

**Universidade do Minho**  
Escola de Psicologia

Margarida Rosa Apolinário de Pinho

**“Time slows down whenever you are  
around” for women but not for men**



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Dissertação de Mestrado  
Mestrado Integrado em Psicologia

Trabalho efetuado sob a orientação da  
**Professora Doutora Joana Arantes**

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## Acknowledgments

*“It's okay not to know all the answers. It's better to admit our ignorance than to believe answers that might be wrong. Pretending to know everything, closes the door to finding out what's really there.”*  
*Neil deGrasse Tyson*

*“The important thing is not to stop questioning.”*  
*Albert Einstein*

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“O tempo abranda quando estás por perto” para as mulheres mas não para os homens

O que acontece quando inesperadamente vemos um potencial parceiro atraente? Estudos anteriores em contexto laboratorial sugerem que a visualização de fotografias de pessoas atraentes e não atraentes influencia a perceção do tempo. O objetivo principal desta investigação é estudar a relação entre perceção temporal e a atração num cenário mais realista, investigando se alterações no tempo subjetivo durante um *speed dating* estão associadas com a atração. No evento, a duração dos encontros era variável e os participantes tinham que estimar o tempo que passou. Além disso, entre outras medidas, os participantes avaliaram os potenciais parceiros em termos da sua atratividade física antes e depois dos encontros e reportaram se estavam interessados em trocar contacto com eles. Os resultados mostraram que, numa situação de *speed dating* real, quando há a perceção do parceiro como sendo fisicamente mais atraente, as mulheres tendem a estimar a duração do encontro como sendo maior, enquanto que os homens tendem a estimar a duração como sendo menor. Estas alterações podem refletir adaptações evolutivas que tornam o sistema cognitivo humano mais responsivo em situações relacionadas com o *fitness* reprodutivo.

*Palavras-chave:* *speed dating*, atração, atratividade física, perceção temporal.

“Time slows down whenever you are around” for women but not for men

What happens when we unexpectedly see an attractive potential partner? Previous studies in laboratorial settings suggest that the visualization of attractive and unattractive photographs influences time. The major aim of this research is to study time perception and attraction in a realistic social scenario, by investigating if changes in subjective time measured during a speed dating are associated with attraction. In the event, the duration of the dates was variable and participants had to estimate the time that passed. Among other measures, participants also rated the potential partners in terms of their physical attractiveness before and after the dates and reported if they would like to exchange contact with them. Results showed that, in a real speed dating situation, when there is a perception of the partner as being physically more attractive, women tend to overestimate the duration of that meeting, whereas men tend to underestimate its duration. Such changes may reflect evolutionary adaptations which make the human cognitive system more responsive in situations related to reproductive fitness.

*Keywords:* speed dating, attraction, physical attractiveness, time perception.

## “TIME SLOWS DOWN WHENEVER YOU ARE AROUND” FOR WOMEN BUT NOT FOR MEN

The development of research in romantic attraction had its apogee in the 1960s and 1970s (Finkel, Eastwick, & Matthews, 2007) and most studies that investigated this theme demonstrated principles of attraction in laboratory settings (e.g., Byrne, Griffitt, & Stefaniak, 1967; Dion & Dion, 1973; Walster, 1965; Kephart, 1967; Stroebe, Insko, & Thompson, 1971). However, most of these studies were conducted among participants who have never interacted with the target of their attraction and who did not actually have the opportunity to form a real intimate relationship after the study (Luo & Zhang, 2009; Finkel, Eastwick, & Matthews, 2007). Finkel, Eastwick and Matthews (2007) suggested that the best way to overcome the limitations of this type of research and increase the explanatory power of the results was to study initial romantic attraction and early relationship development before the two partners met. Mechanisms of attraction are important both because impact that attraction processes have on individual's life and because increasing knowledge in their mechanisms improve our understanding of ongoing relationship dynamics (Finkel, Eastwick, & Matthews, 2007; Schindler, Fagundes, & Murdock, 2010; Simpson, 1990). Therefore, and because of methodological problems of retrospective reports, like systematic memory and selection biases, the real social scenario seems to be a better way to study the genesis of romantic attraction (Sprecher, Wenzel, & Harvey, 2008) and early relationship development from before two partners meet (Finkel, Eastwick, & Matthews, 2007). A more realistic method that provides a naturalistic context to observe how prospective partners interact and that has been used in recent years by social scientists is the speed dating (Turowetz & Hollander, 2012).

