FACE RECOGNITION AND METAMEMORY: FEELING OF KNOWING AND TIP-OF-THE-TONGUE JUDGMENTS IN RESPONSE TO FAMILIAR FACES

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FACE RECOGNITION AND METAMEMORY: FEELING OF KNOWING AND TIP-OF-THE-TONGUE JUDGMENTS IN RESPONSE TO FAMILIAR FACES

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PLAGIARISM

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ABSTRACT

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M.A., Cognitive Neuropsychology

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Feeling of knowing (FOK) judgments allow us to make decisions regarding what is and is not stored within our memory as well as enable us to make judgments about our future cognition performance. Although there are many overlap betwenn FOK and tip-of-the-tongue (TOT) phenomenon, TOT occurs involuntarily unlike FOK. The present study aims to investigate relationships betwenn FOK judgments and TOT states during famous face-naming task. In the literature, relation between FOK and face identification is mostly studied with whole-faces. In the present study, we aimed to further investigate 'holistic' approach on face-naming process while

subjects are making judgments for familiarity of the faces and accessibility of retrieved partial information for the target faces under whole face and half-face (upper part of face) conditions. The classical recall-judgment-recognition (RJR) paradigm (Hart, 1965) is adapted into a face-naming task. It is used in order to examine the two main hypotheses on the basis of FOK, namely cue-familiarity and target-accessibility. In general, subjects' recall, recognition performances, as well as FOK judgments and TOT experiences are measured. Results favored target-accessibility hypothesis on the basis of FOK as well as holistic approach on face recognition. Findings were discussed under face recognition, FOK and TOT literatures.

Keywords: Face recognition, face-naming, prosopagnosia, metacognition, FOK, TOT, semantic memory

ÖZ

YÜZ TANIMA VE ÜSTBELLEK: BİREYLERİN TANIDIK YÜZLERE DAİR BİLME HİSSİ YARGILARI VE DİLİNİN UCUNDA DENEYİMLERİNİN İNCELENMESİ

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Bilme hissi (BH) yargıları, belleğimizde depolanan ya da depolanmayan bilgilere dair yaptığımız çıkarımsal kararlardır. Bu kararlar, anlık olarak doğru hatırlayamadığımız ya da bir kısmını hatırladığımız bilgileri, gelecekte hatırlayabilme olasılığını tahmin etmemize zemin hazırlar. BH, dilinin ucunda fenomeni (DU) ile oldukça benzer olmasına rağmenDU anlık olarak oluşan, oldukça emin ve hatırlamaya çok yakın olduğumuz durumlardaki deneyimlerdir. Bu çalışmanın amacı, ünlü yüzleri isimlendirme görevi sırasında BH kararları ve DU

deneyimleri arasındaki ilişkileri incelmektitr. Literatürdeki çoğu çalışmanın aksine, bu çalışmada BH ve DU arasındaki ilişkileri yüzün yüzün ‘bütünsel tanıma’ sürecinden nasıl etkilendiği, de incelenmiştirBu amaçlar ışığında, BH’nin klasik paradigması olan hatırlama, yargılama ve tanıma paradigması (Hart, 1965) ünlü yüzleri isimlendirme görevine uygulanmış, yüzler bütünsel (tüm yüz) ya da kesitsel (yüzün üst kısmı) olarak sunularak ipucu benzerliği ve hedefin ulaşılabilirliği yaklaşımları test edilmiştir. Sonuçlar BH içimulaşılabilirlik hipotezini yüz tanıma süreci için ise ‘bütünsel’ bakış açısı yaklaşımını destekler yönde olmuştur. Bu bulgular, yüz tanıma, BH ve DU literatürleri bakımından tartışılmıştır.

Anahtar kelimeler: Yüz tanıma, yüz isimlendirme, prosopagnozi, üstbiliş, bilme hissi, dilinin-ucunda fenomeni, semantik bellek

DEDICATION

To my beloved family…

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CHAPTER 1

INTRODUCTION

Metacognition is mostly explained as “thinking about thinking” and “knowing about knowing”. It is a unique ability of ours that enables us to monitor our cognition. An aspect of this unique skill is self-monitoring of memory which is mostly conceptualized as so called metamemory as proposed by Nelson (1990). Metamemory is the awareness of what is and what is not stored in one’s own memory. Through such metamemory evaluations and subjective experiences, we can monitor and control our behaviors. One of the subjective experiences is known as the feeling of knowing (FOK). It is a very common everyday life experience that helps individuals to conclude what they know and what they do not know. Importance of FOK does not solely rely on its frequency in everyday life, but also it is a valuable concept for research purposes because it plays a crucial role in understanding memory monitoring and information processing systems (Hart, 1965). In his influential work, Hart (1965) stated that despite efficient and flexible

information processing memory system, it still has fallible storage and retrieval capacities. This is what makes FOK experience invaluable (Hart, 1967). In this fallible system, since what is retrieved does not reflect completely what is stored in memory and retrieval failures are inevitable, FOK experience may be a beneficial and accurate indicator while assessing this process (Hart, 1967). The majority of findings are consistent with one another that FOK is a robust metacognitive judgment for recognition of formerly unrecalled stimuli (e.g. Hart, 1965; Metcalfe, 1986; Schwartz et al., 2016).

1.1. Feeling of knowing judgment (FOK)

FOK is a unique experience that in everyday life we mostly are not aware of. When we are not able to recall a piece of information, we are still able to make a judgment of whether we have knowledge about the answer or not. Moreover, it seems that such very subjective experience occurs in a very brief time period. Reder and Ritter (1992) advocated that FOK is an implicit process, and we are not aware of making these quick judgments consciously. The essentials underlying this implicit rapid process are a famous debate subject (e.g. Hart, 1965; Koriat, 1993; Nelson, 1990; Schwartz & Metcalfe, 1992). There are different hypotheses regarding underlying mechanism of FOK; and can be classified under two main topics which are inferential theories and direct access theories.

The trace access theory also known as direct access theory was proposed by Hart (1965). According to this hypothesis, we are able to directly access to our memory using monitoring (memory) process which allows us to make FOK judgments. In order to test this hypothesis Hart (1965) developed a paradigm called ‘recall-judgment-recognition’ (RJR) paradigm to show that FOK judgments are relatively

accurate indicator of what is and what is not stored in the memory. This paradigm involves three phases in which (1) participants are given a test to recall, such as a general information question test; (2) then they are asked to make a judgment for the unrecalled items whether they will be able to remember it later or not; (3) and finally, they are given a multiple-choice test (criterion test) to see if they can indeed recognize the unrecalled items. By using this paradigm, particularly accuracy of FOK was investigated. According to Hart, FOK accuracy stems from people's accurate judgments regarding their future recognition performance. In this case, if participants could recognize the items that they gave a positive or high FOK judgment, then Hart (1965) suggested that they are accurate; and so the FOK judgments are relatively accurate indicator of memory. Similarly, if participants could not recognize the items that they gave a negative or lower FOK judgment, suggested that those judgments are also accurate. On the contrary, if participants could recognize the items but they gave low or negative FOK, then Hart (1965) claimed that these are not accurate judgments (also see Fleming & Lau, 2014). Furthermore, if subjects could not recognize the items but they gave a positive or high FOK for those items, authors suggested that such decisions are inaccurate metamemory evaluations (Hart, 1965; Nelson, 1984). The results of his study favored these suggestions.

These conclusions of Hart's (1967) laid the hypothesis known as 'trace-access' or 'direct access' hypothesis. However, the view of direct access hypothesis did not attract much interest; and influenced researchers to explain bases of FOK in different perspectives. Unlike trace access theory, inferential hypotheses suggested that FOK

judgments increase according to familiarity judgment of subjects for the cue (e.g. Schwartz and Metcalfe, 1992) or target's accessibility (e.g. Koriat, 1993).

The cue familiarity hypothesis advocates that FOK judgments are based on the familiarity of the cue (e.g. word, face, or an event). Unlike direct-access theory, FOK decisions are not produced through explicit access to memory-monitoring system aiming to find the formerly unrecalled target but are made according to the familiarity of the target (e.g. Reder, 1987; Schwartz & Metcalfe, 1992). According to Reder (1987), people's higher levels of familiarity judgments for the cue improve FOK decisions and their accuracy. Furthermore, making familiarity judgments for a particular cue is an automatically occurring process even before individuals begin to search and retrieve the target (Benjamin, 2005). When a cue is highly familiar, accordingly FOK judgments improve even without the actual retrieval occurs. This view supports that FOK judgments are relied on familiarity of the present cue which can also be conceptualized as familiarity heuristics providing quick evaluations of the information (Metcalfe et al., 1993; Reder & Ritter, 1992).

