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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Eye Gaze and Dominance, Cues for Online Communication with Strangers

Bakış ve Baskınlık, Yabancılar ile Online İletişime Dair İpuçları

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Abstract

Many digital communication platforms of the new economy are built up on mechanisms to initially communicate and/or develop an acquaintance with "strangers" over displayed profile pictures. This study aims to reveal the impact of the direction of eye gaze and perceived dominance from those pictures during the process of pairing online with a stranger, for spending time in a closed environment. Preference between pairs of 66 participants through their profile pictures having a direct or averted gaze and some manipulated by facial width height ratio (fWHR) aiming to increase perceived dominance, were measured by the eye-tracking device. The findings show that when observing the profile pictures of strangers (i) gaze attracts attention to the face of gazing person, (ii) in case of perceived dominance, the gaze of a stranger induces gaze avoidance for participants. The study further predicted when the user is to prefer between pairs of people that one is perceived to be dominant, the probability of choosing the perceived non-dominant is higher. The participants' preference of the former holdout sample was predicted consecutively by hit ratios of 81.5, 91.4 and 94.9 for three different cases. Analysis of the data revealed no systematic differences between males and females.

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Öz

Yeni ekonomide, birçok dijital platform kendileri üzerinden gerçekleşecek, "yabancılar" ile kurulacak ilk iletişimde ve tanışma sürecinde profil fotoğraflarının kullanıldığı mekanizmaları kullanmaktadır. Bu çalışmada bu platformlardaki profil fotoğraflarındaki kişilerin baktığı yönün ve fotoğraftan algılanan baskınlığın, bireyin tercihleri ve davranışları üstündeki etkisinin ortaya çıkartılması amaçlanmıştır. Araştırmada 66 katılımcıya bir yabancı ile kapalı bir ortamda birlikte vakit geçirmeleri gerektiği söylenmiş, 8 ayrı fotoğraf çifti gösterilmiş ve her bir çiftten bir kişiyi tercih etmeleri istenmiştir. Bu süreçte katılımcının tercihlerinin yanında ekranda baktığı noktalar da göz takip cihazı ile kayıt altına alınmıştır. Çalışmada direkt bakan, farklı yöne bakan ve baskınlığı arttırmak için en-boy oranı manipüle edilmiş profil fotoğrafları kullanılmıştır. Çalışmadan elde edilen bulgularda, (i) direkt bakan profil resimlerinin daha fazla dikkat çektiği ve katılımcının bu resimlere daha fazla odaklandığı, (ii) en-boy oranı manipüle edilerek baskınlığı artırılmış resimlerde ise katılımcıların bu resimlere bakmaktan kaçındığı gözlenmiştir. Çalışma ayrıca, katılımcıların baskın görünümlü profile sahip kişileri daha az tercih ettiğini göstermiştir. Katılımcıların tercihleri iki kümeye ayrılmış ve birinci kümedeki katılımcı tercihleri sırası ile 81.5, 91.4 ve 94.9 isabet oranları ile üç ayrı fotoğraf çifti için tahmin edilebilmiştir. Toplanan verilerin analizi, erkek ve kadın katılımcılar arasında sistematik bir farklılık olmadığını ortaya koymuştur.

Anahtar Kelimeler: Online İletişim, Dikkat, İnsan Yüzü, Algı, Karar Alma, Kaçınma, Dominantlık

Introduction

Since humans are exposed to various signals from the clutter of various living organisms and non-living substances within the complexity of environments, a gaze orienting system is evolved, concentrating on the most informative foci (Foulsham, Cheng, Tracy, Henrich & Kingstone, 2010). Many of the judgments people make about others in daily life are based on the information gathered through non-verbal cues expressed by faces. Although the face is an important attention-grabbing factor and source of information, the gaze specifically arouses the interest of researchers because of its communicative power. Starting from their early ages of infanthood, humans pay attention to others' gazes (Brooks & Meltzoff, 2002). Recently digital encounters over screens raise questions about the role of the gaze for forming attributions about others during interpersonal cyber communication (Wieser, Pauli, Grosseibl, Molzow & Mühlberger, 2010; Yee, Bailenson, Urbanek, Chang, & Merget,2007). From cyber dating services to accommodation or car sharing, gaze may be a notable non-verbal communication tool for evaluating the will of and preferring among strangers when developing acquaintances.

