

The influence of anxiety and personality factors on comfort and reachability space:

A correlational study

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Abstract

Although the effects of several personality factors on interpersonal space (i.e. social-space within personal comfort area) are well documented, it is not clear if they also extend to peripersonal space (i.e. reaching-space). Indeed, no study has directly compared these spaces in relation to personality and anxiety factors even though such a comparison would help to clarify to what extent they share similar mechanisms and characteristics. The aim of the present paper is to investigate if personality dimensions and anxiety levels are associated with reaching and comfort distances. Seventy university students (35 F) were administered the Big Five Questionnaire and the State-Trait-Anxiety Inventory; afterwards, they had to provide reachability- and comfort-distance judgments towards human confederates while standing still (passive) or walking towards them (active). The correlation analyses showed that both spaces were positively related to anxiety, and negatively correlated to the dynamism in the active condition. Moreover, in the passive condition higher Emotional Stability was related to shorter comfort-distance, while higher Cognitive Openness was associated with shorter reachability-distance. The implications of these results are discussed.

Keywords: *interpersonal space; peripersonal space; personality; anxiety; social factors*

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The space around the body is of fundamental importance to interact with objects and persons. For this reason, specialized mechanisms have evolved to encode this area. From a neuro-cognitive perspective, this space is defined in relation to the possibility of acting *hic et nunc*: ‘peripersonal space’ is within arm reaching distance, whereas ‘extrapersonal space’ is outside arm reaching (di Pellegrino and Ladavas 2014; Holmes and Spence 2004; Iachini et al. 2014a; Rizzolatti et al. 1997). Since peripersonal space is the first margin between our body and the external world, it has also been thought of as a protective buffer surrounding the body and prompting defensive actions (Coello et al. 2012; Graziano and Cooke 2006).

From a social psychology perspective, the space around the body is defined in relation to the type of interaction with other people: it is an “emotional” area called ‘personal space’ that people feel like “their private space” and cannot be intruded by others without causing discomfort (Hall 1966; Hayduk, 1983; Lourenco et al. 2011). The distance individuals maintain between themselves and others is defined “interpersonal space”.

Some recent literature has suggested a close relationship between social and action functions of near body space by showing that social information may modulate the representation of peripersonal space (Brozzoli et al. 2013; Cléry et al. 2014; Iachini et al. 2014b; Teneggi et al. 2013). However, the extent to which these spaces share common mechanisms or are instead the expression of selective distinct functions is still under debate. de Vignemont and Iannetti (2014) suggested that a crucial test in this respect would be to investigate to what extent individual factors, such as anxiety, influence these spaces. Indeed, some research reported controversial effects of anxiety factors on near body space (see de Vignemont and Iannetti 2014 for a review). Moreover, the influence of several personality factors on interpersonal space are well documented (Hayduk 1983; Aiello 1987; Sommer, 2002), but no study has directly compared peripersonal and interpersonal spaces in relation to personality and anxiety factors. The aim of the present study was to verify if,

and to what extent, anxiety levels and personality dimensions are associated with the reduction/extension of peripersonal and interpersonal spaces in the interaction between individuals. To this end a correlational study was carried out that compared reaching and comfort distances with self-rated state and trait anxiety scores and personality dimensions scores. The overall pattern of correlations should reveal to what extent the two spaces share common factors.

Method

Participants

Seventy healthy subjects, 35 females (M age = 24.1, SD = 4.7) and 35 males (M age = 24.4, SD = 5.6), took part in the experiment.

Setting and materials

Experimental setting. The experimental session took place in a rectangular room ($7.2 \times 6.4 \times 4.5$ m) of the laboratory of Cognitive Science and Immersive Virtual Reality of the Second University of Naples. For each experimental session, two confederates, a male and a female aged 25 and 23 years respectively, participated in the study.

Big Five Questionnaire. The 60-item short form of the Big Five Questionnaire (BFQ; Caprara et al. 1993) was administered. The scale measures the five global trait domains (Energy; Friendliness; Conscientiousness; Emotional Stability; and Openness) and the 10 correspondent trait facets of the Five Factor Model of personality (McCrae and John, 1992), i.e. Dynamism; Dominance; Cooperativeness; Politeness; Scrupulousness; Perseverance; Emotion Control; Impulse Control; Openness to Culture; and Openness to Experiences, with six items on each facet. Each item presented a description and participants were asked to rate their level of agreement on a 5-point scale.

State Trait Anxiety Inventory. The State Trait Anxiety Inventory (STAI, Spielberger and Sydeman 1994), was administered. The STAI is a 40-item self-report scale that measures two types of anxiety dimensions: state anxiety (20 items), a temporal anxiety or a feeling of tension, apprehension, nervousness, and activation (arousal) of the autonomic nervous system related to an

event; trait anxiety (20 items), a relatively stable individual difference in anxiety proneness. Each item presented a description and respondents were asked to indicate the extent to which each item described them on a 4-point scale.