On the other hand, the target accessibility hypothesis shed light on explaining bases of FOK by focusing on the amount of information that is retrieved for the unavailable material (Koriat, 1993). Koriat articulated that such retrieved partial information serves as mnemonic cues; thus, they facilitate the process of making FOK judgment for future cognition performance. In this model, two fundamental elements were emphasized underlying FOK and its accuracy: (1) the amount of information accessed; and (2) the intensity of accessed information. When more amount of mnemonic cues are retrieved, individuals are more likely to make more confident FOK judgments. Secondly; vividness, specificity, and ease of access

represent the aspects of intensity of remembered partial information. The Intensity of retrieved information helps us to understand why we are accurate in our both prospective and retrospective judgments. Koriat (1993) argued that individuals are more confident and accurate when they retrieved more intense, vivid, and specific partial information regarding unavailable target . In addition to intensity and accessibility of information, Durso et al. (1991) stated that information that is retrieved about the target can be contextual, semantic, or piece of the target itself. Therefore, in oppose to cue-familiarity heuristics, target-accessibility hypothesis advocates that sense of familiarity is insufficient in explaining mechanism of FOK; rather it highlights the role of retrieving relevant partial information about the target which forms underlyings of FOK judgments.

A more recent and prevailing idea proposed by Koriat and Levy-Sadot (2001) articulated the integration of two above mentioned hypotheses while explaining the fundamentals of FOK. According to this view, both familiarity heuristics and recollection improves FOK judgments. The cue itself triggers the subjective judgment for familiarity. It is followed by cue familiarity decision which initiates the process of memory interrogation. This, in turn, leads to retrieval of relevant partial information. In this way, it is possible to conclude that accessibility mechanism is mediated by familiarity judgment.

1.2. Tip-of-the-tongue phenomenon (TOT)

James, (2018; 1893) was the first pointing light to the experience of feeling very sure about knowing something, such as a name or a place but individuals are not able to retrieve it on that particular moment. Brown and McNeill (1966) called this peculiar experience as ‘tip of the tongue’ state (TOTs). In their research, they

defined TOT as following; ‘If you are unable to think of the word but feel sure that you know it and it is on the verge of coming back to you then you are in a TOT state (Brown & McNeil, 1966, p. 327).’

Although, TOT state sounds very similar to FOK, these two experiences differ from one another. TOT state is an imminent experience that people are noticeably confident at a certain level that they will eventually remember the unrecalled information. On the other hand, FOK judgments are only indicators of the likelihood and confidence level of remembering and recognizing the target information later (Brown, 1991).

Similar to FOK, explanations regarding the mechanism of TOTs are mainly divided into two categories: namely, direct access models and inferential models. Direct-access hypothesis emphasized retrieval failures in a way that the target information is sufficient to evoke activation of TOTs but insufficient to evoke recall (Brown & McNeil, 1966; Perfect & Hanley; 1992). On the other hand, inferential view on TOTs assumed that individuals are experiencing TOT states because they are making inferences about their knowledge on the target information. These inferences are made according to familiarity of the cue (e.g. Metcalfe & Schwartz, 1992), or accessibility of the target cue (e.g. Koriat, 1993).

1.3. Face Perception and Its Relationship with FOK Judgments and TOT Phenomena

The present study focused on understanding the relationships between FOK and TOT in response to familiar/famous faces. In parallel with this purpose, under this section these concepts will be elaborated further in detail before moving to the

hypotheses of the study. Understanding face perception has been one of the popular topics among researchers (e.g. Bruce & Young, 1986; Burton, Bruce, & Johnston 1990; Tanaka et al., 1998). According to Bruce and Young's functional model (1986), there are different stages of face perception in which these stages have to be satisfied before reaching to another one. The first stage is structural encoding stage in which fundamental information of faces are encoded such as shape of nose. At this stage, we basically perceive a face as a face. It holds the information that will be provided for face recognition units (FRU). FRU can access identity related semantic information such as name, occupation, which is hold by person identity nodes (PIN). In order to achieve successful face-naming, PIN should be activated first. If PIN is not activated, a retrieval failure of remembering the name for the particular face occurs (Bruce & Young, 1986).

An updated version of the functional model called interactive activation model (IAC) was developed by Burton et al. (1990). Although the basic principles remained similar, the way they explained the role of PIN differed from the first version of the model. The IAC model states that familiarity judgment for a face is made at PIN, whereas functional model gave this role to the FRU. Furthermore, the IAC model has two another components, namely name recognition units (NRU) and semantic information units (SIU). The functional model explains FOK in a way that FRU should be active first; so structural codes of face can fit with the target face. If both codes match with one another, then person is able to make a familiarity judgment without activating identity-specific information units. This process may be followed by activation of PIN which allows person to access semantic identity related information. On the other hand, the IAC model suggests that since the semantic

information is hold separately at SIU, in order to make a familiarity judgment for a face both FRU and PIN must be active. If an individual desires to recall a name or additional information about the person, then higher order stages must be accessed. Although the models place semantic (person-identity related) information on different components, both models articulate that naming a face is the very final stage of face recognition process. This reminds the famous work "I recognize you but I cannot remember your name" (Burton & Bruce, 1992). Such explanations are especially very beneficial while explaining why we are able to make familiarity decision and can retrieve partial information about the person, such as importance of field or nationality but still not able to recall the name and so experiencing TOT state. This situation, in turn, may accompany the process of making FOK judgments, whether we will be able to remember or recognize the person's name in future. According to Yarmey (1973), recognizing a face without identifying the person is very common phenomenon occurring in our everyday lives which allows us to experience TOT state for those faces (see also Bruce and Burton, 1992). Yarmey also argued that experiencing TOT state is more related to the retrieval of partial information. In this account, if more amount of information about the familiar face is retrieved, but still failed to recall the name, experiencing TOT state is almost inevitable. However, such differentiation is not reported for unfamiliar face recognition. On the other hand, Schwartz, Benjamin, and Bjork (1997) found that individuals base their FOK judgments on the familiarity of the face and so they can come up with confident FOK judgments for the unrecalled names of faces.

Aly, Knight, and Yonelinas (2010) aimed to explore the relation between specific deficits due to medial temporal lobe epilepsy and recognition memory

particularly recollection and familiarity for faces and words. Medial temporal lobe (MTL) involves structures critical for long-term memory such as hippocampus which plays a crucial role in mediating declarative memory, such as retrieval of personal events; and semantic memory, e.g. factual knowledge. Results of the study showed that MTL epilepsy patients had severely impaired word recognition ability while face recognition ability relatively spared. Aly et al. (2010) argued that faces may tend to elicit a greater reliance on familiarity than other types of stimuli such as words; it may be the case that subjects rely more heavily on cue familiarity when giving FOKs to faces than when giving FOKs to other types of stimuli. This accord with the findings that face recognition remains relatively spared in amnesia (e.g. Yonelinas et al., 1998). Although patients' ability for recollection was impaired, their ability to make familiarity judgments especially for faces remained intact (Aly et al., 2010).

Hosey et al (2009) investigated FOK judgments for face identification by using both famous and unfamiliar faces. Results favored combined hypothesis (Koriat & Levy-Sadot, 2001) that subjects reported both strategies. In addition, it is also observed that subjects relied more on cue-familiarity heuristics than accessibility strategy while making FOK judgments although the difference between strategies was not significant. Moreover, when high level of familiarity judgment is made for faces, subjects did not further need to use target-accessibility. Peynircioğlu and Tekcan (2000) found that the strategies might have influenced the magnitude of FOK decisions, but accuracy of FOK ratings might have been influenced solely by familiarity judgments. Unlike Peynircioglu and Tekcan, Hosey et al. (2009) did not find evidence for such possible influence of strategies on accuracy of metacognitive judgments.

1.4. Neurobiology of FOK Judgments and TOT Phenomena During Face Recognition

Prefrontal regions have a specific role during FOK judgments (Funnell et al., 1996). Especially ventromedial prefrontal cortex is associated with FOK accuracy. Also, this area is thought to be important for assessment of partial information retrieved from the hippocampus and the medial temporal lobe which is thought to be related with retrieval of partial information comes from hippocampus and medial temporal lobe (Perrotin, Belleville, & Isingrini, 2007; Schnyer, Nicholls, & Verfaellie, 2005). Furthermore, it is found that the prefrontal cortex and parietal regions were activated during TOT states and FOK decisions (Maril et al., 2005). Kozlovskiy et al. (2017) found that parahippocampal gyrus was active during TOT states, when name retrieval for the famous face from long term memory fails.

