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***A Dialogue between the Cartesian-Kantian
and the Phenomenological Perspectives in Neuroscience:
the Case of Face Perception Investigation.***

Abstract: Face perception and facial expression recognition have always been an important research topic in psychology and neuroscience. According to the Cartesian-Kantian tradition, the assumption that orients face processing investigation conceives the face as an object. On one hand, this approach has allowed us to investigate the neural mechanisms underlying the processing of the structural, invariant and changeable aspects of faces and their expressions. On the other hand, we wonder if this assumption might work in real world given the primary role played by the other's face in motivating human behavior. Indeed, we believe that there are still questions that need to be addressed including how we experience others' faces in terms of affective engagements, and how the other's face is a deciding factor in orienting our behavior in everyday life. In an attempt to give an answer to these questions, we highlight the dialogue between the Cartesian-Kantian and the Phenomenological traditions, suggesting food for thought in rethinking assumptions underlying face perception and facial expression investigation.

La percezione del viso ed il riconoscimento delle espressioni facciali sono sempre stati un importante campo di ricerca per la psicologia e per le neuroscienze. Secondo la tradizione cartesiana-kantiana, l' assunto che orienta l'indagine sul processamento del viso concepisce quest'ultimo come un oggetto. Da un lato, questo approccio ci ha permesso di studiare i meccanismi neurali sottostanti la percezione degli aspetti strutturali, invarianti e mutevoli dei volti e le loro espressioni. D'altra parte, ci chiediamo se questo assunto possa funzionare nel mondo reale, visto il ruolo primario svolto dal volto dell'altro nel comportamento umano. Riteniamo, infatti, che ci siano ancora domande che devono essere affrontate, tra le quali, per esempio, il modo in cui percepiamo le facce degli altri a partire dal coinvolgimento affettivo che genera e come il volto dell'altro sia un fattore decisivo nell'orientare il nostro comportamento ogni giorno. Nel tentativo di dare una risposta a queste domande, il presente lavoro promuove un dialogo tra la tradizione cartesiano-kantiana e quella fenomenologica, suggerendo spunti di riflessione per ripensare gli assunti sottostanti lo studio della percezione del viso e dell'espressione facciale.

Keywords: *Cartesian-Kantian Phenomenological, face processing, categorization processing, affective engagements.*

Parole chiave: *tradizione cartesiano-kantiana, fenomenologia, processamento del viso, processamento delle categorie, coinvolgimenti affettivi*

1) Introduction

Face processing remains a challenging issue. Indeed, the face of the other has always been a source of fascination and unease. If we consider the face of the other as a way of revealing and therefore gaining access to the other, it is easy to understand why it remains a topic which creates interest and which raises difficult questions within psychology and neuroscience research.

Neuroscience has made substantial contributions to the subject. Face sensitive

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processing has been explored in its cortical and subcortical components through various techniques (fMRI, TMS, EEG), across ages, in healthy and clinical populations. There is a general agreement on the primary brain structures involved during this process and their functional properties (Puce et al. 1995; Kanishwer et al. 1997). On the other hand, there is an ongoing debate on this multifaceted phenomenon. For instance, there is a lack of consensus and clarity on what is meant by parts and wholes in the visual processing of faces and other objects, as well as to what extent face processing is an experience-dependent specialization rather than an automatic one (see Watson and Robbins, 2014). In addition, there are other questions which remain unanswered concerning, for instance, the role played by attention and expectations, e.g. prior beliefs, as well as by emotion as a factor facilitating face processing. Hence, a more basic question raises: could this assumption that conceives a face as an object be adequate to explore how we experience a face in the real world, given its primary role in conveying and evoking emotions every day throughout our lives? As a matter of fact, the emotions displayed more or less strategically in interactive situations affect performance, decision-making and behaviors of the participants (Gneezy and Imas, 2014; Lerner et al. 2015).

Given its complexity, it is not simple to provide an answer to these questions. In this perspective article our aim is to propose a dialogue between two traditions in an attempt to find new ways to explore the fascination and the unease created by this phenomenon. In the next section, we illustrate some neuroimaging studies of face processing according to the Cartesian-Kantian tradition. Then, we explore what else the Phenomenological tradition can indicate to us. Accordingly, we provide evidence in neuroimaging research. Far from being a comprehensive review, we have selected works that we believe help to refine our approach to the subject matter here debated.