Procedure

Participants were first required to fill the two self report scales, then they were required to start the experimental session. The experimental session was divided in four blocks corresponding to the experimental conditions: passive-comfort distance, active-comfort distance, passive-reachability distance, active-reachability distance. For each block, participant received a training illustrating the entire procedure. In half of the trials participants were given the reachability-distance instructions (i.e., "stop the movement as soon as you can reach with your hands the confederate"), in the other half, the comfort-distance instructions (i.e., "stop the movement as soon as the distance between yourself and the confederate makes yourself feel uncomfortable"). This procedure was repeated in passive and active approach conditions. In the passive approach, participants stood still and saw the confederates walking towards them until they stopped them. In the active conditions, the confederate stood still and participants walked towards them until they stopped. After stopping the movement, the participant or the confederate returned to their starting position. In each condition, the starting distance between the participant and the confederate was approximately 3 meters and the chin-to-chin distance was measured using a digital laser distance measurer. Finally, for each condition, participants repeated the distance estimation six times, three with the male confederate and three with the female confederate. The repetitions were randomized across participants and the conditions were presented in a counterbalanced way.

Data analysis

The Pearson correlation between the mean distance as a function of the experimental condition and each of the two facets of the STAI and the five global trait domains of the BFQ were computed to test the pattern of associations. As regards the BFQ, if significances emerged, the correlations between the distance measures and the specific trait facets were also considered.

Moreover, to test if the significant effects were observed also when controlling for age and gender of participants, a series of hierarchical regression models were tested by considering each distance measure as dependent variable. In the regressions, we first controlled age and gender of participants. We then examined whether each of the global traits or the anxiety dimensions explained significant additional variance.

Results

The overall pattern of correlations is shown in Table 1. Analyses showed that both distances were negatively associated with the Age, with a stronger association in the reaching conditions (see Table 1). Therefore, the older the participants the shorter the distances.

Insert Table 1 about here

As regards the relation between the global personality dimensions and the distances, data showed that in both spaces in the active approach condition the distance was inversely related to the Energy dimension. The more the participants rated themselves as energetic (e.g., active, sociable, etc.) the more they reduced their reaching/comfort distances from confederates. The analysis on the specific trait showed that this effect was due to the Dynamism facet only, whereas the regression analyses showed that the effect was observed also if controlling for Age and Gender of participants, as shown in Table 1.

As regards the passive approach condition, data showed that the comfort-distance was associated with Emotional Stability, whereas the reaching distance was associated with Openness. The more the participants rated themselves as emotionally stable the more they allowed confederates to get closer to them, thereby reducing their comfort distance. The more the participants rated themselves as open the more they allowed confederates to walk closer to them and therefore the reaching distance was reduced. The analysis on the specific trait facets showed that the Emotional Stability effect was due to both facets (Emotion Control and Impulse Control) whereas the Openness effect was related to the Openness to Culture dimension only; both effects were also observed if controlling for Age and Gender of participants.

Finally, as regards the relation between anxiety and distances, data showed that in both approach conditions and in both spaces the distance was positively related to both state and trait anxiety, with a stronger association with the latter. The more participants rated themselves as anxious the more they increased their distance from confederates. The regression analyses illustrated that the effect was also observed if controlling for Age and Gender of participants.

Discussion and Conclusions

The present study compared peripersonal and interpersonal spaces in their association with anxiety and personality dimensions. Data showed that both spaces were positively related to anxiety with a stronger association with the trait anxiety. This result is in line with a previous study (Sambo and Iannetti 2013) and may reflect the need of controlling the social context by extending the protective body area. Following the suggestion by de Vignemont and Iannetti (2014), this result seems to indicate that the two spaces share common socio-emotional mechanisms.

As regards the relation with the personality dimensions, data showed that when participants could actively control the interaction the two spaces were similarly related to the Dynamism. This could be taken as a further evidence that the basic communality between the two spaces is rooted in action possibility (Iachini et al. 2014b). Instead, when participants were passive and could only observe other people walking, a difference emerged: comfort space was associated to the emotional component of the personality, whereas reaching distance was associated to the cognitive component of the personality.

The overall pattern of association, then, suggests that the relationship between the two spaces cannot be described in terms of simple same-different functions. The interpersonal space as defined by comfort distance seems particularly sensitive to the first aspect (i.e. emotional stability) and to the possibility of unwanted spatial violations. The peripersonal space as defined by reaching distance stresses the second factor and seems more sensitive to the cognitive and action context. This reflects the complexity of our spatial behavior that modulates both our socioemotional life and possibility of acting. For this reason, there would be more a quantitative than a qualitative

difference between peripersonal and interpersonal spaces, with some emotional factors (i.e. need of control, anxiety) and some action factors (i.e., actively interacting in a social context) that look particularly important in the representation of the near body space and are probably shared. This is a first preliminary study that investigated in a direct way the relation between individual factors and peripersonal and interpersonal spaces. Further studies are needed to replicate and extend these results by taking into account more personality factors and individual differences, and by enriching the set of stimuli.

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Table 1

Correlation between the considered variables and the distance as a function of the experimental condition (N = 70)

Variables	Distance			
	Comfort		Reaching	
	Active	Passive	Active	Passive
Gender (M = 1)	.062	.007	-.026	.035
Age (years)	-.215	-.238*	-.269*	-.401***
Big Five				
Energy	-.284 ^{*,a}	-.118	-.285 ^{*,a}	-.210
Conscientiousness	-.073	.066	-.199	-.187
Emotional Stability	-.171	-.290 ^{*,a}	-.052	-.165
Friendliness	-.042	-.057	-.152	-.200
Openness	-.154	-.118	-.161	-.306 ^{*,a}
STAI				
State	.149	.216	.220	.297*
Trait	.283 ^{*,a}	.251*	.242 ^{*,a}	.350 ^{**,a}

Note.

* $p < .05$;

** $p < .01$;

*** $p < .001$;

^aThe effect is specific over and above the Age and the Gender of participants.