A differentiation has been proposed between neural correlates of semantic FOK and episodic FOK decisions. Activation in the right inferior frontal cortex was observed during semantic FOK decisions (Kikyo & Miyashita, 2004). Another fMRI study found a valuable activation in PFC and also in parietal regions for TOT and FOK together (Maril et al., 2005). Tsukiura, Mochizuki-Kawai, and Fujii (2006) showed that especially the left anterior temporal region is activated while face-naming regardless of faces' familiarity. Patients with prefrontal cortex (PFC) lesion showed low FOK accuracy (Schnyer et al., 2005). Furthermore, other results demonstrated that FOK accuracy is also correlated with the ventro-medial PFC which plays an essential role in judgment of partial information accessed from hippocampal region and medial-temporal lobe (Schnyer et al. 2005).

Studies about understanding neurophysiologic correlates of FOK focused on event-related potentials (ERP) correlates of both familiarity and recollection. A study investigating ERP components of FOK during face-name recognition task found two early face sensitive ERPs, namely N170 and P100 (Irak et al., 2019). N170 is found to be related to configural face processing which is not dependent on emotional facial expression (Herrmann et al., 2002). In addition, previous studies showed that N170 is not only familiarity specific (Alzueta et al., 2019); but also related to neural mechanism underlying the process of detecting a face (Goffaux, Gauthier, & Rossion, 2003). P100 is found to be associated with the process of detecting a face as a face (Xu, Liu, & Kanwisher, 2005). Furthermore, Irak et al (2019) found bigger amplitudes for high levels of FOK than low level FOK judgments. All in all, these ERP results suggested that different stages of face recognition reflects different neural mechanisms through potentials such as P100 and N170; and levels of FOK judgments are related to different magnitude of amplitudes.

1.5. Holistic requirements of face processing

In addition to theoretical bases as well as neurobiological and neurophysiologic correlates for face perception and FOK, here we will briefly mention additional basic information regarding the factors influencing the face recognition process because the present study aims to investigate FOK and TOT in response to famous faces but by manipulating the face stimuli. Tanaka and Farah (1993) investigated face recognition by questioning whether it is recognized by using holistic representations or not. They hypothesized that face recognition is a holistic process which is why a part of a face will be more easily recognized when it is presented in the whole face than when it is presented as an isolated part of the face. The results of the

experiments they conducted have favored this assumption. Indeed, we use holistic representation while recognizing a face because it is more difficult for us to recognize a face by only seeing an isolated part of it. Their results further showed that inversion (Yin, 1969) influences correct face recognition ability of ours in a way that when we see faces upright, it is easier for us to correctly identify them than when they are inverted (Tanaka & Farah, 1993). These findings are important because the such advantage on recognition of other types of objects, such as houses, is not found. Kanwisher further supported the idea of that face perception is special and specific process. fMRI studies showed that there is a face-specific region in brain which is called the fusiform face area (FFA) that is only activated while recognizing faces because she did not observe any activation on that area during recognition of other types of objects (Kanwisher, McDermott, & Chun, 1997; Kanwisher & Yovel 2006).

1.6. The purpose of the present study

The present study aims to investigate the effects of face-naming on eliciting FOK judgments and TOT states. More particularly, unlike previous studies (e.g. Hosey et al., 2009; Yarmey, 1973), in order to assess their effects on face-naming ability we manipulated the presentation of different parts of the famous faces in two ways. These were the upper half of the face or the whole-face. If the eyes are the most diagnostic feature for face naming (e.g. Hsiao & Cottrell, 2008; Schyns, Bonnar, & Gosselin, 2002), then we expect that there will be no difference in successful face-naming and face-recognition performances between whole-face and half-face conditions. On the other hand, if the face perception relies on integrating features such as eyes, mouth, into an organized whole as Tanaka and Farah proposed (1993), then we expect significant advantage for face-naming performances in

whole-face groups (also see Tanaka, Heptonstall, and Campbell, 2019). Specifically, viewing solely the upper half of the face should result in failure of retrieving the name; and we expect that it will have a negative influence on correct face-recognition ability as well. In oppose to that, if seeing half-upper-faces is sufficient to recognize that particular person, then we suggest that there will be no difference in FOK judgments between whole-face and half-face conditions. Furthermore, as another important point related to FOK accuracy, Peynircioglu and Tekcan (2000) found evidence for that FOK's accuracy relied on familiarity strategies, whereas Hosey et al. (2009) did not show any evidence for such dissociation between cue-familiarity and target-accessibility. Therefore, we aim to further investigate FOK's accuracy during famous face recognition.

Hosey et al. (2009) investigated FOK in response to both familiar and unfamiliar faces. However, there were some methodological weaknesses related to that particular study which are worth to be mentioned. The pictures of famous faces were not standardized in terms of factors such as gaze, facial expressions, although, the photographs were all black&white. It would be beneficial if the authors considered such factors and present the stimuli on a template frame to assure standardization of the famous face stimuli (e.g. Ellis, Shepherd, & Davies, 1979) rather than presenting them directly in their original form. Moreover, in the study of Hosey et al. (2009) the participants had to finish the task for each face in 20 sec. However, the time period presenting the faces was not limited. It is not certain how long each participant viewed the faces. That is why, it is crucial to provide standardization both on the stimuli and on the experimental flow as possible. In order to control these issues we developed an experimental task by using the PsychoPy tool

which is a free source software mostly used in neuroscience and experimental psychology researches. We designed a famous face-naming task in which subjects' spontaneous face-naming performances, as well as TOT ratings, FOK decisions, and face-recognition performances were analyzed while FOK strategies (cue-familiarity vs. target-accessibility) and famous-face presentation types (half vs. whole) were controlled.

In the study of Hosey et al (2009), TOT phenomenon was not assessed while investigating FOK for familiar faces. On the other hand, Díaz et al. (2007) studied TOT states for famous faces but did not examined FOK judgments in this process. In these studies, FOK and TOT were not investigated together. In the present study we aim to do so, because examining these processes together will shed light on the questions about their similarities and differences during familiar-face recognition. This in turn raised the question to further examine these phenomena together in response to famous face-naming because it is unclear that how TOT experiences and accuracy of FOK judgments together will be influenced by presenting the half-faces vs. whole-faces. We expect that presenting upper-half-faces will be associated with lower familiarity judgments compared to whole-face condition. In addition, we expect that subjects may not experience TOT state when they will be presented with upper-half-faces because the cue (the half face) itself may not be sufficient to evoke TOT state. This assumption can be derived from Hart's (1965) recognition threshold concept. If the cue is not sufficiently familiar, it is very likely that individuals will not experience neither TOT state nor make confident FOK judgments. On the other hand, we assume that individuals will perform better on the face-naming task when they see whole-faces. We further expect that seeing whole-faces will be associated

with confident FOK judgments. Finally, in regards to dissociation between cue-familiarity and target-accessibility strategies while making FOK judgments, we assume that subjects who will see whole-faces will rely on accessibility strategy. Whereas we assume that half-face group will rely on familiarity of cues while making FOK judgments because the cue will not be sufficient to remember person-specific information. In order to investigate these assumptions regarding effects of holistic face processing on individuals' face-naming performance, FOK judgments, bases of FOK, TOT ratings, familiarity judgments, amount of accessed partial information, and face-recognition; we developed a famous-face naming task by using recall-judgment-recognition (RJR) paradigm. Following questions are asked in order to further examine TOT state and FOK in response to famous faces:

(1) Which model regarding FOK decisions (cue-familiarity and target-accessibility) about the famous faces is active?
(2) Under which condition (familiarity or target-accessibility) subjects will experience TOT state more for the unrecalled names of the famous faces?
(3) Which model regarding FOK decisions is associated with correct spontaneous face-naming, and face-recognition?
(4) What is the effect of holistic face processing (whole-face vs half-face) on evoking TOT states and accurate FOK judgments?
(5) What is the effect of holistic face processing on subjects' spontaneous face-naming and face-recognition performances?

1.5.1. Hypotheses of the study

(1) Seeing faces half vs. whole changes the likelihood of experiencing TOT state and FOK judgments. There will be a dissociation in familiarity and accessibility conditions in terms of FOK accuracy during face recognition.

   a. The whole-face groups under both conditions (namely, familiarity and accessibility) will have higher FOK ratings compared to the half-face group under accessibility condition.

   b. The whole-face groups under both conditions (namely familiarity and accessibility) will experience TOT state more for the famous faces than the half-face groups. Accessibility will increase the likelihood of TOT.

   c. The whole-face groups under both conditions will have vigorous FOK accuracy than the half-face groups. Accessibility will improve FOK accuracy.

(2) Different models of FOK (cue-familiarity and target-accessibility) and holistic face processing will influence participants' face-naming and face-recognition performances.

   a. The target-accessibility strategy will improve face-naming and face-recognition performances.

   b. The whole-face groups will perform better both at spontaneous face-naming and face-recognition phases compared to the half-face groups.