### *The speed dating methodology*

The speed dating was invented by Rabbi Yaacov Deyo in the 90's, with the purpose of helping single Jews of Los Angeles to meet each other. In this paradigm, people interested in meeting potential romantic partners have, approximately, 10 to 25 brief meetings with a series of partners (Finkel & Eastwick, 2008), which typically last from three to ten minutes each (Janz, Pepping, & Halford, 2015; Ranganath, Jurafsky, & McFarland, 2013; Todd, Penke, Fasolo, & Lenton, 2007; Turowetz & Hollander, 2012). After the event, the participants report if they are interest or not to exchange contact with each potential partner (Finkel & Eastwick, 2008). Speed dating quickly became an element of pop culture, spread to metropolitan areas of EUA, United Kingdom and Australia and emerging in diverse countries like Japan and South Africa (Eastwick & Finkel, 2008a). The mediatisation of speed dating through TV programs such as

“Sex and the city” (2000), “House M. D.” (2010), “Lost girl” (2010), “Partners in crime” (2016), movies like “The 40-year-old virgin” (2005), “Hitch” (2005), “Speed dating” (2010), “Movie 43” (2013), allowed speed dating to quickly evolve into a business that involves millions of people and tens of millions of dollars to access this events (Finkel, Eastwick, & Matthews, 2007).

Speed dating enables researchers to access a large battery of background information about individuals before they meet one another, to introduce them to one another and to follow them after the event in order to examine relationship dynamics over the ensuing days, weeks, and beyond (Finkel, Eastwick, & Matthews, 2007). This methodology also allow researchers to study the dyad as the unit of analysis and not only one person’s perspective and the attraction dynamics between two individuals who can actually create a relationship in the future (Finkel & Eastwick, 2008). Eastwick and Finkel (2008a) presented eight features of the ideal paradigm of speed dating: study real relationships with a potential future; study both interactions; maintain experimental control; give participants multiple romantic options; get background characteristics before participants meet; implement experimental manipulations; collect “objective” ratings of participants; and follow potential relationships into the future.

In the last years, speed dating methodology has been used by different researchers (Berrios, Totterdell, & Niven, 2015; Eastwick & Finkel, 2008abc; McClure & Lydon, 2014; Schroder-Abé, Rentzsch, Asendorpf, & Penke, 2016; Spielmann et al., 2013; Todd, Penke, Fasolo, & Lenton, 2007; Turowetz & Hollander, 2012) to study several relevant aspects in research on intimate relationships. Among others, research using the speed dating methodology has studied variables such as attachment (Eastwick & Finkel, 2008b; McClure & Lydon, 2014; McClure, Lydon, Baccus & Baldwin, 2010; Spielmann et al., 2013), physical attractiveness (e.g., Eastwick & Finkel, 2008b; Luo & Zhang, 2009; Back et al., 2011), personality (e.g., Back, Penke, Schmukle, & Asendorpf., 2011; Back et al., 2013; Luo & Zhang, 2009), and sex (e.g., Eastwick & Finkel, 2008c).

### *Physical attractiveness*

Physical attractiveness is one of the most relevant variables studied in speed dating context (Eastwick & Finkel, 2008c; Jauk, Neubauer, Nairunteregger, Pemp, Sieber, & Rauthmann, 2016; Luo & Zhang, 2009; Todd, Penke, Fasolo, & Lenton, 2007). In light of evolutionary psychology, the research suggests that physical attractiveness is a large indicator of good health, high reproductive value and good genes. Physical attractiveness is a cue to female fertility (e.g., Buss 1989; Miller 2000) which seems very important on both short-term

and long-term relationships. Women preferentially desire men as short-term mates who possess cues to good genes, but value social stability and economic security above traits relating to fertility and physical appearance for long-term relationships (Regan, 1998). Other studies using the speed dating methodology have also shown that physical attractiveness is very important in attraction for both man and woman (e.g., Back et al., 2011; Eastwick & Finkel, 2008b; Luo & Zhang, 2009). Luo and Zhang (2009) analysed many variables to know which of them were attractive, namely demographics, interests, values, political attitudes, personality, affectivity, attachment and self-esteem, finding that physical attractiveness is the most important variable in attraction to both sexes.

Some studies found that when people perceive a conversation partner as physical attractive, they tend to form a positive first impression (Dong & Wyer, 2014). There is much evidence that the sight of a physically-attractive person engages the appetitive motivational system, resulting in physiological responses associated with positive affect (Arantes, Berg, & Wearden, 2013). Experienced emotions are founded on the activation of neural circuits that evolved in the mammalian brain to guarantee the survival of individuals and their progeny (Lang & Bradley, 2010). Dong and Wyer (2014) suggested that social and motivational factors that influence people's focus of attention can have an impact on both their perceptions of duration and the judgments they base on these perceptions. Maner, Gailliot, Rouby and Miller (2007) defend that motivational states can affect perceptual and evaluative processing of goal-relevant stimuli in a rapid and automatic manner. Their results show that mating primes interacted with functionally relevant individual differences to promote attentional adhesion to reproductively relevant social targets. These authors found that there was a selective processing bias for physically attractive potential mates among participants with unrestricted sociosexual orientation. Despite of some authors suggesting that implicit cognitive processes may be evolved in mating and that cognitive resources might be attuned to stimuli related to mating opportunities (Maner et al., 2003), less is known about the role of automatic and instinctive cognitive processes in attraction, such as time perception. Moreover, there are no studies using a speed dating to understand what happens when people met a physical attractive potential partner in terms of their time perception. The only three studies (Arantes, Berg, & Wearden, 2013; Dong & Wyer, 2014; Odgen, 2013) that discussed the relation between attractiveness and temporal perception were conducted in laboratory circumstances, so it seems important and relevant to study this in a real scenario, such as a speed dating event. Studying time perception in these settings is important because, as mentioned previously, physical attractiveness is one of the most important variable in attraction, and seems to influence the temporal perception

when people see a person of the opposite sex.