People are continuously concerned with obtaining information to deduce the intention of others by two dimensions, namely valence, and dominance (Fiske, Cuddy & Glick, 2007; Todorov, Said, Engell & Oosterhof, 2008). While the valence dimension implies the interpretation of intentions through perceived trustworthiness, the person's capacity to apply intentions is assessed by the dominance dimension (Todorov et al., 2008; Wojciszke, Bazinska & Jaworski, 1998). Thus, there is a positive correlation between dominant appearance and perception of the capacity to apply intentions (Judd,

James-Hawkins, Yzerbyt & Kashima, 2005). The expression of dominance is the ground of diverse interactions for all species, and its attributes should be quickly recognizable for survival (Burgoon & Dunbar, 2000). Thus, people perceived to be dominant gets more attention. Dominance, signaling the physical strength along with social rank, may be perceived by overgeneralization of facial cues (Cheng, Tracy, Foulsham, Kingstone & Henrich, 2013). Based on these findings, the aim of this study is to reveal the impact of the direction of eye gaze and perceived dominance of strangers displayed by profile pictures over the digital communication platforms on user (i) eye gaze (ii) preferences of strangers when pairing with them. The stranger is defined as "a person that is unknown or with whom one is unacquainted" (*Merriam-Webster*, 2019).

In Case Of Perceived Dominance, Eye Gaze Induces Gaze Avoidance

In general, head orientation and/with eye gaze direction jointly constitute the initial encounter for interpersonal interaction (Hietanen, 1999). Gaze engages the attention and causes rapid orienting to the face of the gazing person. The attention of individuals varies according to the direction of both the head and gaze of the person facing them. While the direct gaze turns the attention of an individual to the face, the averted gaze reorients the individual's visual attention to the other people, things, etc. (Hietanen, 1999). Furthermore, people mostly pay no attention to the other gazing in different directions (Senju & Hasegawa, 2005).

People sometimes use gaze to assert their dominance, that the others escape or comply depending on the perceived motivations of the gazing (Kleinke, 1986). The perception of averted gaze and that of direct gaze trigger distinct cognitive processes (George & Conty, 2008). A direct gaze from a stranger's face, compared to that of an averted gaze, can be interpreted as a threat and induce avoidance if that stranger is perceived to exert dominance. People further avert their gaze from the dominant others to prevent conveying an unwanted signal or any misunderstanding. They look less often and for shorter durations at the faces of targets displaying dominance even by pictures (Holland, Wolf, Looser & Cuddy, 2017) or by video displays (Gobel, Kim & Richardson, 2015).

In parallel with these findings, in this study, it was predicted that individuals would look at profile pictures of dominant looking strangers for shorter periods than those of less dominant looking ones. The digital profile pictures were used as the sole tool of assessment in this study. Facial width-height ratio (fWHR) started to appear in the literature as another variable that affects dominance perception (Koç & Özkoçak, 2019; Özener, 2012; Sarıbay, 2018; Weston, Friday & Liò, 2007). The perceived dominance over the neutral profile pictures was created by manipulating, thus increasing the facial width-height ratio (fWHR) of males since fWHR is found to be positively correlated with perceived dominance for males (Mileva, Cowan, Cobey, Knowles & Little, 2014). All profile pictures were kept neutral to neutralize the effect of emotions on respondents' perception and also the probability of the emotional facial expressions to change the fWHR (Kramer, 2016). Only the profile pictures of males were used for manipulating dominance referring that the higher the fWHR of the man, the more dominant he will be perceived since the dominance dimension is polarized and heightens from feminine/babyface at one end to the masculine face at the other end (Todorov, 2008). This finding is

also confirmed in Mileva et al.'s (2014) study. Thus, the dominant appearance is directly affected by adulthood, masculinity, and physical strength. fWHR is calculated by dividing the distance between the two Zygion points to the distance between the Nasion-Prosthion points (Weston et al., 2007). Those four cranial landmarks are shown in Figure 1 below.