CHAPTER 2

METHOD

This chapter provides detailed information regarding the method, material, and procedure of the present study.

2.1. Participants

A total of 60 young adults participated in the study (38 of female, *N*=60). Their ages were ranging from 18 to 26, (*M* = 23, *SD* = 2.85). All participants were right-handed. They reported neither neurological and psychiatric medical history nor related treatment and medication use. Furthermore, subjects had normal vision and/or vision corrected near to normal.

2.2. Materials

2.2.1. Stimuli

Semantic memory and FOK judgment performances of participants were measured by using famous face naming task. The face stimuli used in the task were

received from (Irak et al., 2019)study. All of the faces (N = 43) were black and white, and equal in size and luminance. The famous faces were randomly selected from different occupations, e.g. scientist, actor, singer. There were both Turkish and foreigner famous faces used as stimuli. Pictures involving eye-glasses were not involved. Furthermore, all faces were almost in neutral pose in order to prevent any interference related to emotional gestures. The half-face groups were presented with horizontally cut upper-half-faces involving features such as forehead, eyebrows, eyes, and nose. The whole-face groups were presented with whole form of faces (See Appendix A).

2.2.2. Semantic FOK Judgments: Familiar Faces Task

In the present study, the task was developed through using the Psychopy, 3.0.6 version (Peirce et al., 2019). The PsychoPy is an open-source experiment design tool in Python which allows researchers to design various experiments. It is commonly used in many labs particularly in fields such as, cognitive neuroscience, experimental psychology, and psychophysics.

The task is developed based on recall-judgment-recognition (RJR) paradigm (Hart, 1965). The classic procedure of the paradigm is applied to the task. The responses of each participant were automatically recorded by the PsychoPy in a detailed output involving both correct and incorrect answers as well as reaction times. After presenting the famous faces which remained for 3 ms on the middle of the screen, participants completed three phases for each face. Immediately after disappearance of faces on the screen, recall phase took place in which subjects are asked the following question: *'Are you able to name the face out loud?'*. The responses were either *'Yes, I can'* or '*No, I cannot'.*

In the judgment phase, in order to test familiarity hypothesis subjects were asked to rate the familiarity of each famous faces on the 6 Likert-type scale in which responses were *1: Definitely not familiar, and 6: Definitely familiar*.

Furthermore, to test target accessibility hypothesis 3 questions were asked to the participants regarding the famous faces. In order to examine the role of semantic knowledge in successful naming and FOK judgments following questions were asked; *'(1) Do you know what this person's occupation is?', '(2) From where do you know this person, e.g. TV?'*, and *'(3) Do you know any other additional information about this person?'* The responses were *'Yes'* and *'No'*. When subjects responded 'Yes', it was named in the result section as 'Positive TOT'. When they responded 'No', it was named in the result section as 'Negative TOT'.

In order to test tip-of-tongue state, participants are asked for each item that*'Are you having a tip of the tongue state?*' Similarly, responses were *'Yes'* or '*No'*. Afterwards, in order to measure feeling of knowing judgment participants are asked to rate *'How likely would you recognize the name of this face if the faces will be shown again in the future?'* on the 6 Likert-type scale. Responses were *1: Definitely not sure, 6: Definitely sure.*

In order to test FOK judgments, subjects are asked to rate their future memory performance. They were required to rate "How likely you will recognize the name of the face out of choices in future?" on the 6 points Likert scale (*1: I definitely cannot recognize, 6: I will definitely recognize).* We classified subjects' rating as

'Low FOK' if they rated between 1-3 points. We classified subjects' ratings as 'High FOK' if they rated between 4-6 points.

Finally, in the recognition phase, each face was presented in the same order as in the beginning of the task. Immediately following the disappearance of the stimuli, participants are given 4 options of names which were selected appropriately based on the target's gender and occupation. Participants are required to recognize the correct answer if they are able to do so. Regarding time limitation during the task, although there was no restriction criterion, participants were expected to respond as quickly as they can.

2.3. Design

The present study was designed as between-subjects experimental design. There were two main conditions, namely familiarity and accessibility. Under each condition, we created two groups according to face manipulation (whole-face vs. half-face). Therefore, there were 4 groups which were; the half-face familiarity, the whole-face familiarity, the half-face accessibility and the whole-face accessibility. The dependent variables were recall answers (correct and incorrect naming scores), familiarity ratings, accessibility ratings, TOT state ratings, FOK judgment scores, and recognition answers (correct and incorrect recognition scores). Reaction times of these variables were recorded as dependent variables as well. The independent variables were face type (whole vs half) x condition (accessibility vs familiarity).

2.4. Procedure

Approval is obtained from Bahcesehir University Ethic Committee. All experiments were proceeded individually in a specific testing room after. Subjects reported demographic information such as age, gender, hand preference, and medical history. Later, they were seated in front of the screen and presented with general instructions about the study. After giving instructions, participants were provided sufficient information about the TOT state in order to make sure that they know how to respond once related question appears on the screen. The instructions regarding experiment were as follows: *'This experiment consists of different phases and you will receive different instruction regarding how likely you will remember the names of faces and your confidence about your memory performance. In each after seeing the instructions on the screen, you will be seeing a fixation point '+' in order to keep your focus on that particular area. Later, you will be shown many famous faces on the centre of the screen from different gender, occupation, and nationality. For each face, you are asked to answer some questions. You may begin any moment once you are ready.'*

Participants are randomly assigned to the groups. First group was half-face familiarity. Figure 2.1 represents the diagram flow. In this group, half versions of faces were presented as stimuli. Afterwards, they rate the familiarity on the 6 points Likert-type scale. Furthermore, they were required to name each faces if they can. Later, they responded whether they are having a TOT state. Then, FOK judgment took place and they are asked to make FOK judgment about how likely they would recognize the name. Finally, face-recognition phase was completed. Each stimulus

was presented one more time and then recognition of correct name out of four options took place.

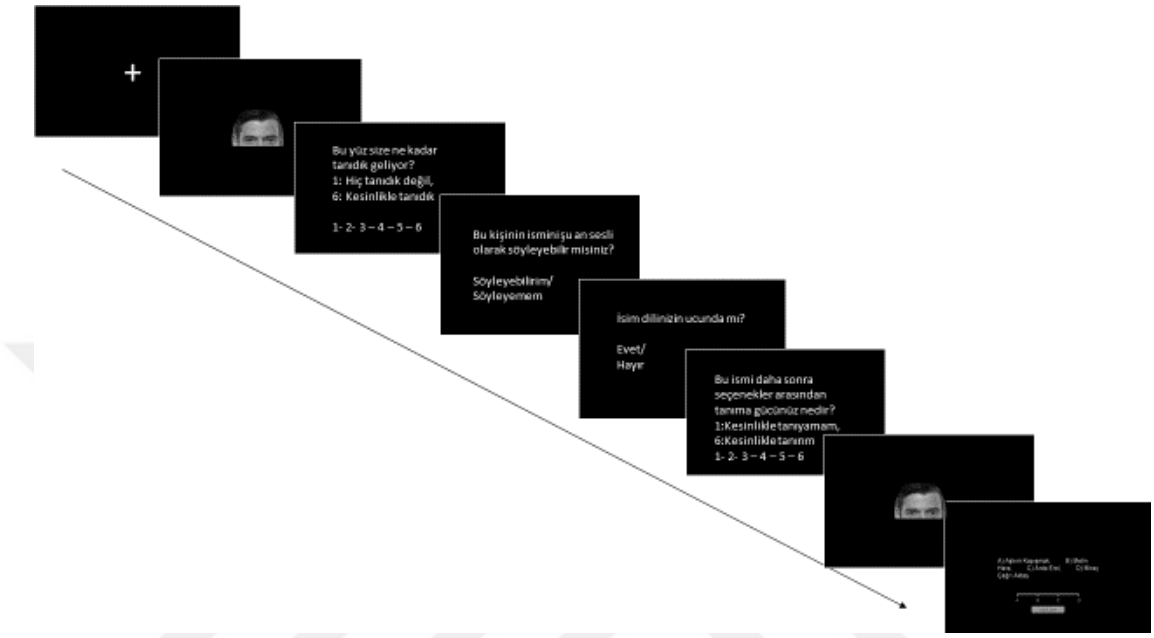

Figure 2. 1. Half-face familiarity diagram flow.