### *Time perception*

Humans, like other animals, can estimate time (Block, 1990; Ferguson & Martin, 1983). This ability is very important in terms of survival and, on humans, time estimation is always regarded as a part of life necessary to carry out everyday chores (Pande & Pati, 2010). However, subjective duration often diverges from objective duration and when this occurs time feels distorted. Humans may perceive the time as passing more quickly or more slowly than the reality (Sackett, Meyvis, Nelson, Converse, & Sackett, 2010). There are some factors studied involved in time perception accuracy, such as emotion (Droit-Volet, Fayolle, & Gil, 2011; Droit-Volet & Meck, 2007; Zhang, Zhang, Yu, Liu, & Luo, 2017), arousal (Schwarz, Winkler, & Sedlmeier, 2013), attention (Brown, 2008; Gibbon, Church, & Meck, 1984; Zakay & Block, 1996) and memory (Brown, 1997; Staddon, 2005).

Odgen (2013) did a study with female participants exploring whether the attractiveness of a female face affected its perceived duration. Results showed that participants judged female's unattractive faces to be shorter than neutral and attractive faces of the same duration. On the other hand, Arantes, Berg and Wearden (2013) tested the hypothesis that female's duration estimates of briefly-viewed male, but not female, photos would be modulated by attractiveness. Their results showed that duration estimates of attractive male photos were significantly longer than corresponding estimates for attractive and unattractive female photos. Their findings are consistent with the hypothesis that the timing system contains adaptations which provide flexibility in situations related to reproductive fitness.

Dong and Wyer (2014) conducted an experiment in which participants engaged in an 8 minutes' conversation over the internet with an opposite sex person in which they could only hear each other voices without a visual display. Before the conversation, each participant received an attractive or unattractive photo that they thought was of the potential partner, which was in fact manipulated by the researcher. They concluded that when both male and female participants perceived a partner as physical attractive, they estimated immediately after the conversation the time engaged has been passed quickly because they based their judgement on the involvement. However, this experiment was conducted under laboratorial circumstances, and important cues of attractiveness were not present, such as eye contact, smiling and body language (Muehlenhard, Koralewski, Andrews, & Burdick, 1986). Therefore, it seems relevant study the relationship between attractiveness and time perception in a conversation in a naturalistic scenario.

## **Current study**

The major aim of the present study is to investigate the relationship of physical attractiveness and temporal perception in a relationship initiation using a speed dating methodology.

Our first hypothesis is that temporal perception in a speed dating event is related to the attractiveness that the participant feels towards the potential partner (Arantes, Berg, & Wearden, 2013). However, we expect this relationship to be different for both males and females. More specifically, we hypothesize that: a) For women, when they perceive their potential partner as very attractive, they will estimate the duration of the date as being longer; and b) For men, when they perceive their potential partner as very attractive, they will estimate the duration of the date as being shorter. These hypotheses can be understood in the light of the evolutionary psychology (Buss, 1995). We expect this results for women because according to Trivers (1972) parental investment theory women are the most investing sex and when they perceive the potential partner as physically attractive, they will allocate more mental resources to evaluated other characteristics of the partner that are important to them (e.g., economic resources, intelligence) to make the choice based in elevated range of characteristics. The use a lot of cognitive resources would make the perceived duration of the date longer (Ornstein, 1969). For men, we imagined this possibility, because according to Trivers, males are less selective than woman and they may feel attracted to potential partners based mostly on their physical attractiveness (Todd, Penke, Fasolo, & Lenton, 2007). So, when men have a meeting with a potential partner they perceived as physically attractive, they do not waste a lot of resources like women to evaluate the partner and they may feel more motivated to talk and experience this conversation as being enjoyable. Consequently, they may estimate the time that passed as being shorter. This hypothesis is also based on the idea that “time flies when you are having fun”, supported by some studies, (e.g. Danckert & Allman, 2005; Glabe & Poole, 2012) that, for example, found out time is underestimated when participants are not boring or are motivated and is overestimated when participants are boring or not motivated.