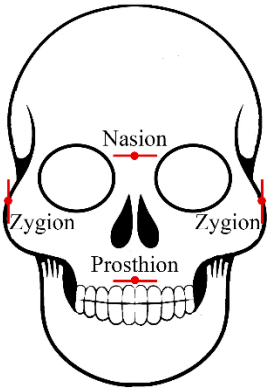

Figure 1. Cranial landmarks of Nasion, Zygion, and Prosthion

In accordance with assertions from various literature, two hypotheses are proposed as follows.

H1: *Participants, tend to look longer at digitally displayed unmanipulated profile pictures of male strangers gazing directly when compared with those looking at different directions.*

H2: *Participants, tend to look longer at digitally displayed unmanipulated profile pictures of male strangers when compared with those of increased dominance (fWHR increased) gazing directly.*

People Make Preferences Between Pairs Of Strangers By Their Perceived Dominance

In order to assess the probable future outcome of encounters, a gaze is a powerful tool for communicating social intentions (Adams & Kleck, 2005). Gaze often functions as a signal facilitating social interaction, on the other hand, it can be also perceived as a threatening signal. People display avoidance when they unconsciously perceive a threat from others and they physically distance themselves (Wyer & Calvini, 2011). Gaze direction and gaze duration have a significant impact on how the gaze is perceived and interpreted (Kuzmanovic et al., 2009). Looking directly to the face of others, especially for longer periods, would convey the expression of dominance. People immediately react by rapidly taking action that can be evaluated at a preconscious level for favorability-unfavourability (Zajonc, 1980, 1984).

The dominant appearance is directly affected by adulthood, masculinity, and physical strength. While the extremely obedient faces resemble the face of a baby or a woman, extremely dominant faces seem masculine and mature (Todorov et al., 2008). Therefore, another dimension that affects

the dominant appearance is the gender of the person (Keating, 1985), and male faces seem to look more dominant than female faces. For that reason, it is decided to add a male-female face comparison in the study. On the other hand, the gender of the participants does not make a significant difference in the evaluation based on the dominance dimension (Wang, Tong, Shang, & Chen, 2019).

Based on these assertions, this study further aimed to understand whether the preference between pairs of strangers both male and female, "*for spending time in a closed environment*" can be foreseen when the user is free to use the time for looking at their profile pictures and questioned;

RQ1: When the user is to make a preference between digitally displayed unmanipulated profile pictures of a stranger woman and a stranger man, is the probability of choosing the woman higher?

RQ2: When the user is to make a preference between digitally displayed unmanipulated and fWHR increased profile pictures of a stranger man, is the probability of choosing the man with unmanipulated profile higher?

RQ3: When the user is to make a preference between digitally displayed fWHR increased direct looking and averted gaze profile pictures of a stranger man, is the probability of choosing the man with averted gaze higher?

Methodology

Data Collection

A total of 66 participants comprised of convenient university students and scholars, 98.5% younger than 42 years of age, 50.0% male and 50.0% female, voluntarily responded a question for each pair of pictures separately when their eye movements were recorded in a controlled environment. Data collection from all participants was carried out within 2 weeks.

Procedure

Participants were informed that they would be viewing 8 pairs of pictures and that they would be asked to decide which of each pair they choose to stay in a closed environment for 30 minutes. Written consents of the participants were taken. Participants viewed the selection screens on a flat-screen set at a resolution of 1920x1080 pixels and a refresh rate of 100Hz, controlled by a PC, running the Windows 10 OS and iMotions software (iMotions, 2017). Eye movements were recorded by EyeTribe desk-mounted eye tracker, which has a 20ms response rate, controlled by iMotions software. Participants sat at about 60 cm from the screen. For eye-tracking, a standard nine-point calibration procedure of the eye tracker was performed. When the system is calibrated, the eye-tracking software calculates the user's eye gaze coordinates with an average accuracy of around 0.5º to 1º of visual angle. Approximately 60 cm away from the screen/tracker, this accuracy corresponds to an on-screen average error of 0.5 to 1 cm. Once the calibration process was completed successfully, each participant was expected to make a preference between pairs of profile pictures by answering the question of "*If you have to spend 30 minutes alone with a stranger in a closed environment, which of those two people would you choose?*" for each pair. Participants responded to the question by clicking

the radio button below each picture via an optical mouse. No time limit was applied during the survey which constitutes one question for each picture pair and eye movements were recorded. The reason for not applying a time limit was to simulate real-life conditions as much as possible and to eliminate the possible effect of the time pressure on participant behavior and decisions. The average response time of participants was measured as 7 minutes. This 7-minute average response time covers both survey response and eye tracking recording stages, as the participants were recorded simultaneously with the eye tracker while answering the questionnaire.