The second group was half-face accessibility group. The Figure 2.2 shows diagram flow. In this group, subjects were presented half version of the faces. In contrast to the first group, subjects were directed 3 questions about stimuli instead of familiarity rating. After the stimuli disappeared on the screen, subjects responded following questions: “What is the occupation of this person?”, “Where do you know this person?”, and “Do you know any additional information about the person except for the occupation and where you know he/she.” Afterwards, the same procedure applied, recall phase (naming), judgment phase (TOT state and FOK judgment), and recognition phase.

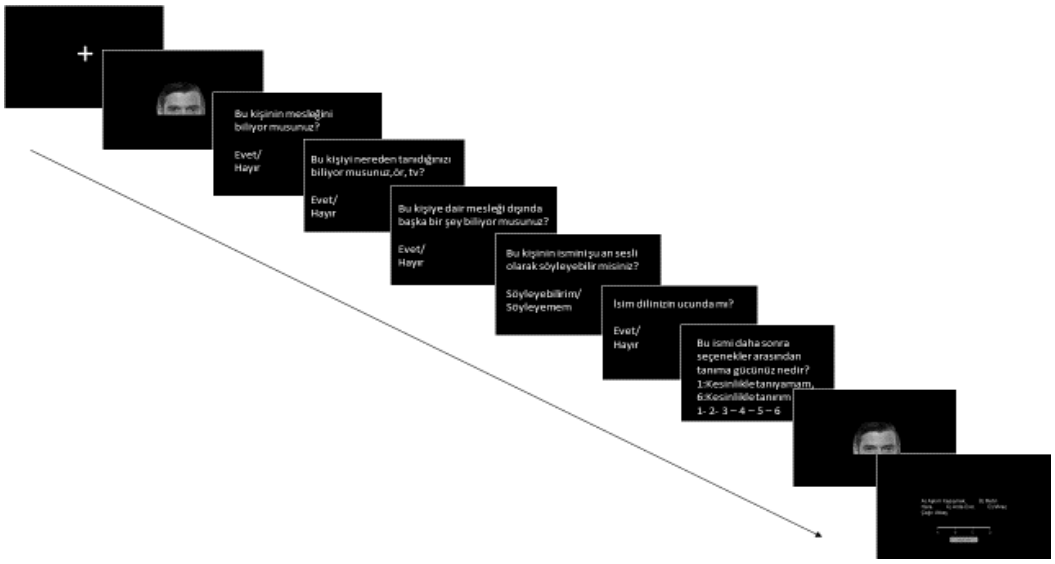

Figure 2. 2. Half-face target-accessibility group's diagram flow.

The third group was whole-face familiarity group. Differing from the first group, although the procedure was the same in terms of familiarity question, whole form of faces was used as stimuli. The Figure 2.3 shows diagram flow regarding the procedure of this experimental group. After presenting the faces, familiarity rating is asked which is followed by recall phase (naming), judgment phase (TOT state and FOK judgment), and recognition phase.

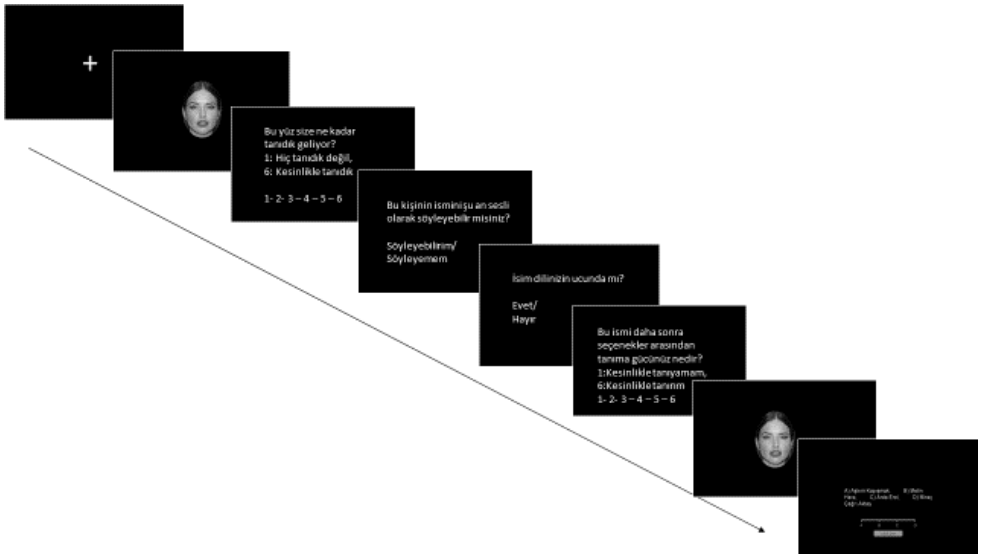

Figure 2. 3. Whole-face familiarity diagram flow.

Finally, the fourth group was the whole-face accessibility group. Only difference from the half-face accessibility group was the stimuli. In this group, whole version of faces was used. Afterwards, subjects were asked 3 questions which were about 'what, where, and additional information' related to target accessibility hypothesis which is then followed by recall phase (naming), judgment phase (TOT state and FOK judgment), and recognition phase. The Figure 2.4 summarizes diagram flow of this group.

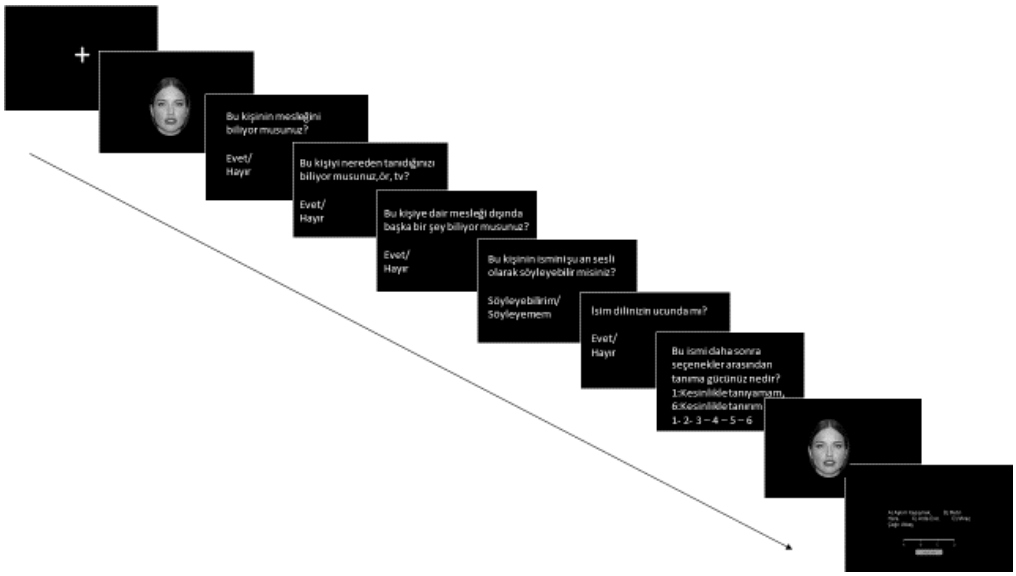

Figure 2. 4. Diagram flow of whole-face accessibility group.

CHAPTER 3

RESULTS

Before the statistical analysis, assumptions of multivariate statistics such as normality, homoscedasticity, and linearity were analyzed. Further, the data werescreened for both univariate and multivariate outlier values; and any type of outliers was not detected. In the familiarity condition, FOK and TOT in response to famous faces were investigated with familiarity ratings in addition to RJR (recall-judgment-recognition) paradigm between two groups (N = 15 for each group). Similarly, in the accessibility condition, FOK and TOT in response to famous faces were examined with accessibility ratings in addition to RJR paradigm between two groups (N = 15 for each group). Accordingly, results of the present study were reported below in the following order: descriptive results, results of cue-familiarity condition, results of target-accessibility condition, and general results.

3.1. Descriptive Analyses

Sixty participants (38 females) between the ages of 18 – 28 (M_{age} = 23.47, SD_{age} = 2.86) were involved in the study. Participants were assigned to the groups randomly. To show the relation between TOT, FOK judgments, and recognition performance, correlation analysis was conducted between groups. Table 3.1. shows these relations in detail below.

Table 3. 1

Pearson correlation results of positive TOT, high levels of FOK, and correct recognition between groups.