The secondary aim of our study is to analyse the influence of meeting a potential partner in an attractiveness judgment. We hypothesize that on a speed dating context, when participants stay interested and want to exchange contacts with a potential partner for keep in contact in future, the perceived attractiveness will increase, and when they do not want it, it will not change. Some laboratorial studies have shown that the evaluated attractiveness of opposite-sex people is influenced by their personality. For example, Lewandowski, Aron and Glee (2007) found that when positive personality information about the person shown in a photograph was

presented, participants rated that person as more physically attractive and when photographs were paired with negative personality information, participants rated that person as less physically attractive. This results are consistent with Kniffin and Wilson (2004) naturalistic studies which showed that non-physical characteristics such as familiarity, liking, respect, talent, and effort have a greater influence in physical attraction judgements. Nevertheless, there is no research using speed dating to understand the effect of characteristics of the potential partner perceived by the participant in attractiveness evaluated of the partner by asking the participant to rate the physical attractiveness of the partner before and after the meeting. However, there are no studies in which participants rate the potential partner in terms of physical attractiveness before and after the speed dates. In the majority of studies using real contexts as speed dating, the physical attractiveness was measured by external observers (e.g., Back et al., 2011; Jauk, Neubauer, Nairunteregger, Pemp, Sieber, & Rauthmann, 2016) and in the few studies in which attractiveness of potential partner was measured by participants, this evaluation is made only one time in the event (e.g., Selterman, Chagnon, & Mackinnon, 2015), whereby it could be influenced by other characteristics of the partner and by whether they like it or not.

## Method

### Participants

Our sample was composed by 36 participants, 17 females and 19 males. More specifically, in the first speed dating were present 21 participants, which 11 were females and 10 males and in the second event attended 16 participants, 7 females and 9 males. This yielded a total of 173 speed dates. Participants were aged between 18 and 27 years old ( $M = 21.78$ ,  $SD = 2.36$ ). Males ( $M = 22.19$ ;  $SD = 2.33$ ) were older than females ( $M = 20.88$ ;  $SD = 2.08$ ),  $t(250.20) = -4.40$ ,  $p < .001$ . None was involved in a romantic relationship. Males reported having more relationships in the past ( $M = 3.30$ ;  $SD = 2.95$ ) than females ( $M = 2.13$ ;  $SD = 1.67$ ),  $t(250.20) = -4.40$ ,  $p < .001$ .

Volunteers were recruited through online social networks and advertisements at Minho University and at the bar where the event was held. Participants did not receive any kind of reward for participation besides the snack we offered after the event, while the participants were waiting for the remaining people, which was not announced previously.

## **Mesures**

### *Demographic questionnaire*

Participants answered to a demographic questionnaire that included questions about their age, sex, nationality, and number of previous romantic relationships.

### *Pre-event questionnaire*

Before the event, we presented photographs of all potential partners and participants rated them in terms of their physical attractiveness, using a 10-point scale, from 1 (“not attractive at all”) to 10 (“very attractive”).

### *Post-meeting questionnaire*

After each date, participants answered to a brief questionnaire in which they were asked to evaluate: how long the date lasted (by marking on a line from 1 to 8 minutes); the physical attractiveness of the partner, on a 10-point scale, from 1 (“not attractive at all”) to 10 (“very attractive”); how much attracted they felt toward the potential partner; and how much attracted they believed the partner was toward them, on a 10-point scale, from 1 (“nothing”) to 10 (“a lot”). Then, they were asked whether they would like to exchange contact details with that person. Finally, participants were asked if they already knew that person. Those that answer affirmatively were asked to specify the degree of proximity.

## **Equipment**

To take the photographs of participants before the event we used an instant camera *Fujifilm instax wide*. Using this camera enabled us to take a photo just before the event in a less informal and more comfortable way, because we could give participants their own photos in the end of the event.

## **Procedure**

As instructed on the advertisements, participants interested in participating on the speed dating events sent an e-mail to the researchers. Later, they were contacted and given a brief explanation about the experience and some indications for the event.

The event was held in a bar near to Minho University and before the event, males and females were directed to different spaces of the bar: men to the right and women to the left and all participants received a sticker with a number. Those spaces were separated by a wall and participants entered by different doors to avoid visual contact with the other sex participants.

Then, they were asked to take individual photos. They were offered a snack while they waited. Afterwards, each participant was given photos of the potential mates, printed on paper, and evaluated them in terms of physical attractiveness. Subsequently, men were given directions to go to the left space.

In each speed dating event, participants experienced dates with all the opposite sex participants, each date varied in duration from 180 to 375 seconds ( $M = 269$  s;  $SD = 73.12$  s) and the durations of the dates were selected in randomized order. Immediately before the event, the participants were asked to remove their watches and cell phones. Each date ended with the sound of a bell, followed by a quick post-meeting survey that was given to every participant about the concluded date. After each interaction men moved to the next date and women remained in the same table. At the end of all the speed dates, participants answered a demographic questionnaire. After the event, those who indicated mutual interest received each other's contact details via email.