2) The face considered as a visual object

Scholars and researchers have discussed the basic computational challenges to process faces and whether they are common to all object recognition (namely, detection, measurement, and classification) (Tsao and Livingstones, 2008). Within a cognitive functional model, face recognition has been studied by encoding the invariant visual structure of the face. By a structural encoding processing the relationships and dimensions between the facial features are extracted, and a view-invariant representation of the face is created (Bruce and Young, 1986). Assuming the face as a visual object allows for face categorization tasks, with or without prior expectations having to be manipulated, in order to investigate the behavioral and neural activity underlying recognition processing. Showing together a scrambled face (van Harmelen et al. 2013), a human face, a doll face, a dog face, and a toy dog face (Looser et al. 2012), faces edited into a bluish-colored and natural colored (Nakajima et al. 2014), or a face in the middle of a scenario photo (Freeman et al. 2013) allows us to investigate the components of the logical skills required to perform the task. In so doing, we measure the participant's ability to infer the physical properties or the spatial relationships between those different objects and the underlying neural network involved during this recognition and categorization processing (Jack et al. 2014).

Thanks to this approach, we have collected knowledge on the primary brain network (the face-sensitive network) generally involved in face processing, allowing us to recognize the violations in atypical situations, and to reproduce a face recognition processing (Bartlett et al. 2014; Cowen et al. 2014). Similarities and differences have been found between the face-object and other categories of object perception, and yet there is not

certainty about the kind of face perception processing involved, whether this perception processing is different when compared to the perception of other objects as it is more holistic (Richler and Gauthier, 2014). Some conclude that face perception differs from the perception of most other objects in that it relies heavily on emergent features (the interrelations between the more salient features of a face) as well as the features themselves (Andrews et al., 2010).

Nevertheless, the face-sensitive network includes various brain areas such the amygdala, the insula, the medial prefrontal cortex, the basal ganglia, the thalamus, and the hypothalamus (Haxby et al. 2002; Vuilleumier and Pourtois, 2007; Pessoa and Adolphs 2010). These areas are clearly related to some other social and affective components involved in face perception, but the explanation about their involvement during face processing may give rise to some doubts. For instance, the role played by the pre-supplementary motor area in impairing the recognition of a happy facial expression is unclear (Rochas et al. 2013). It would be explained by mimicry and simulation processing in the case of robotics processing.

Can we be sure that if we were to meet a human face, without ears, neck and body, suspended in the air, or even if we were meet a virtual face, we would process, e.g. make sense of, this object by engaging the face-sensitive network? We would certainly be quite shocked, with the neural correlates related to the ongoing shock well activated! Joking aside, to what extent would investigating face perception in extra-ordinary conditions help us to unveil other components, which do exist, in addition to the logical component? Does perceiving a person's face only involve cognitive or logical skills?

To find another way, it may be useful to understand why the face has been maximally considered as an object, such a bottle. In our opinion, this is in full respect of the Cartesian-Kantian tradition (Descartes, 1637; Kant, 1997, 1998, 2006, 196-203). It refers to the methodological indication to find the maximally simple that can be isolated and manipulated as an independent variable (Descartes, 1973). By putting close some truths observed elsewhere, the maximally simple can be inferred. For instance, we can put items that we encounter in our office like a chair, a table, a pen, a colleague's talking on the phone, another's reading an article, and a lamp close together. What is the primary element, the maximally simple in the Cartesian words, that makes us intuiting and grasping all these things simultaneously? By spending time going through, back and forth, and visually inspecting the features of these items, we would find one independent property, the most distant from all the others, the most absolute. This would be, for instance, the shape. Therefore, the shape would be our independent variable to be investigated in all possible conditions, for example when studying a phenomenon like processing objects vs numbers. The shape would be a property also used to define our colleagues, as it is for the other items. In our experiment we will have chairs, tables, pens, faces, lamps, and numbers as stimuli. During our visual inspection procedure of the items, we have the impression that we missed something, for instance about the two colleagues doing something.

3) If it is not handled as a visual object, what might a face reveal us?

According to Arendt, action has a specific revelatory quality (Arendt, 1958). Acting implies the disclosure of who is acting. Talking on the phone, as well as reading a paper in a certain way will disclose her/him in this or that way, e.g. fair, inappropriate, passionate or absorbed. In addition, the other's disclosure lets us find ourselves in a certain way. When we encounter another person who is so absorbed in reading that he/she greets us

casually, because he/she has been distracted by our greeting, lets us find happy, for instance, because we share the same passionate attitude with him/her, or guilty because we didn't finish our job, or even it makes us feel unimportant. Each time we encounter another person we are affectively engaged, in a way which is less or more conscious or non-conscious, less or more intense, less or more outlined. We find ourselves emotionally situated, that is, in a continual variation of modes of feeling related to new possibilities of action, in a continual reorientation of ourselves in relation to the ongoing context (Arciero and Bondolfi, 2009).