Conditions/Groups	Variables	M	SD	1	2	3
Half-face familiarity group (n = 15)	1. Positive TOT	26.40	7.34	-		
	2. High FOK	30.13	7.15	.85**	-	
	3. Correct Recognition	35.00	4.99	.62*	.75**	-
Half-face accessibility group (n = 15)	1. Positive TOT	27.07	8.08	-		
	2. High FOK	30.13	6.97	.75**	-	
	3. Correct Recognition	33.67	5.25	.86**	.90**	-
Whole-face familiarity group (n = 15)	1. Positive TOT	29.13	7.29	-		
	2. High FOK	31.60	6.30	.93**	-	
	3. Correct Recognition	35.27	4.91	.75**	70**	-
Whole-face accessibility group (n = 15)	1. Positive TOT	30.93	6.81	-		
	2. High FOK	33.13	7.32	.83**	-	
	3. Correct Recognition	36.13	5.89	.82**	.89**	-

* p < .05, **p < .01

3.2. Cue-familiarity results

A series of MANOVAs were conducted between half-face-familiarity and whole-face-familiarity groups to determine the effects of cue-familiarity strategy and face manipulation on eliciting TOT state and making accurate FOK judgments. Results of the analyses are reported in the following order: participants' familiarity judgments for the famous faces, spontaneous face-naming (recall) performances, TOT ratings, FOK judgments, and correct recognition performances on the multiple choice name list presented with the famous faces stimuli.

3.2.1. Effects of Familiarity Levels. We analyzed the effect of face manipulation on cue-familiarity ratings across half-face and whole-face familiarity groups. The Levene's test of equality of variances showed a nonsignificant value which allowed us to satisfy homogeneity of variances assumption (p = .91). However, manipulation on faces did not significantly influence subjects' familiarity judgments, (p = .43). If the face was rated between 1-3 points, subject's judgment was accepted as 'low familiarity/not familiar'. On the other hand, if the face was rated between 4-6 points, then the judgment of subject was accepted as 'high familiarity/ highly familiar'. Herein after the results regarding familiarity levels will be used accordingly. Whole-face group had high familiarity levels for 79.06% (34 faces out of 43) of the faces compared to half-face-familiarity group who made 'highly familiar' decision for 71.46% (31 faces out of 43) of the famous faces.

3.2.2. Face Naming (recall). MANOVA was carried out to compare groups' face naming performances and familiarity judgments for the famous faces. Levene's test

satisfied the homogeneity assumption, (p = .72). However, a main effect of cue-familiarity strategy on groups' face-naming performances was not observed, (p = .88). Yet, whole-face group could correctly name 54.88% (24 faces out of 43) of faces, whereas half face group could name 50.22% (22 faces out of 43) of faces. Table 3.2. summarizes means (standard deviations) for face-naming and cue-familiarity levels across half-face and whole-face familiarity groups.

Table 3. 2

Means (standard deviations) of correct responses for familiarity levels and face-naming performances across groups.

	Half-face familiarity group (n = 15)	Whole-face familiarity group (n = 15)
Faces that were rated as	M (SD)	M (SD)
'not familiar' but correctly named	.27 (.46)	.20 (.78)
'not familiar' and not correctly named	12.00 (6.27)	8.93 (5.59)
'highly familiar' and correctly named	21.33 (6.02)	23.40 (7.26)
'highly familiar' but not correctly named	9.40 (5.04)	10.47 (5.03)

3.2.3. Tip-of-the-tongue state (TOTs) for Faces. ANOVA was conducted to examine the effect of cue-familiarity on evoking TOT state between half-face and whole-face groups. Levene's test results did not violate homogeneity assumption, (p = .98). However, we did not find a significant effect of making high levels of familiarity judgments on the likelihood of experiencing TOT states for the famous faces across half-face and whole-face familiarity groups, (p = .62). Yet, whole-face familiarity group experienced TOT state for 68% (29 faces out of 43) of the faces whereas half-face familiarity group who experienced TOT state for 61% (26 faces

out of 43) of the faces. Table 3.3. shows means (standard deviations) for TOT ratings in regards to familiarity judgments.

Table 3. 3

Means (standard deviations) of correct responses for TOT experiences in relation with familiarity levels across half-face familiarity and whole-face familiarity groups.

	Half-face familiarity group (*n* = 15)	Whole-face familiarity group (*n* = 15)
Faces that were rated as	M (SD)	M (SD)
highly familiar' and elicit TOT state	25.80 (7.12)	28.33 (8.71)
low familiar' and not elicited TOT state	11.33 (6.17)	8.47 (5.60)

3.2.4. FOK judgments (FOK) for Faces. We carried out a series of MANOVAs in order to examine the effect of cue familiarity and face manipulation on FOK levels (low vs. high), and accuracy of FOK between whole face and half face groups. Participants rated their FOK judgments on the 6-Likert scale (1: '*I definitely will not recognize name of the face later'*; 6: '*I definitely will recognize it later*'). On this scale, FOK levels were classified into two levels in order to facilitate the analyses, namely low FOK (corresponding to 1, 2 or 3 points on the Likert) and high FOK (corresponding to 4,5 or 6 points on the Likert). Results of Levene's test of equality of variances met the homogeneity assumption, *(p* = .70). There was not a significant main effect of cue-familiarity on subjects' FOK decisions, (*p* = .51). In general, participants rated high FOK for 73% of faces. For both half-face and whole-face groups, the mean FOK rate was 4.5 out of 6 which showed that both groups had

strong FOK judgements for the famous faces, also see Appendix D. Table 3.4. summarizes the mean number of faces as well as standard deviation values for FOK and familiarity of the faces across half-face and whole-face familiarity groups.

Table 3. 4

Mean number of correctly recognized faces (standard deviations) for FOK and familiarity levels across groups.

	Half-face familiarity group (n = 15)	Whole-face familiarity group (n = 15)
Faces that were rated as	M (SD)	M (SD)
'not familiar' and rated with low FOK	10.93 (6.52)	8.53 (5.58)
'not familiar' but rated with high FOK	1.33 (1.50)	.60 (.99)
'highly familiar' but rated with low FOK	1.93 (1.75)	2.87 (2.17)
'highly familiar' and rated with high FOK	28.80 (6.92)	31.00 (6.33)

.

In regards to relation between FOK and face-naming, results showed that whole-face familiarity group made higher FOK judgments for the faces that were not named correctly (M = 8.67, SD = 4.70) compare to half-face familiarity group (M = 8.27, SD = 5.06; p = .83).

In terms of FOK and TOT state, results indicated that half-face group rated lower FOK for the faces that they did not experience TOT state (M = 12.27, SD = 7.13) compare to whole-face group (M = 10.80, SD = 6.29; p = .56).

A significant main effect of cue-familiarity levels was found on groups' reaction times of negative TOT for faces that they rated lower FOK. Specifically, TOT state decision was made significantly faster in whole-face group for the faces that were rated with lower FOK (M = 3275.18 ms, SD = 2017.08 ms) than half-face group (M = 5985.19 ms, SD = 2702.61 ms), $F(1,28) = 9.69$, $p = .00$, $\eta^2 = .26$.

FOK accuracy was measured for each participant and group by calculating Goodman-Kruskal gamma correlation and calibration scores separately. Both gamma and calibration coefficients are nonparametric correlation measures ranging from -1 to +1. For gamma correlation, the higher score points to better accuracy between groups whereas for calibration score, lower score indicates better accuracy of metacognitive judgment between groups. In the cue-familiarity level, for both half and whole face groups did not significantly differ in terms of their accuracy scores, ($p = .24$). Yet, results showed that whole face group was more accurate than half face group (see Table 3.5).

Table 3. 5

Gamma and calibration values for FOK judgments between half-face and whole-face groups under cue-familiarity condition

	Familiarity groups	M	SD	N
Gamma	Half-face familiarity	0.68	0.19	15
	Whole-face familiarity	0.78	0.20	15
	Total	0.73	0.20	30
Calibration	Half-face familiarity	0.36	0.10	15
	Whole-face familiarity	0.32	0.09	15
	Total	0.34	0.10	30

3.2.5. Face Recognition. MANOVA is conducted in order to investigate effect of cue-familiarity on face recognition performances of both half-face and whole-face groups. Furthermore, additional analyses were also conducted to understand if participants could recognize the faces that they could not correctly recall the name. Similar analyses were carried out to examine positive TOT state and subjects' face recognition abilities. Further, recognition performances were analyzed in terms of FOK ratings of groups.

Levene's test results met the homogeneity assumption, (p = .96). Results showed that cue-familiarity did not have a significant main effect on subjects' recognition performances, (p = .61). Nevertheless, whole face group could recognize 82.01% (36 of faces out of 43) of faces correctly. Similarly, half face group could correctly recognize 81.39% (35 faces out of 43) of the famous faces. Table 3.6.

summarizes cue-familiarity judgments and face-recognition performances between familiarity groups.

Table 3. 6

Mean values (standard deviations) of correct responses for familiarity levels and recognition across familiarity groups.