Stimuli

Eight profile picture pairs, 14 male profile and 2 female profile pictures having either direct or averted gaze direction were selected from the Radboud Faces Database (Langner et al., 2010) and used as stimuli for each participant (see Figure 2 for a sample stimuli screen). The reason for choosing only two female profile pictures is that only the RQ1 about women is included in this study. All other hypotheses and research questions are based on comparing male pictures among themselves. All picture pairs were shown to each participant in random order.

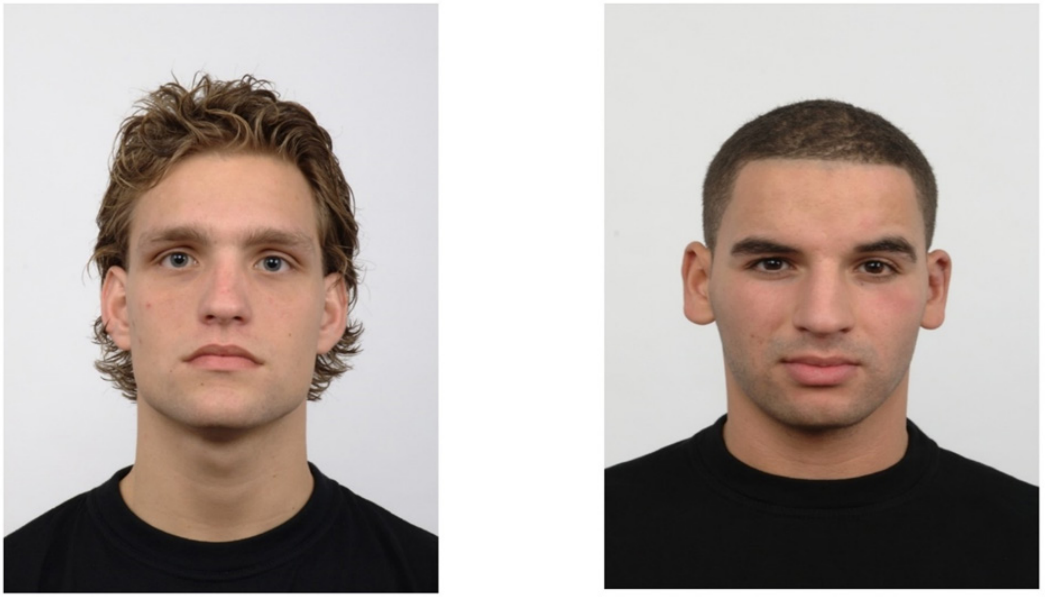

Figure 2. The Sample Stimuli Screen

All profile pictures utilized were neutral, thus without any emotional expression, in order to neutralize the effect of facial emotional expressions on respondents' choices (Kramer, 2016). All pictures were 1024 x 681 pixels (Langner et al., 2010). For this study, six male profiles further were manipulated to increase dominance by increasing fWHR. Original and manipulated widths and heights of profile pictures are shown in table 1 along with fWHR increase ratios. See figure 3 for a sample male profile showing both neutral and fWHR increased picture types.

Figure 3. A Sample Male Profile Showing both Picture Types. Neutral Looking Unmanipulated and Neutral Looking Fwhr Increased Types Respectively

To check the consistency of participatory responses and eye-tracking data, two groups of four pairs with the same qualifications were formed. The picture types of the last four pairs (pair 5 to 8), which are shown in table 1, were the same as the first four pairs, but different profiles from the database were used in those pairs. In order to eliminate any potential bias or trend, the order of the trials (pair 1-8) was randomized by iMotions software for each participant.

