

# *The Effects of Enfacement Illusion on Self and Other Perception and Relevant Implications*

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**Abstract:** Perceiving self is one of the crucial issues discussed in psychology. Studies have suggested that the evaluation of the self could be manipulated by divergent factors and operations. Some experiments proved the variability of self-concept. A typical instance is the rubber hand illusion, causing a discrepancy between the visual and tactile sensation and the confusion of identity. Enfacement illusion, similarly, have the resembling influence but focuses on the human face instead of the hand. It's an important phenomenon with the significant meaning of being related to the perception of self and other. The impact of the enfacement effect on one's perspective of oneself and that of others was examined through the analysis of recent research, with further implications given. Discussions done in this paper could make contributions in the area of comprehension of self and other. First, various findings bring up the individualized irregularity that emerged among people. Second, according to plenty of studies, enfacement has the potential to encourage the establishment of relationships with more intimacy. Thirdly, studies on illusions other than the perception of faces were conducted, and they demonstrated similarities to the enfacement illusion's effect. Limitations of not elaborating on compound factors associated exist in previous research. Addition explorations are required for examining the causation of values altered. This review can provide some suggestions for intervention studies and applications in children with social functioning deficits.

**Keywords:** Enfacement Illusion, Empathy, Self-Concept, Social Boundary

## 1. Introduction

The perception of self is one of the pivotal areas in the field of psychology, bringing up plentiful literature investigating its factors in relevance [1]. In the study conducted by McConnell, self-concept representation is analyzed in terms of the multiple self-aspect frameworks (MSF). MSF is defined as the collection of self-perspective demonstration that places a strong focus on the role that an individual's diverse, situation-related facets play in behavioral and experiential shaping. The investigation regarding MSF reveals several potential factors that may influence the assessment of the self. Such factors include the acquisition of feedback pertinent to the self, the concealed background shaped by the individualized, subjective features, and so forth. MSF additionally interacts with a wide range of psychological factors. It indicates the association among self-construction and the modulation, malleability, and emotions of the ego. Other experiments also showed that certain illusions operated can alter the self-concept. One typical example is the rubber

hand illusion [2]. During the trial of rubber hand illusion, participants view a rubber hand that is positioned physiologically similar to their covered hand. Both the participant's own hand and the rubber hand are brushed simultaneously, resulting in the visual and tactile mismatch of seeing a strike that is sensed elsewhere. By assimilating the rubber hand with an individual's own body content and shifting the felt placement of his/her physical hand toward the rubber hand, this incompatibility among diverse sensations is resolved. According to Verhagen, participants began to regard the rubber hand as their real bodily components, experiencing the illusory representation of the self after being simultaneously touched for around 15 seconds [2].

Additionally, there is research done on a similar topic, but with a focus concentrated on the human face rather than the hand. The distinctive characteristics of face perception are revealed as well. Face perception is a vital ability that appears as an innate ability in human developmental stages [3]. In Fantz's study, two stimulations, a figurative face and an eye of a bull, were presented to newborn babies. After being asked to make a choice, babies overall showed a preference for looking at the face [4]. Face perception is essential, due to its contribution to the aspects of social cognition. For instance, facial information provided can enable the inference of others' minds [5]. The boundary between self and others is one facet associated with social cognition. Learning to perceive facial information is contributory to the process of distinguishing self from others. Resembling statements were provided by Sigmund Freud that the awareness of an individual's own body and face lays the foundation for the perception of his or her identity [6]. Therefore, experiments on certain facial-perceptual illusions were conducted to examine their effect on perceiving the self. Enfacement illusion has been conducted in previous studies. In this illusion, individuals are touching their own faces and watching another individual's face being touched at the same time, which leads to distortion in recognizing their own faces [7]. The effect of making it harder to distinguish between self and other is induced. Comprehending the effect of enfacement illusion is conducive for gaining a better idea about the nature of social boundaries. It can provide some clarification regarding how the self and others could be associated together and has implications that may be applied in the clinical and social fields of study.

Existing research related to enfacement illusion has mainly focused on its relationship with multisensory integration and its effect on the identification and representation of self. Porciello et al. conducted a study that adopted the enfacement illusion. It was induced by the Interpersonal Multisensory Stimulation (IMS) paradigms, to reveal the effect of multi-sensory integration and the further influence generated on how malleable the self-face is [8]. Its result suggests that the vividness of the enfacement illusion does not increase with the augment of channels that are congruent with sensory inputs. Besides, Porciello et al.'s study reveals that practices that are pertinent to developing physical processes of self-representation and self-recognition must be executed in order to produce illusory effects and alter the corporeal self. A similar topic is also discussed in the study done by Tajadura-Jiménez et al. [9]. They looked into how the changes of self-identification evoked by enfacement illusion were perceived consciously, utilizing principal component analysis (PCA). The results showed that while synchronous IMS focused on facial likeness, asynchronous IMS concentrated on stimulating many senses. In-depth statistical distinctions between self-identification and perceived facial resemblance with either synchronous or asynchronous IMS were found after analysis of the established common element structure. Stronger enfacement illusions were found together when participants' interoceptive sensitivity was decreased. Furthermore, the study indicates the structural difference between the experiences of body-ownership and self-face identity.