	Half-face familiarity group (n = 15)	Whole-face familiarity group (n = 15)
Faces that were rated as	M (SD)	M (SD)
'not familiar' and not recognized	5.47 (3.94)	4.53 (3.66)
'not familiar' but recognized	6.80 (3.93)	4.60 (3.98)
'highly familiar' but not recognized	2.53 (1.92)	3.20 (2.27)
'highly familiar' and recognized	28.20 (7.02)	30.67 (6.57)

There was no significant difference in face-naming and recognition performances between half-face and whole-face familiarity groups, (p = .20). In the case of relation between TOT state and recognition performances, MANOVA results indicated that there was no significant difference between half-face and whole-face familiarity groups, (p = .24).

In regards to FOK judgments and recognition performances, MANOVA results showed that there was no significant difference between half-face and whole-face familiarity groups, (p = .55, see AppendixD).

3.2.6. Summary of cue-familiarity results. Overall, results showed that seeing whole-faces increased participants' level of familiarity judgment. Whole-face

familiarity group made more 'highly familiar' judgments than half-face familiarity group. Similarly, whole-face familiarity group was better at face-naming and face-recognition. TOT state experiences and accurate FOK judgments were observed more in whole-face familiarity group than half-face familiarity group.

3.3. Target-Accessibility Results

A series of ANOVAs were carried out in order to examine effect of target-accessibility on participants' spontaneous famous face-naming, and recognition performances. In addition, analyses further proceeded to investigate the effect of retrieving partial information for the famous faces on evoking TOT state and FOK judgments. Results of the analyses were reported below in following order: groups' accessibility levels (amount of partial information retrieved) for the famous faces, spontaneous face-naming (recall) performances, TOT state ratings, FOK judgments, and face recognition scores.

3.3.1.Target-accessibility levels for the faces. In general, participants could retrieve partial information (e.g. occupationand where they know the famous faces) for 81.4% (35 faces out of 43) of the famous faces. The most correctly answered question was '*where do you know this person, e.g. TV, newspaper, theatre?*' (M = 34.53 out of 43). The second most correctly answered question was famous faces' importance of field (M = 33.63 out of 43). Finally, the third question which was '*can you bring any additional information different from answers you gave on question 1 and 2?*' was responded relatively weaker (M = 25.9 out of 43).

If participants could retrieve correct partial information for at least one question, it is accepted as '*high accessibility level'*. If they cannot retrieve any

information for the famous faces, it is accepted as '*no accessibility level'*. Herein after results related to accessibility levels will be reported accordingly.

ANOVA was conducted to examine the effect of face manipulation on accessibility levels of half-face and whole-face accessibility groups. Results of Levene's test of equality of variances satisfied the homogeneity assumption, (p = .54). Furthermore, there was a significant difference for subjects' partial-information-retrieval levels between half-face and whole-face accessibility groups, $F(1,28) = 8.95$, $p = .01$, $\eta^2 = .24$. Specifically, whole-face group was significantly more successful at retrieving partial information for 87% (M = 37 faces out of 43) of faces. On the other hand, half-face group could correctly retrieve information for 75.8% (M = 32 faces out of 43) of the faces.

3.3.2. Face Naming (Recall). MANOVA was conducted in order to examine the effect of face manipulation on participants' spontaneous face naming performances. Results of Levene's test met the assumption of homogeneity, (p = .54). Furthermore, results indicated significant difference for spontaneous face-naming performances between half-face and whole-face accessibility groups, $F(1,28) = 3.52$, $p < .05$, $\eta^2 = .11$. Specifically, whole-face accessibility group was significantly better at correctly naming the faces with 60.77% (26 faces out of 43) recall success compare to half face group whose recall success was 48.68% (21 faces out of 43).

MANOVA was conducted to investigate the effects of accessibility levels (low vs. high) on spontaneous face-naming performances across half-face and whole-face accessibility groups. The Levene's test satisfied the homogeneity assumption,

(p = .36). Furthermore, there was a main effect of accessibility levels on face-naming performances of the groups, $F(2,26) = 5.29$, $p = .01$, $\eta^2 = .29$. Specifically, whole-face accessibility group performed significantly better on spontaneous face-naming for the faces that they retrieved partial information (M = 26.07, SD = 6.36) compare to half-face accessibility group (M = 19.79, SD = 6.68), $F(1,28) = 6.72$, p = .01, $\eta^2 = .29$. In addition, half-face accessibility group had significantly more incorrect naming performances for the faces that they could not retrieve any partial information (M = 10.86, SD = 3.46) than whole-face accessibility group (M = 5.60, SD = 4.94), $F(1,28) = 10.87$, $p = .00$, $\eta^2 = .29$.

3.3.3. Tip-of-the-tongue state (TOTs) for Faces. In order investigate the effects of target-accessibility on evoking TOT states between whole-face accessibility and half-face accessibility groups, MANOVA was conducted. Results of Levene's test of equality of variances had not violated the homogeneity assumption, (p = .55). However, results did not indicate a significant main effect of face manipulation on evoking TOT state, (p = .20, see Appendix D).

Furthermore, MANOVA was conducted to analyze the effect of accessibility levels (no-accessibility vs. high-accessibility) on evoking TOT states across half-face and whole-face groups. Levene's test allowed us to satisfy homogeneity assumption (p = .3). Analysis revealed that accessibility levels had a significant effect on evoking TOT states, $F(9,20) = 3.38$, $p = .01$, $\eta^2 = .60$. Specifically, half-face accessibility group had more negative TOT states for the faces that they also did not retrieve any partial information (M = 10.27, SD = 3.96) than whole-face accessibility group (M = 5.40, SD = 4.94), $F(1,28) = 8.84$, $p = .01$, $\eta^2 = .24$.

In regards to relation between spontaneous face-naming and TOTs, MANOVA results showed that there was no main effect of accessibility levels on spontaneous face-naming and TOT ratings across accessibility groups, (p = .33, see Appendix D).

3.3.4. Feeling of knowing (FOK) judgments for faces. MANOVA was conducted to analyze the effect of face manipulation on FOK judgments (low vs high FOK) of accessibility groups. Levene's test met the homogeneity assumption, (p = .82). However, a main effect of face manipulation was not found on subjects' FOK decisions, (p = .61, see Appendix D).

In terms of accessibility levels (low vs high) and their effect on FOK ratings (low vs high), MANOVA was conducted which showed that accessibility levels had a main effect on FOK decisions between accessibility groups, $F(9,20) = 3.38$, p = .01, η^2 = .60. Specifically, half-face group significantly made lower FOK decisions for the faces that they could not retrieve any partial information (M= 9.20, SD = 3.69) compare to whole-face accessibility group (M = 5.40, SD = 5.04; $F(1,28) = 5.56$, p = .03, η^2 = .17).

In order to investigate the effects of face manipulation on spontaneous face-naming and FOK decisions across accessibility groups, MANOVA was conducted. Box's test satisfied homogeneity assumption, (p = .10). However, there was not a main effect of face manipulation on naming and FOK ratings between groups, (p = .70).

In order to examine the influence of accessibility levels on evoking TOT states while also considering subjects' FOK ratings, MANOVA was conducted.

There was not a significant main effect, (p = .56). Nevertheless, whole-face accessibility group made higher FOK judgments for the faces that they experienced TOT state (M = 29.93, SD = 7.72) than half-face accessibility group (M = 26.40, SD = 7.95 p = .23).

Similar to cue-familiarity condition, accuracy of FOK judgments under accessibility condition was calculated for each participant and groups by calculating Goodman-Kruskal gamma correlation and calibration scores. Both gamma correlation value and calibration scores are ranging from -1 to +1. According to gamma score, the group whose have higher gamma score, have better accuracy. Whereas for calibration score, the groups whose have lower calibration score, is more accurate than other group. In the light of these information, results revealed that whole face group made significantly more accurate FOK judgments regarding their future face recognition performance, according to their calibration score, F (1, 29) = 4.22, p < .05. Similarly, although the difference was not significant, participants who saw whole form of famous faces had higher gamma values compare to subjects in the half-face group (p = .19). Table 3.7 summarizes groups' mean results of both gamma and calibration scores.

Table 3. 7

Gamma and calibration scores for FOK judgments of whole-face and half-face groups under accessibility condition

	Groups	Mean	Standard Deviation	N
Gamma	Half-face accessibility group	0.71	0.20	15
	Whole-face accessibility group	0.81	0.19	15
	Total	0.76	0.20	30
Calibration	Half-face accessibility group	0.36	0.09	15
	Whole-face accessibility group	0.30	0.08	15
	Total	0.33	0.09	30

3.3.5. Face Recognition. A series of MANOVAs were carried out in order to assess the effect of accessibility levels (low vs high) and face manipulation (half vs whole) on participants' face recognition abilities. Levene's test met the homogeneity assumption, (p = .28). Furthermore, there was a main effect of face manipulation on participants' recognition performances, $F(3,26) = 2.97$, $p < .05$, $\eta^2 = .26$. Specifically, whole-face group was significantly faster in recognition phase (M = 6307.78 ms, SD = 1864.46) than half-face accessibility group, (M = 8733.65 ms, SD = 2630.27; $F(1,28) = 8.49$, $p = .01$, $\eta^2 = .23$). Moreover, whole-face group could correctly recognize 84.03% (36 faces out of 43) whereas half-face accessibility group could recognize 78.29% (34 faces out of 43).