Follow-up sessions 3 and 6 months later were held to know if any participants got involved in a romantic relationship.

### **Data analysis**

The data collected in this research was analysed with Statistical Package for Social Sciences (SPSS; v. 24). Analysis comprehended *t*-tests for dependent samples to analyse differences between subjective and real time, Pearson's correlations to study associations between time perception and attractiveness measures, and repeated measures with linear mixed model to analyse the changes between rated attractiveness of the partner before and after in function of exchanging contact and sex (Field, 2005). To analyse the data, were excluded the participants that already met the speed date partner.

## Results

In general, participants tend to estimate the duration of the dates as being shorter ( $M_{\text{subjective}} = 221.96$  s,  $SD = 81.19$  s) than it was in reality ( $M_{\text{reality}} = 268.26$  s,  $SD = 72.76$  s),  $t(320) = 9.39$ ,  $p < .001$ . Figure 1 shows that as actual time increases, the perceived time also increases. This shows that participants were able to estimate the time.

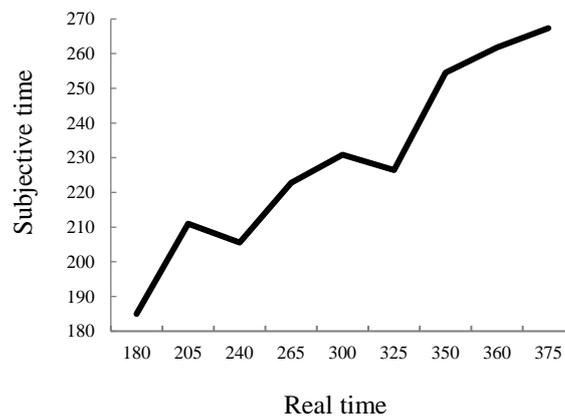


Figure 1. Subjective time average cross real time average.

To measure the timing, we calculated the ratio between subjective duration and real duration of the date. Figure 2 present the ratio of subjective/real time across real time and show that participants overestimate the time for durations bellow 205 seconds and underestimate the durations above that value. This pattern show that the estimated time in this research is according to Vierordt's Law (1868), that say that for shorter durations participants tend to overestimate the time and for longer durations underestimate.

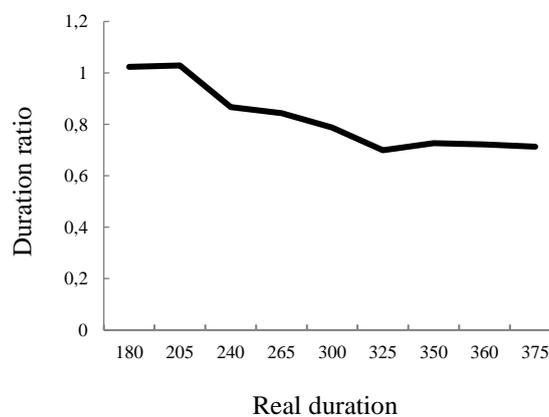


Figure 2. Ratio of time perceived/real time average cross real time.

### Attractiveness and Timing

Tables 1 and 2 show the Pearson's correlations to study associations between time perception, attractiveness and attraction for females and males, respectively. Table 1 show that when female participants perceive a potential partner as being physically more attractive before and after the meeting, they report more attraction to the partner,  $r_{\text{before}}(149) = .57, p < .001$ ,  $r_{\text{after}}(163) = .89, p < .001$ . Similarly, table 2 show that when male perceive a potential partner as being physically more attractive before and after the date, they report more attraction to the potential partner,  $r_{\text{before}}(160) = .54, p < .001$ ,  $r_{\text{after}}(160) = .86, p < .001$ . In addition, the more attracted the participants felt for their partners, the more attracted they judged that the partner would be to them. This was observed in both female and male,  $r_{\text{female}}(163) = .63, p < .001$ ,  $r_{\text{male}}(163) = .74, p < .001$ . When females judge a potential partner as physically more attractive before and after the date and the more attracted they were to him, the longer they estimated the time of the speed date,  $r_{\text{before}}(148) = .26, p = .002$ ,  $r_{\text{after}}(162) = .19, p = .02$ ,  $r_{\text{attraction}}(162) = .24, p = .002$ . However, in case of males, the perception of the partner as physically more attractive before and after the meeting and the more attraction they felt to their female potential partners, the shorter they estimated the time of the speed date,  $r_{\text{before}}(159) = -.18, p = .02$ ,  $r_{\text{after}}(159) = -.20, p = .01$ ,  $r_{\text{attraction}}(159) = -.23, p = .004$ .