Previous studies mainly focused on the effect of enfacement illusion on individualized perception and perceptual experience. The relationship between self and other from a social perspective has not been extensively discussed, with several heuristic implications not being

analyzed or elaborated. Studies that are related to this gap were demonstrated in this review. They were discussed in respect of the self-other perceptions and their underlying meanings. This paper future elaborated on the self and other interpretations, analyzing chiefly through enfacement illusions and additional illusions beyond the human face. This review can provide some guidance for the design of socio-emotional education programs for children and adolescents and relevant research.

## **2. Individual Differences in Enfacement**

Through investigating the factors that influence the effect of enfacement illusion, variations caused by individualized features are founded and analyzed. Self-personality features, for example, are proved to be in relation to the intensity of enfacement. In the study by Gülbetekin et al., relationships between face stimulation and vividness of the enfacement illusion are revealed [7]. It also discussed the effects of enfacement illusion caused by factors such as personality traits and the ability to emphasize. An experiment was conducted, using a syringe to get access to the face and a cotton swab to touch the face. Questionnaires are applied to evaluate subject opinions of the illusion and morphed face assessment between self and others. The researchers besides measured galvanic skin response (GSR). They found out that higher GSR is caused during syringe conditions than during touching conditions. Such phenomenon is apparent in the right facial stimulation group, for both the synchronous session and asynchronous session. Nevertheless, the results are consistent in the left face treatment group only for the synchronous session. A such difference existed between the groups for left and right face stimulating reveals the nonidentical effect of self-perception. Besides, results indicated that participants maintained strong senses of self even when experiencing the illusion. Other relationships were found between personality traits, empathic abilities, and enfacement illusions. Connections between every two aspects of personalities: theory of mind ability (i.e., the capacity to draw informed conclusions about the emotions and mindset of other individuals) and extraversion were discussed, with a result presented positive correlations between participants' theory of mind ability, as well the extraversion and the vividness of enfacement illusion experienced. Furthermore, a conclusion is reached indicating that people who were better at emphasizing experienced higher vividness of the illusion. There's also a significant relation found linking the synchronous stimulation of self and other's faces and sociability characteristics.

Beyond the personal characteristics, other individualized variables are affiliated with the illusion of enfacement. For all society, it's a pervasive phenomenon that people have the inclination to more easily accept their excellence and merit than acknowledge their imperfections. The tendency of perceiving the superior side exists not only in the area such as personality and capacity but also in terms of appearance. The facial features, the obscurity of self, and other boundaries associated with enfacement lay the foundation for such implication. Panagiotopoulou conducted a study to investigate the effects of facial attractiveness on the self-other thresholds of the single and many senses [10]. The influence of other people's attractiveness on self's multisensory perception is assessed using the Enfacement illusion. Videos of both the participants' own faces morphing into one attractive face or one unattractive face and the unfamiliar face morphing into their own faces are presented to participants. Participants paused the video as immediately as they realized the face resembled the one it had been transforming into. It's defined as the baseline self-recognition task. Then the experimenter used a tender cosmetics brush on the two unfamiliar faces (one attractive with another unattractive) either synchronously or asynchronously, producing visual-tactile stimulation. Then the implicit measure of enfacement illusion (a task of self-recognition) and a clear measurement (questionnaire related to enfacement) is operated. The results showed that the enfacement illusion, both for implicit and explicit, was higher for an attractive face than an unattractive face. Besides, it suggested that attractiveness generally enhances ownership of the face

as people tend to identify more with an attractive face rather than the unattractive face. Such research done previously indicates that the diverse personal facets are able to alter the intensity of the illusory effect of enfacement. It includes the ability to comprehend and draw a conclusion on others' mental states, the extent of how extrovert people are, the empathetic capability, and the level of aesthetic approval or appreciation toward the stimulus face, creating personal discrepancy.