Table 1. Paired Profile Pictures

			Original Picture			**Values After fWHR Increase**			
		Definition	Width	Height	fWHR	Width	Height	fWHR	fWHR Increase Ratio
Pair 1	**Picture A**	Direct Gaze Male	305	157	1,94				
	Picture B	fWHR Increased Direct Gaze Male	297	162	1,83	337	162	2,08	13%
Pair 2	**Picture A**	fWHR Increased Direct Gaze Male	308	163	1,89	349	163	2,14	13%
	Picture B	fWHR Increased Gaze Averted Male	307	166	1,85	348	166	2,10	13%

Pair 3	**Picture A**	Direct Gaze Male	303	163	1,86				
	Picture B	Head and Gaze Directed toward different direction Male	293	164	1,79				
Pair 4	**Picture A**	Direct Gaze Male	299	154	1,94				
	Picture B	Direct Gaze Female	263	137	1,92				
Pair 5	**Picture A**	Direct Gaze Male	307	163	1,88				
	Picture B	fWHR Increased, Direct Gaze Male	284	140	2,03	318	140	2,27	12%
Pair 6	**Picture A**	fWHR Increased, Direct Gaze Male	292	146	2,00	331	146	2,27	13%
	Picture B	fWHR Increased, Gaze Averted Male	284	151	1,88	320	151	2,12	13%
Pair 7	**Picture A**	Direct Gaze Male	294	161	1,83				
	Picture B	Head and Gaze Directed toward different direction Male	292	163	1,79				
Pair 8	**Picture A**	Direct Gaze Male	305	153	1,99				
	Picture B	Direct Gaze Female	279	164	1,70				

It was shown that even a 5% increase in fWHR increases perceived dominance significantly (Merlhiot, Mondillon, Méot, Dutheil & Mermillod, 2021). Thus, a minimum of 12% increase in fWHR would be enough.

Results

Eye movement data (horizontal and vertical coordinates on the screen) were automatically parsed into saccades and fixations by iMotions software which decomposed fixation durations according to the area of interests (AOI) (iMotions, 2017). Based on the literature about the link between the depth of processing and fixation duration (Henderson, Nuthmann & Luke, 2013; Nuthmann, Smith, Engbert & Henderson, 2010), in this study, only the fixation durations were analyzed assuming that information extraction only takes place during these intervals. For each pair, profile pictures were identified as AOI on the screen. The non-parametric Wilcoxon Sign Rank test was used to compare the mean durations on profile pictures in each pair because of the non-normality of the duration time 'in milliseconds'. The results did not show a significant difference between female and male participants. Analysis results were summarized in table 2.

Table 2. Analysis of Mean Fixation Durations for Each Picture Pair (Mean and Median Values Are In Milliseconds)

	Tested Hypotheses	Picture	Mean	S.E.	Median	Z	p-value
		P1fwhrdirectgaze	1328.14	170.032	1202		
Pair1	**H2**	**P1neutraldirectgaze**	1718.38	261.876	1268	-3.122	<.002
		P3neutralheadandgazedirected differentdirection	827.41	131.991	633		
Pair3	**H1**	**P3neutraldirectgaze**	1760.17	275.145	1200	-3.103	<.002
		P5fwhrdirectgaze	1059.07	162.171	834		
Pair5	**H2**	**P5neutraldirectgaze**	2152	216.331	1832	-4.324	<.000
		P3neutralheadandgazedirected differentdirection	598.45	87.117	466		
Pair7	**H1**	**P3neutraldirectgaze**	1848.9	216.416	1564	-3.852	<.000

Mean fixation durations for the pairs of 3 and 7 were used in order to test Hypothesis 1. The mean fixation durations for the neutral looking and direct gazing male profiles are higher and mean differences were found to be significant. The p-values were found for pair3 as 0.002 and for Pair7 as 0.000. By these results, *Hypothesis 1 is supported.* The participants focused on the profile pictures gazing directly for a longer period of time than the profiles looking in a different direction. In parallel to the findings of Hietanen (1999), a gaze turns the attention of an individual from the other variables to the gazing person in digital communication platforms, too.

In order to test Hypothesis 2, picture pairs of 1 and 5 were used. When male profile pictures with direct gazing were compared, participants' mean fixation durations for the unmanipulated pictures were significantly higher than the fWHR increased (pictures with increased dominance) ones. For both pair 1 and pair 5, total gaze durations median values for fWHR increased profile pictures were significantly lower than unmanipulated profile pictures with the p-value for pair 1 as 0.002 and p-value for pair 5 as 0.000. By these results, *Hypothesis 2 is supported*. Participants tend to avoid looking at the pictures of relatively dominant males. As mentioned earlier people avert their gaze from the dominant others to prevent conveying an unwanted signal or any misunderstanding in real-life encounters. This finding indicates that individuals act similarly also on digital communication platforms.