Back to the office vignette, coming into the office I see the absorbed colleague's face which makes me feel, for instance, guilty. Then, I orient what I am going to do starting from my own affective engagement. Arriving in my room, I encounter the other colleague who is talking on the phone in an inappropriate way. I am already feeling guilty and I feel the urgent need to start working immediately. Her/his face makes me feel angry and I can tell her/him to shut up in a more or less kind, or controlled way. Thus, according to these assumptions, the face of the other plays a role as a deciding factor in orienting us in our daily situations.

Let us return to the Cartesian-Kantian tradition. The simple example in the previous paragraph does not account for the true complex nature of the subject, but to do so, it would be beyond the scope of this paper. However, its simplicity may help us to find a step that might open up a dialogue between the two traditions and provide a glimpse of a different direction to follow. What did we miss during our visual inspection procedure of our items? We believe that the practical dimension to which all the items refer to has not been contemplated. The items have been extracted from their native environment and then observed. It is not possible to grasp, for example, the specific characteristics of that chair in that context, of that colleague's reading in that context. Rather, it seems that the properties of these items are intuited in an absolute, theoretical manner, that is, untied and released from the practical dimension in which they disclose themselves. Leaving aside the practical dimension does not allow for other kinds of the maximally simple, such the affective engagements triggered in that person by encountering that face of that colleague's reading at that moment.

There is an ontological difference between the Cartesian-Kantian and the Phenomenological perspectives (Heidegger, 1982). It corresponds to the distinction between the manners of being of objects in the world and that of human beings. Indeed, the presence of another human being and, in consequence the existential relationship that we may have with him, is incommensurably diverse than any object at hand or available. The other person resists being simply an entity. What I see in the other's face is irreducible to its shape or physical properties (Heidegger, 1967). Quoting Heidegger, «thus, as Being-with, *Dasein* 'is' essentially for the sake of others» (Heidegger, 1962, 160). In this sense, what I see in the other's face can not be reduced to physical properties, that is, being with the other is always a relation of positions between individuals (e.g. emotional situatedness). Therefore, in intersubjective contexts, visual perception of the face of the other is not equivalent to glancing at an object, but it is a matter of an active, e.g. affective, engagement with another engaged subject (Arciero and Bondolfi, 2009).

Thus, according to this assumption in our experiment we can manipulate the practical dimension by creating different emotional sessions in which the participants encounter a person doing something such as grasping objects with different facial expressions (Mazzola et al. 2013). We can also manipulate the quality of the face which participants encounter during the task, a loved one versus an unknown, both in pain or not (Mazzola et al. 2010). Then, we will see that the amygdala (Bertolino et al. 2005), the insula (Mazzola et al.

2010), the medial prefrontal cortex (Rubino et al. 2007; Mazzola et al. 2010), and the thalamus (Mazzola et al. 2013), those brain areas which are included in the face-sensitive network were differently engaged according to various affective engagements. Hence, the role played by these brain regions related to social and affective components in face perception would be better explored and explained in the light of the affective engagements.

4) Conclusion

Far from being exhaustive, the present work is simply an attempt to think over the theoretical assumptions underlying face perception investigation. Indeed, within each tradition some goals are primary than others, leading also to different strategies for analysis, interpretations, and implications.

We welcome the invitation to increase the ecological validity of fMRI studies by studying human behaviors within natural contexts (Hasson and Honey 2012). In our opinion studying face perception in natural contexts means taking into account the affective engagements. Looking at another's face in everyday life is not a matter of recognition of features. It involves complex behavioral and response patterns arising out of an affective engagement with the other, beyond the face perception processing. Paraphrasing Arendt, we could say that, being an entity, a face has a twofold specific revelatory quality: it is an encounter that reveals at the same time both the displayer and the perceiver.

Going beyond models of face processing which propose that changeable versus invariant aspects of a face are coded and processed by functionally and anatomically separated pathways (Kant, 2006, pages: 196-203; Bruce and Young, 1986; Haxby et al. 2000), we believe that the dialogue between the two traditions gives useful insights into categorization processing. Rethinking the maximally simple from out of the practical dimension which generated it may provide new directions for research in social and affective neuroscience, both in healthy and clinical populations. The emotional biases in visual face processing in some neurological and neuropsychological conditions, for instance, is still poorly understood (Vuilleumier and Schwartz, 2001; Fox, 2002; Lucas and Vuilleumier, 2008; Grandjean et al., 2008; Peelen et al. 2009; Grabowska et al., 2011).

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