### **3. The Effect of Enfacement on The Perception of Others**

#### **3.1. Reducing Self-Other Distance through Enfacement**

As mentioned above, the perception of the face is interrelated with social cognition. When living together with clusters of individuals and establishing bonds, certain types of social skills are required and exerted. The capability to emphasize, for instance, is largely dependent on the pattern of social networks [11]. According to Kardos et al., in more intimate relationships, empathic emotions are more likely to be triggered. In several experiments operating enfacement, the extent of empathy is measured to test the illusion's effect on this social-emotional capability. Minio-Paluello et al. assessed the effects of enfacement illusion of facial mimicry (i.e., the automatic copying of another individual's mood, which is as well a process or performance behind emotion detection and emotional contagion, a type of phylogenetic conservation of empathy that exists before the subsequent development of empathic abilities) [12]. Participants' electromyography activity from two eye muscles was recorded, then touched on their faces with a stick by the experimenter. There are four blocks presented: the first one is a baseline without any tactile stimulation, followed by synchronized and asynchronous blocks (in a participant-by-participant-counterbalanced manner), and finally a second baseline. As participants watched videos of the expresser's happy and sad facial emotions. Questionnaires were subsequently adopted to test the participants' scores on the autism spectrum quotient, empathic concern, and perspective-taking (i.e., the process of viewing a circumstance or comprehending a topic from a different viewpoint, such as that of another person). The researchers' findings demonstrate that participants' baseline propensity for mimicking influences whether simultaneous visual-tactile stimulation can indeed promote face mimicry. Results of this study indicate that the enfacement effect does have the ability to boost participants' inclination to imitate the facial expressions of the stimulus. These findings may serve as the foundation for the creation of novel treatments for illnesses with impaired empathic and emotional awareness.

The empathy stimulated toward the stimuli suggests the closer distance between the participants and the exhibiter. Not only does the increased intimacy appear among humans, but also exists across species. Ma et al. evaluated the effect of enfacement across species and the self-other assimilation induced on intelligence and emotion facet [13]. Participants were shown a synthetic human face that matched their own face closely or not at all before it was changed into a face of an ape. According to ownership of the body and involving others in the self-assessments, participants had an inclination to think of the face of the ape as being their own in the coetaneous situation. This study showed that even members of other species can be enfaced by humans and that doing so encourages "feature migration"—the transference of attributes like emotion and intelligence—from the self's representation to that of the other, and vice versa. Additionally, synchrony also boosted the inclination to attach emotions to apes while decreasing performance on a fluid intelligence challenge. These findings are consistent with the theory of event coding, which believes that feature codes can be used to represent both the self and the other, and that illusory grouping of traits from one portrayal to the other is encouraged by representational self-other overlap.

Among the issues of social intercourses, misconceptions across distinct assemblies are concerned. In current society, there's a continuous difference between males and females. The society-

considered roles that should be played by men and women are inconsistent. Biased ideas then emerged and constantly appeared among the two groups. The deficiency in comprehension leads to stereotypical opinions. Enfacement illusion, the process closely interacting with social affairs, is, in turn, picked to test its influence on such social phenomena. Zhang et al. investigated whether men demonstrate a less obvious implicit gender-science stereotype when their movements appear at the same time with a virtual female visage than men whose actions are asynchronous [14]. Participants were asked to wear HTC headmounted displays in the visual reality environment, with a virtual three-dimensional model of an average Asian female face generated. The experimenter applied an implicit association test with a questionnaire to evaluate the participants' stereotypical ideas associated with gender and professions. Two groups are set, with one synchrony group and another asynchrony group. The findings demonstrate that the opposite gender's visage was successfully given illusory agency and ownership. Additionally, as compared to asynchrony, the inapparent stereotype associated with gender was greatly weakened by the synchronization. The researchers' results are consistent with earlier evidence that being in sync with other people makes feature migration easier.

Studies above all reveal the outcome that participants who have experienced enfacement illusion shorten the distance between self and other. Closer distance is promoted by the increased empathy participants express toward apes after experiencing the enfacement illusion. The face mimicry facilitated indicates the synchronization and congruence of the emotional comprehension with the stimulus. Supportively, Minio-Paluello and colleagues speculated that such a result may be associated with the blurred self-other boundaries, triggered by the enfacement, suggesting the enhancement in intimacy. For Zhang and colleagues' study, the impaired phenomena of stereotypes that existed among distinct genders may be regarded as a weakened difference in how men view women from themselves. Thus, the influence of enfacement on narrowing the self-other distance is presented.