Logistic regression was used in order to test the research questions and to analyze whether the preference between pairs of strangers can be predicted by the fixation durations. In this test, when the estimated probability is less than 0.5, it is predicted that the event will not occur, or if the probability is higher than 0.5, vice versa. In this study, the selection of one profile picture in the pair is defined as success and is coded as one. Pair 1, Pair 2, and Pair 4 are used to estimate the logistic regression model then Pair 5, Pair 6, and Pair 8 are used as a holdout sample in order to see the model fit. Higher values of Cox and Snell R^2 indicate better model fit. Since the maximum value of 1 cannot be reached Nagelkerke's modification is used (see table 3) (Hair, Black, Babin & Anderson, 1998).

Table 3. Logistic Regression Model for Stranger Preference Fit Statistics

	Picture Pair	Research Question	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1 st Model	Pair 1	RQ2	59.345	.275	.388
2nd Model	Pair 2	RQ3	12.332	.652	.906
3rd Model	Pair 4	RQ1	13.444	.654	.886

Exponential (B) is a value by which the odds of an event (ratio of the probability that an event will occur to the probability that it will not) change when the independent variable increases by one unit. An odd ratio greater than one indicates that the odds of being selected by the respondent increase when the independent variable increase one unit (see table 4).

Table 4. Coefficient of the Variables in the Logistic Regression Model

	Picture Pair	Research Question	Variables	B	S.E.	Wald	df	p-value	Exp(B)
1st model	**Pair 1**	**RQ2**	**P1neutraldirectgaze**	.005	.002	5.98	1	<.014	1.005
			P1fwhrdirectgaze	-.007	.003	6.224	1	<.013	.994
			Constant	.526	1.099	.229	1	<.632	1.692
2nd model	**Pair 2**	**RQ3**	**P2fwhrdirectgaze**	-.003	.001	5.921	1	<.015	.997
			P2fwhravertedgaze	.009	.004	4.743	1	<.029	1.009
			Constant	-.871	1.283	.461	1	<.497	.419
3rd model	**Pair 4**	**RQ1**	**P4neutralmale**	-.005	.002	11.957	1	<.001	.995
			P4neutralfemale	.004	.002	6.673	1	<.010	1.004
			Constant	2.394	1.387	2.980	1	<.084	10.953

When the validation is based on the same cases, the hit ratio of the logistic regression is overestimated to derive the logistic regression. Thus, second pairs are used as a holdout sample to calculate the hit ratio of the holdout sample to estimate the logistic regression model using the prediction sample (table 5).

Table 5. Classification Results for a Holdout Sample of Pairs

	Picture Pair	Research Question	Hit ratio (%)
1st Model	Pair 1	RQ2	81.5
2nd Model	Pair 2	RQ3	91.4
3rd Model	Pair 4	RQ1	94.9

As could be seen from table 5 estimation of hit ratios was higher than 80% for all models. In other words, participants' gaze durations to the profile pictures affected their choices. Additionally, the Exp(B) values in Table 4 show in which direction the participants' preferences will probably be. The Exp(B) value above one means that the probability of selecting this picture is higher than the other one. In the first model, which analyzes RQ2, the Exp(B) value of unmanipulated direct

looking picture was 1.005. This means that the probability of participants choosing a male with an unmanipulated profile picture was higher than the male with a neutral looking fWHR increased profile picture. Similarly, in model 2, the fWHR increased profile picture of a male with an averted gaze has an Exp(B) value of 1.009, while in model 3, the female picture has an Exp(B) value of 1.004. This shows that the probability of selecting these pictures is higher than the other pictures in the pairs. The participants tended to prefer the profile pictures which they perceived as less dominant, in parallel to assumptions.

In the first research question, it was asked whether the probability of participants choosing the female is higher than the male by only looking at their profile pictures. Based on the analysis of the participants' gaze time at the pictures, it is realized that this possibility is high. In other words, consistent with the literature (Todorov, 2008), female faces are perceived as less dominant than male faces and are preferred more.