Table 1

*Correlations for duration ratio, physical attractiveness before the date, physical attractiveness after the date, participant attraction towards partner and perception of partner attraction toward her, for females.*

	Duration ratio	PA before	PA after	Attraction towards Partner	Expected attraction towards them
Duration ratio					
PA before	.26**				
PA after	.19*	.61***			
Attraction towards Partner	.24**	.57***	.89***		
Expected attraction towards them	.06	.32***	.55***	.63***	

Note. PA - Physical Attractiveness.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 2

*Correlations for duration ratio, physical attractiveness before the date, physical attractiveness after the date, participant attraction towards partner and perception of partner attraction toward him, for males.*

	Duration ratio	PA before	PA after	Attraction towards Partner	Expected attraction towards them
Duration ratio					
PA before	-.18*				
PA after	-.20*	.57***			
Attraction towards Partner	-.23**	.54***	.86***		
Expected attraction towards them	-.18*	.40***	.56***	.74***	

*Note.* PA - Physical Attractiveness.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

### **Perception of physical attractiveness of the partner**

Data were entered into a 2x2x2 repeated-measures analysis of variance (ANOVA) with male/female and exchange/not exchange contact as between-subjects and physical attractiveness before/after the date as within-subject (Table 3). This analysis found a significant main effect of attractiveness before and after the date,  $F(1, 305) = 21.38, p < .001$ . Post-hoc analysis determined that participants tend to evaluate the physical attractiveness of the partner as being higher after the date ( $M = 5.62$ ) compared with before the date ( $M = 5.17$ ). Results also showed a significant interaction between physical attractiveness before/after and sex of participant,  $F(1, 305) = 13.39, p < .001$ . Post-hoc analysis showed that women rated the partners as being more physically more attractive after the date ( $M = 5.64$ ) compared to before the date ( $M = 4.77$ ). For men, their attractiveness perceptions of the partners did not change between before ( $M = 5.71$ ) and after the date ( $M = 5.83$ ). There was a significant interaction between exchange/not exchange contact and physical attractiveness before/after,  $F(1, 305) = 29.56, p < .001$ . When participants chose to exchange contacts with a partner, their perception of their partner's physical attractiveness increased after the date ( $M = 6.82$ ) compared with the rating before the date ( $M = 5.85$ ). On the other hand, when participants do not show interest in exchanging contacts, the physical attractiveness rating of the potential partner does not change after the date ( $M = 4.41$ ) compared with before the date ( $M = 4.49$ ). The three-way interaction between sex, contact and physical attractiveness was not statistically significant,  $F(1, 305) =$

.02,  $p = .893$ .

Table 3

*Physical attractiveness of the partner perceived by the participant before and after the speed dates in function of the interest in exchange or not contact with them for females and males.*

		<b>Contact</b>	<b>No contact</b>
<b>Physical attractiveness before</b>	Female	5.41 (2.02)	3.91 (1.87)
	Male	6.3 (1.50)	5.08 (1.47)
<b>Physical attractiveness after</b>	Female	6.71 (1.50)	4.19 (1.72)
	Male	6.93 (1.41)	4.64 (1.70)

*Note.* The values presented are mean and standard deviation.

For follow-up, we contacted all participants. Participants of the first speed dating event were contacted after three and six months, and those who responded, we were informed that two intimate relationships were formed. In case of the second event, we were only able to perform the three-month follow-up and since the participants from whom we got feedback, we were informed of one formed relationship.

### **Discussion**

The main objective of this research was to study time perception and attraction in a realistic social scenario by investigating if changes in subjective time measured during a speed dating were related with attraction and liking. In the event, the duration of the dates were variable and participants had to estimate the time that passed. Participants were asked to rate the potential partners in terms of their physical attractiveness before and after the dates and to report if they wanted to exchange contacts with them. Our data suggest, consistently with our hypotheses, that the estimated time of the dates were associated with the physical attractiveness of the potential partners perceived by participants.

More specifically, our results showed that the more females rated a potential partner as physically attractive, the longer they perceived the duration of the date. That goes along with the popular idea that “time slows down whenever you are around” (Swift, 2010). This may be due to a bigger allocation of women’s cognitive resources to process more information of the meeting (Loftus, Schooler, Boone, & Kline, 1987) and of the potential partner they are interested in. More specifically, even though physical attractiveness is important in a potential

partner, for women there are other characteristics that have a higher value, such as good economic perspectives (Buss & Barnes, 1986; Bech-Sørensen & Pollet, 2016). Therefore, searching for cues of positive traits in a potential mate requires the use of cognitive resources. Besides that, research has shown that when women perceived the partner as attractive, they tend to be more motivated to make a good impression on the partner and pay more attention to the things they say that might influence this impression (Dong & Wyer, 2014). According to Ornstein's storage size model (1969), when people store more information in memory, they tend to perceive the duration of that interval of time as being longer. Furthermore, women may consider the experience with a partner who they consider physically attractive as positive in an emotional view. This result is also consistent with that study of Kellaris and Kent (1992) in which time did seem to slow down when participants were exposed to positively balanced music, compared to participants exposed to negatively balanced music. The authors suggested that when people receive positive emotional information they tend to pay more cognitive resources to listening to music. Therefore, they tend to perceive the received stimulus information as bigger and remember the event as being longer (Ornstein, 1969). Besides that, a study conducted by Zhang, Zhang, Yu, Liu and Luo (2017) showed a reliable sex difference in temporal distortion with an emotional stimulus. Women, compared to men, tended to overestimate the durations presented in lexico-semantic level using emotional words.