### **3.2. Enfacement and the Perception of Social Boundaries**

Unequal availability and allocation of supplies (both monetary and immaterial) and societal prospects are types of social disparities modified to be objectively known as social boundaries [15]. The affection caused by enfacement on social borders is discussed. In the study by Ferroni et al., the influence on others' boundaries caused by multisensory experience is discussed, specifically with the focus on enfacement illusion in schizophrenia [16]. To define, according to some descriptions, schizophrenia is a mental illness characterized by difficulties recognizing one's own and other people's faces as well as a distorted feeling of bodily ownership. Since there's no study has combined these two lines of inquiry in order to examine the likelihood of enfacement illusion in schizophrenia, The traditional technique of enfacement was adopted to evaluate the implicit ability of the Self-Other and Other-Other borders to alter to achieve this goal. The findings demonstrated that enfacement caused both controls and patients to exhibit the expected malleability of the Self-Other border. Additionally, the malleability of the Other-Other barrier had a different modulation between the two groups. According to these findings, there is a qualitative difference in the mutability of the Other-Other boundary between schizophrenia patients and matched controls rather than larger Self-Other boundary flexibility. The researcher also proposed that the current study reveals a novel aspect of body illusions and schizophrenia sickness, demonstrating that EI is not just restricted to the self-sphere but also affects how people classify others, potentially playing an important role in the social sphere.

#### 4. Other Aspects of Self Illusion beyond Face

Except for the face, illusory perception of self is also found and investigated in other components of the human body. Though the representation of the face possesses its unique traits, self-illusion beside the face as well have the attribute of obscuring the distinction between self and other, affecting the concept of self-identity. In the study conducted by Tacikowski et al., the effects of the body on self-concept and self-incoherence are revealed [17]. The experimenter created the perceptual illusion by swapping a pair of friends' bodies. Other operations such as knife threats were also involved. Subsequently, participants were asked to finish a memory test, making judgments on whether the words given had already occurred in the study. As a result, the participants rated their own personality attributes more similarly to how they had before evaluated their mate's characteristics during the illusion, the researchers found. The participants' perceived strength of ownership over their friend's body was correlated with their ability to adjust their self-concept to the "new" corporeal self. On top of that, the memory test revealed that personality qualities evaluated during the friend-body-switch deception were often recalled poorer than features assessed under the control treatment. Importantly, however, this deficit of episodic memory recall was markedly attenuated for participants whose self-concept drastically changed during the deceptive body switching. These findings demonstrate the flexibility of people's impressions of their own personality characteristics. These findings show that people's perception of their bodies dynamically shapes people's ideas about their own personalities and that the accurate encoding of episodic memories depends on the consistency between the conceptual and physical representations of themselves. Though differences between face and body perception exist, similarities performed, such as the process and effect when completing recognition tasks between body and face perception, still enables people to view the study done by Tacikowski et al. as a reference that helps understand the enfacement illusion, in terms of the effect on memory and impression [9, 18].

#### 5. Conclusion

Previous studies in this field have left a gap since there hasn't been much discussion from the social perspective regarding the effects of enfacement on the boundary between oneself and others. Several heuristic implications haven't been examined or built upon previously. This gap has been the aim of this paper, as well as research regarding how people perceive themselves and others and the meanings behind those perceptions. This review also added to the field by discussing enfacement illusions and other illusions that go beyond the human face, while also offering threads for the self and other interpretations. Several studies in relation to the enfacement effect were analyzed, in order to examine its impact on self and other perceptions, with further implications expressed. Firstly, the individualized inconsistency that appeared among people is brought up by various findings. It comprises the attractiveness of the stimulation, social-related personality traits, and capacity on emphasizing. Implications might be reached toward people's inclination to accept them in the attractive though illusory visage and the tendency on keeping positive expectations of themselves. Secondly, several studies indicate that enfacement can cause individuals to blur the boundaries they should have kept between themselves and other. This phenomenon is proved as a pervasive situation that can appear across gender and species. Determinants revealing the emphatic index and assimilation were evaluated, concluding the fact that participants get closer and established more intimate relationships with the stimulus. It is worth noting that the boundaries being affected are not only ones that exist between self and other, but also the other-other differentiation, which is especially remarkable in individuals with schizophrenia. Thirdly, experiments related to self-illusions besides the perception of faces were discussed, showing a

resemblance with the effect of enfacement illusion. Both types of experiments led to the result of vague self-identification and decreased ability to distinguish self and other.

Admittedly, there are several limitations in the previous studies. Factors, for instance, whether the enfacement is implemented synchronically or practiced in asynchronism, were not comprehensively studied, which though can cause alterations in the vividness. Besides, most of the studies mentioned revealed mere the correlation between factors, but few of them can indicate causal relationships. Further explorations toward the deep investigation of the root causes are needed to complete and refine the theories regarding enfacement illusion. This review can provide some directions for the design of socio-emotion related educational programs and their intervention research.

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