In the second research question, it is tried to be found out whether the probability of participants choosing the unmanipulated profile picture of a male is higher than the fWHR increased profile picture by only looking at their profile pictures. It is examined that Exp(B) value of the unmanipulated profile picture is 1.005 that makes it the most probable choice for the participants. As mentioned before, an increase in the fWHR also increases perceived dominance and those profiles are preferred less.

In the last question, fWHR increased two male profiles, one looking directly and the other one looking in a different direction are compared. Based on the analysis of the participants' gaze time at the pictures, it was concluded that the possibility of selection of the profile with an averted gaze is higher than the direct looking one. Exp(B) value of the profile with averted gaze is 1.009. It has been found that gaze from a stranger's face can be interpreted as a threat and induce avoidance if that stranger is perceived to exert dominance (George & Conty, 2008). Thus, this finding is also in parallel with the previous studies (Holland et al., 2017; Gobel et al., 2015).

Discussion

Our results provide a new perspective for examining how fWHR might relate to social behaviour and communication. Integrating work from the social psychological literature and natural sciences on nonverbal communication, we provide strong evidence that humans, avert their gaze from individuals with higher fWHR due to increased dominant appearance. It is also found that those who look at us directly draw our attention more than those who look in the other direction. The study further predicted when the user prefers between pairs of strangers that one is perceived to be dominant, the probability of choosing the perceived non-dominant is higher.

How individuals may evaluate online photos via nonverbal cues like gazes or aversions, is an intriguing area of research in the digital era. Also revealing the impact of gazing for online validation and preference when pairing with strangers of different personalities has implications to many digital platforms of communicating, sharing, and dating. Various technical protection mechanisms are provided by these platforms to minimize the potential risks that may happen during real encounters

of two people paired online. On the other hand, the self-intuition of the users about the possible intentions of a stranger and awareness of the means of assessing these intentions are still important.

This study aims to analyze the impact of eye gaze and perceived dominance within the context of digital communication through profile pictures. The study focuses solely on the attentional duration of participants on the faces of strangers and does not measure any variables about their emotional or cognitive load that could have a situational effect on their preference. There is no attempt to give any further information than profile pictures like rating scores about the stranger to prefer, and it also does not provide any clue for the context of the primary dependent variable of "spending 30 minutes alone with a stranger in a closed environment".

The findings posit the literature about the significance of the eye gaze as being a nonverbal communication tool useful to assess the others' intentions and the avoidance impact of the gaze displayed by a dominantly perceived face. Although a wide variability in gaze behavior is reported in the literature (Hietanen, 2018), as found in our study, direct eye gaze was found to shift the attention to the face of the gazing person and humans avert their gaze from targets if they perceive the displaying of dominance (Holland et al., 2017). Analysis of our data revealed no systematic differences between male and female participants.

The main contribution of the study is introducing a new data analysis method of preference prediction in a digital scenario of pairing with strangers to further spend time in a closed environment through gaze assessment. The method introduced could predict the direction of preference in a range of 80% to 94.9%, when the participant is free to use time. The study found that when the user is to prefer between pairs of people that one is perceived to be dominant, the probability of choosing the perceived non-dominant is higher. Thus, the probabilities of choosing the former were predicted to be higher when the user is to prefer between (i) neutral face of one woman and one man, (ii) gazes of two gazing men that one has manipulated fWHR, (iii) two men both having manipulated fWHR but one has averted gaze and the other is directly gazing.

The findings of this study will contribute to all communication platforms where the human face is at the forefront for meeting others. Proper platform designs will enable the users to focus on the desired points and make the expected choices. The findings further more contribute to human-computer interactions with human-like digital interfaces by providing hints for face development or preference among digital characters for games, animations, films and e-commerce.

As mentioned before, the study does not measure any variables about participants' emotional or cognitive load that could have a situational effect on their preference. It would be significant to expand this study further by considering the emotional or cognitive load of the participants in future studies. In addition, a study that will be carried out by considering the personality traits of the participants will be meaningful in terms of understanding the reactions and preferences of the participants with different personality traits.

In this study, only the profile pictures are used. Nowadays, besides profile pictures, it is common for users of digital platforms to represent themselves with short videos. For this reason, it would be meaningful to expand the study by using short videos as the main variable.

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