However, for men, our results showed that time does not seem to slow down whenever someone attractive is around. In fact, the more males rated a female participant as physically attractive, the shorter they perceived the duration of the speed date. This seems to be consistent with the idea that "time flies when you are having fun". Research has shown that men's preferences for potential mates are based mostly in physical attractiveness (Todd, Penke, Fasolo, & Lenton, 2007). Therefore, when they have a meeting with a potential partner that they perceive as being physically attractive, they do not need to spend much cognitive resources searching for other cues, feeling automatically motivated to be with her. Consequently, they will tend to estimate the time that passed as being shorter. This result also suggests that time perception in males during the dates may be affected by motivation because, according to previous literature, positive approach motivation causes the perception of time to be shorter (Gable & Poole, 2012). Besides that, the subjective perception of the passage of time seems to be an important component to evaluate the experience of boredom (Danckert & Allman, 2005). So, when males are interested and motivated in the date with a physical attractive potential partner, they tend to estimate the date duration as shorter and, on the other hand, this time underestimation reinforces the perception of an interesting date (Sackett, Meyvis, Nelson,

Converse, & Sackett, 2010). Underestimate the duration of the date may prolong approach-motivated behaviour (Gable & Poole, 2012) and this increases the probability of a successful mating. On time, Einstein said “Put your hand on a hot stove for a minute and it seems like an hour. Sit with a pretty girl for an hour, and it seems like a minute”.

According to Trivers (1972) theory, the relative parental investment of the sexes in their offspring is the key variable controlling the operation of sexual selection. A sexual intercourse that for a male is a reduced investment, for a female can produce a 9-month investment. For a female, this investment requires more choosiness in the partner choice. Besides that, prior research showed that females tend to be more selective (Kurzban & Weeden, 2005) and more discriminating (Todd, Penke, Fasolo, & Lenton, 2007) than males. Therefore, it is expected that females allocate more attention to capture a greater number of characteristics of the potential partner in addition to physical attractiveness, such as intelligence, earning prospect and other signs suggesting he could be good partner in the future. This process seems to imply an exhaustive evaluation in the first meeting which required spending a lot of cognitive resources. On the other hand, men are attracted for less characteristics of the partner compared to females (Luo & Zhang, 2009). So, males do not waste so much energy and resources in cognitive processing of information and focus more energy in having fun with the partners they perceived as being more attractive. Such changes may reflect evolutionary adaptations which make the human cognitive system more responsive in situations related to reproductive fitness.

Williams (2012) suggested that sex differences in timing might be due to the effects of circulating estrogen in adult females versus testosterone in adult males. Besides that, gonadal hormones had been found to influence sexual motivation (Wallen, 2001). In men, testosterone increases interest in a woman, engagement in self-presentation, smiling and making eye contact. (Meij, Almela, Buunk, Fawcett & Salvador, 2011). Meij, Almela, Buunk, Fawcett and Salvador (2011) suggested that during encounters with the opposite sex, testosterone may promote the display of affiliative behaviours that increase a man’s mating prospects and during social contact with a potential partner testosterone is linked to the initiation of courtship behaviours. On the other hand, in women estradiol seems to be a significant positive predictor of sexual desire (Roney & Simmons, 2013).

Estradiol is one of the natural estrogens and has been revealed to increase striatal dopamine release, that may modify temporal perception and timed performance in a manner similar to indirect dopamine agonists such as amphetamine and cocaine (Pleil, Cordes, Meck, & Williams, 2011). Estrogen as a dopamine agonist facilitate striatal dopaminergic activity (Sandstrom, 2007), stimulating the dopaminergic transmission and, consequently, producing an

