of "you", closeness, and EDA though. Although this was contrary to our expectations, Timmons et al. (2023) also did not find a significant relationship between annoyance and linkage in EDA. Perhaps this reflects a reality in which hourly physiological linkage in EDA is not influenced by conflict. However, a more likely explanation is that our couples did not experience much conflict during the short data collection period (13 hours). In order to investigate how physiological linkage is influenced by conflict, a longer period of data collection may be necessary. Moreover, the effects of conflict on physiological linkage may not be evident when the data is aggregated across hours. A finer-grained time scale may be more appropriate to examine conflict and the associated fluctuations in physiological linkage.

Limitations and future directions

Since three out of four of our hypotheses were deemed insignificant, it is important to recognize a number of limitations to our study. First being that our data was only collected over the span of about 13 hours per couple, which may have prevented more obvious patterns if the data collection were to prolong for several days, weeks, or even months. In accordance with the communication accommodation theory, a longer time span could reveal stronger relationships between language use and closeness amongst romantic couples (Bringberg & Ram, 2021). With

that being said, even having participants in more long term relationships could imply greater associations between physiological and linguistic similarities. A second limitation related to time scales is that we aggregated both EDA and language usage across an hour. Future research should investigate both variables in finer-grained scales (such as over the course of a conversation episode). Thirdly, we solely focused on EDA for physiological data meanwhile other measures such as blood pressure, heart rate, finger temperature, respiration, etc. could perform differently upon each linguistic context. Each physiological measure represents a different process. For example, one could represent the sympathetic nervous system and another the parasympathetic nervous system or even both. Lastly, we only took into account pronoun usage, “we” and “you”, as well as positive and negative emotional words. By including more linguistic contexts (such as incorporating all function and/or content words), language usage may be more informative in future studies. Furthermore, it may be more informative to create a composite variable that represents overall word usage and similarity to one’s partner on a positive and negative scale. This would provide richer context to investigate linkage within.

Conclusion

In accordance with a growing body of literature, we discovered the presence of physiological linkage and language style matching for the couples we studied. Although couples are likely unconscious of their linguistic similarities and physiological linkage, both of these processes have been related to interpersonal outcomes, such as feelings of closeness and relationship satisfaction (Seider et al., 2009; Timmons et al., 2015). The significance of language style matching, when and how it’s good for a relationship, is clear, but there’s still much to learn about when physiological linkage is good or bad (Timmons et al., 2023). Therefore, it’s important to investigate the context-dependent relationship of physiological linkage, and the

linguistic context could be informative when investigating linkage. Although we weren't able to discover any contexts that had a strong influence on physiological linkage, our research looked at linkage from a unique perspective (the linguistic context). The linguistic context still holds promise for illuminating the context-dependent significance of physiological linkage, and we provided a direction for future researchers to pursue such as using different physiological measures, time scales, and linguistic predictors. If the context-dependent relationship and significance of physiological linkage can be teased apart, then physiological linkage could be passively sensed in the future and used as a tool to monitor and improve relationship health, which could have cascading benefits for those involved in the relationship.

References

Bates, D., Maechler, M., Bolker, B., Walker S. (2015). Fitting Linear Mixed-Effects Models Using lme4. Journal of Statistical Software, 67(1), 1-48. doi:10.18637/jss.v067.i01.

Brandstätter, H., Brandstätter, V., & Pelka, R. B. (2018). Similarity and Positivity of Personality Profiles Consistently Predict Relationship Satisfaction in Dyads. Frontiers in Psychology, 9, 1009–1009. https://doi.org/10.3389/fpsyg.2018.01009

Brinberg, & Ram, N. (2021). Do New Romantic Couples Use More Similar Language Over Time? Evidence from Intensive Longitudinal Text Messages. *Journal of Communication, 71*(3), 454–477. https://doi.org/10.1093/joc/jqab012

Cox, M. J., & Paley, B. (1997). Families as systems. *Annual Review of Psychology, 48*(1), 243–267. https://doi.org/10.1146/annurev.psych.48.1.243

Ireland, M. E., Slatcher, R. B., Eastwick, P. W., Scissors, L. E., Finkel, E. J., & Pennebaker, J. W. (2011). Language Style Matching Predicts Relationship Initiation and Stability. *Psychological Science, 22*(1), 39–44. https://doi.org/10.1177/0956797610392928

R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Seider, B., Hirschberger, G., Nelson, K. L., & Levenson, R. W. (2009). We Can Work It Out: Age Differences in Relational Pronouns, Physiology, and Behavior in Marital Conflict. *Psychology and Aging, 24*(3), 604–613. https://doi.org/10.1037/a0016950

Timmons, A. C., Han, S. C., Chaspari, T., Kim, Y., Narayanan, S., Duong, J. B., Simo Fiallo, N., & Margolin, G. (2023). Relationship satisfaction, feelings of closeness and annoyance, and linkage in electrodermal activity. *Emotion* (Washington, D.C.). https://doi.org/10.1037/emo0001201

Timmons, A. C., Margolin, G., & Saxbe, D. E. (2015). Physiological linkage in couples and its implications for individual and interpersonal functioning: A literature review. *Journal of Family Psychology, 29*(5), 720–731. https://doi.org/10.1037/fam0000115

Youyou, W., Stillwell, D., Schwartz, H. A., & Kosinski, M. (2017). Birds of a Feather Do Flock Together: Behavior-Based Personality-Assessment Method Reveals Personality Similarity Among Couples and Friends. *Psychological Science, 28*(3), 276–403. https://doi.org/10.1177/0956797616678187