overestimation of time intervals (Cheng, MacDonald, & Meck, 2006). Pleil, Cordes, Meck and Williams (2011) investigated the sex differences in the rapid and acute effects of estradiol on time perception in adult male and female rats. According to the authors, their results are consistent to the idea that there are multiple mechanisms of estrogens' action in the striatum that modulate dopaminergic activity and are differentially organized by gonadal steroids during early brain development. Additionally, Becker (1999) found that striatal dopaminergic release is affected by estrogen only in females. Striatum is one of the components of basal ganglia that have been suggested to be a fundamental component of timing process (Ivry & Spencer, 2004) and multiple studies, specifically with patients with dopamine system disorders as Parkinson (Leranth, Roth, Elsworth, Naftolin, Horvath & Redmond, 2000; Michel, Frederic, Marc, & Paolo, 2002; Wearden et al., 2008), schizophrenia (Michel, Frederic, Marc, & Paolo, 2002; Riecher-Rössler & Häfner, 1993; Seeman & Lang, 1990) and others, found an interaction between gonadal steroid hormones as estrogen in basal ganglia mechanisms (Harteveldt & Joyce, 1986). So, because of the fact that estrogen is a predictor of sexual desire and sexual motivation, this may increase their circulation in women during a speed date with physical attractive partners and, subsequently, increase dopamine release in striatum. Besides that, some studies found that women, on average, have higher presynaptic dopamine synthesis capacity (Laakso et al., 2002) and lower D2 receptor affinity (Pohjalainen, Rinne, Nägren, Syvälahti, & Hietala, 1998) that suggests an increased endogenous dopamine in women's striatum, comparing to men. So, neural sex differences in dopaminergic circuit in striatum could explain this sex differences on the influence of physical attractiveness in time perception. So, it is possible that sexual hormones on males have an opposite effect in striatum (Myers, Anderson, & Dluzen, 2003).

Our results may diverge from Dong and Wyer (2014) study because sex differences in their study could be masked by lack of cues in the interaction that could influence attraction mechanisms. Specifically, the reduction of nonverbal information influence more the response of females because, according to a vast literature (Mehrabian, 1972; Mehrabian & Ksionzky, 1972; Zahn, 1973, 1975), females are more sensitive to nonverbal information and males to a verbal information.

Our study also demonstrates that for the decision of exchanging or not contact with the partner, physical attractiveness seems to be an important factor for both sex because when participants perceived the partners as physically attractive, they tend to exchange contact with them. In addition, consistently with our second hypothesis, the physical attractiveness of the potential partner perceived by the participant changes according to the interest in exchanging

contact him/her. In other words, interest or not in the meeting with a potential partner and the desire or not to keep in contact in the future influences the physical attractiveness perceived of them. Particularly, when participants are interested in a potential partner in the end of the date, they perceive their physical attractiveness as being higher compared to the initial evaluation (i.e., before the date). When participants are not attracted to partners in the end of the date, expressing the desire not to exchange contacts with them, they not change the evaluation of the potential partner's physical attractiveness. These results suggest that there may be an effect of other characteristics of the potential partner in the physical attractive evaluation. This is supported by some laboratorial studies that have shown that the evaluated attractiveness of opposite-sex people is influenced by the personality of them. For example, Lewandowski, Aron and Glee (2007) found that when was presented positive personality information about the person shown in a photograph, participants rated her as more physically attractive and when photographs were paired with negative personality information were rated as less physically attractive. These results are also consistent with Kniffin and Wilson (2004) naturalistic studies that showed that non-physical characteristics such as familiarity, liking, respect, talent, and effort have a greater influence in physical attraction judgements. Nevertheless, this is the first research that uses speed dating to understand the effect of an interaction with a potential romantic partner and knowing information about them in physical evaluation of the partner's.

### **Limitations and Future research**

First, the age of the participants, who are relatively young people, represents a limitation of the present study. Therefore, it seems important to understand if the results of this study are extensible to older ages, in future research. Second, previous studies found that preferences in mate selection are influenced by the type of desired relationship, short or long-term. Thus, in future research it seems relevant to question participants in the speed dating event if they would like to have a short or long-term relationship with the partners they show an interest in exchanging contacts with. Third, this research shows that in a realistic scenario where two people meet each other, changes occur in time perception and seems plausible to us that other implicit cognitive processes are affected in this context. However, there are no studies about other implicit measures in speed dating event, as memory or attention, and future research should focus on this theme. Finally, in terms of time perception and attractiveness, our data were correlational, which do not provide evidence for a causal influence of the physical attractiveness on timing. Our results suggest that the two variables are associated but it would be interesting to understand if are a causal relation between them.

## **Conclusion**

Results of the present study open access to new knowledge about what happens when an individual feels attracted to other of the opposite sex. This is the first research to study time perception in a real speed dating event. Our data show that changes in timing are associated with attraction, particularly, when the meeting is with someone perceived as physically attractive. On one hand, the more women perceive men in a date as physically attractive, the longer they estimate the duration of the meeting. On the other hand, the more men rate the potential partner as physically attractive, the shorter they estimate the duration of the date. This research is also the first to analyse the perceived physical attractiveness of a potential partner before and after the meeting. Our results demonstrate that when people show an interest in a potential partner, the perceived physical attractiveness of the partner increases.

Our research will help to understand what happens automatically and instinctively in the cognitive system in situations related to interpersonal attraction and provides new evidence for probable human timing adaptations that may respond differently according to sex to a stimulus related with mating. So, it seems that implicit cognitive processes may be involved in attraction when people meet for the first time and could be explained in the light of evolutionary psychology. Besides that, it opens a new line of research on intimate relationships outside the lab, in a real-life event.

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