MANOVA was conducted to examine the relation between accessibility levels (low vs high) and recognition performances between half-face and whole-face

accessibility groups. Results showed that whole-face accessibility group was significantly better at recognizing the faces that they could retrieve partial information (M = 33.93, SD = 7.25) than half-face accessibility group (M = 28.93, SD = 6.15; $F(1,28) = 4.15$, $p = .05$, $\eta^2 = .13$). In addition, half-face group was significantly better at recognizing the faces that they could not retrieve any information for (M = 4.87, SD = 1.89) than whole-face accessibility group (M = 3.20, SD = 3.82; $F(1,28) = 14.303$, $p = .00$, $\eta^2 = .34$).

To investigate the effects of face manipulation on recognition performances in relation to spontaneous face-naming, MANOVA was conducted. The results did not point to a significant effect, ($p = .11$). Furthermore, MANOVA was proceeded to understand the effect of face manipulation and accessibility levels on recognition responses while considering TOT ratings. Results did not show a significant difference between half-face and whole-face accessibility groups, ($p = .50$).

Finally, MANOVA was carried out to investigate the effects of accessibility levels on participants' recognition scores while also considering their FOK ratings for the famous faces. The results showed that manipulation applied on the famous faces had a significant effect on response times for recognition, $F(7,22) = 2.63$, $p = .04$, $\eta^2 = .46$. Specifically, whole-face accessibility group was significantly faster while responding at the recognition phase for the faces that they rated lower FOK (M = 5915.65 ms, SD = 2045.93) than half-face accessibility group (M = 10136.09 ms, SD = 4525.94; $F(1,28) = 10.83$, $p = .00$, $\eta^2 = .28$).

3.3.6. Summary of accessibility results. Overall, results demonstrated high accessibility level increased the likelihood of recalling names correctly, and making more accurate FOK judgments. Also, retrieving partial information regarding the

target faces improved the likelihood of correct recognition as well but that is the case if only faces were presented in whole-form. When participants saw whole-faces, they performed better on each phase of the task under accessibility condition. In terms of accuracy of FOK decisions, results revealed that whole-face accessibility group had more accurate FOK judgments about their future face recognition performance than half-face accessibility group.

3.4. General Results

Presenting faces in whole-form increased participants' ability to retrieve identity-specific partial information. In addition, whole-face group under accessibility condition, performed better on spontaneous face-naming and face-recognition phases. It was found that whole-face condition eased the process for making more accurate FOK judgments. Such differences were not found under familiarity condition for both whole-face and half-face groups. Finally, in terms of evoking TOT, we did not find significant difference between whole-face and half-face groups under both conditions.

.4.1. Face Naming (Recall): The whole-face group under target-accessibility condition (M = 26.13, SD = 6.51) had the highest successful naming scores compare to the whole-face familiarity (M = 23.60, SD = 7.32), the half-face accessibility (M = 20.93, SD =8.53), and the half-face familiarity (M = 21.60, SD = 6.15) groups. However, the difference was not significant, $F(3,59) = 1.587$, $p = .203$.

3.4.2. Tip-of-the-tongue state (TOT) for faces. The whole-face accessibility group (M = 30.93, SD = 6.81) rated TOT more than the whole-face familiarity (M = 29.13, SD = 7.29), the half-face accessibility (M = 27.07, SD = 8.08), and the half-face

familiarity (*M* = 26.40, *SD* = 7.34) groups. However, the difference was not significant, *F(*3,59) = 1.165, *p* = .331.

The whole-face accessibility group (*M* = 29.53, *SD* = 7.88) performed the best at recognizing the faces which were elicited TOT, than the whole-face familiarity (*M* = 28.1, *SD* = 7.62*)*, the half-face accessibility (*M* = 25.53, *SD* = 8.43*)*, and the half-face familiarity (*M* = 24.73, *SD* = 7.92*)* groups. However, the difference was not significant, *F(*3,59) =1.180, *p* = .326.

The half-face familiarity group (*M* = 10.27, *SD* = 5.46) performed better at recognizing faces which were not elicited TOT than the half-face accessibility (*M* = 8.13, *SD* = 4.58), the whole-face familiarity (*M* = 7.13, *SD* = 4.57), and the whole-face accessibility (*M* = 6.60, *SD* = 3.44), *F(*3,59) = 1.885, *p* = .143.

3.4.3. FOK judgments (FOK). The whole-face accessibility group (*M* = 33.13, *SD* = 7.32) had the highest FOK judgments for the famous faces compare to the whole-face familiarity (*M* = 31.60, *SD* = 6.30), the half-face accessibility (*M* = 30.13, *SD* = 6.97), and the half-face familiarity (*M* =30.13, *SD* = 7.15). However, the difference was not significant, *F(*3,59) = .639, *p* = .593.

The whole-face accessibility group (*M* = 36.13, *SD* = 5.89) was the most successful at recognizing the faces which were rated with high FOK compare to the whole-face familiarity (*M* = 35.27, *SD* = 4.91), the half-face accessibility (*M* = 33.67, *SD* = 5.25), and the half-face familiarity (*M* = 35, *SD* = 4.99). However, the difference was not significant, *F(*3,59) = .818, *p* = .489.

The half-face familiarity group (*M* = 7.20, *SD* = 4.60) was better at recognizing the faces which were rated with lower FOK compare to the half-face

accessibility (*M* = 6.13, *SD* = 3.34), the whole-face familiarity (*M* = 5.87, *SD* = 4.21), and the whole-face accessibility *(M* = 4.73, *SD* = 3.20) groups. However, the difference was not significant, *F(*3,69) = 1.023, *p* = .389.

3.4.4. Recognition of the famous faces: The whole-face accessibility group (*M* = 36.13, *SD* = 5.89) was the most successful at recognizing the faces than the whole-face familiarity (*M* = 35.27, *SD* = 4.91), the half-face accessibility (*M* = 33.67, *SD* = 5.25), and the half-face familiarity (*M* = 35, *SD* = 4.99). However, the difference was not significant, *F(*3,59) = .564, *p* = .641.

CHAPTER 4

DISCUSSION

4.1. Overview

The present study aimed to provide a comparison of TOT and FOK judgments given in the famous face-naming task. On account of this aim, the RJR paradigm (Hart, 1965) was adapted for a famous face-naming task in which the subject's spontaneous naming and recognition performances were analyzed as well as their TOT and FOK ratings. Two main hypotheses of inferential theory for FOK, namely cue-familiarity hypothesis (Schwartz & Metcalfe, 1992) and target-accessibility hypothesis (Koriat, 1993), were tested in a way that participants' familiarity judgments and amount of accessed identity-related information in response to famous faces (namely half-face vs whole-face conditions) were evaluated. Accuracy of FOK judgments were one of the main concerns of the present study which were calculated according to scores obtained from face-recognition phase. General results showed that there were positive correlations

between FOK, TOT, and face-recognition performances. In details, the whole-face accessibility group was significantly more accurate for FOK judgments. Moreover, the whole-face accessibility group significantly differentiated from other groups according to their spontaneous-naming, face-recognition, and FOK judgments. We observed that accessing identity-related information improved face-naming and face recognition performances. In the below sections we discussed our results under the related literature of FOK, TOT, and face recognition.

4.2. FOK Judgments During Face Recognition Task

We investigated the effects of cue-familiarity and target-accessibility hypotheses on the accuracy of FOK judgments during famous face-recognition. Hart (1965) claimed that the FOK is an accurate indicator of what is stored and not stored within the memory. In the present study, mean values of gamma and calibration scores were calculated for each group. Both gamma and calibration scores were consistent with the literature (e.g. Fleming & Lau 2014; Schwartz et al., 2016). These results pointed to a significant and robust resolution regarding FOK accuracy ofparticipants'' future memory performances. When people make FOK decisions regarding their future face-recognition performances, they have vigorous accuracy for their prospective memory judgment. The reason for such strong accuracy related to face recognition may rely on the methodology used to analyze the FOK accuracy. The FOK ratings were collected for all-items because in the literature it is found that all-item method provides better resolution than 'FOK ratings for only unrecalled items' method (e.g., Boduroglu et al., 2015; Schwartz et al., 2016). Since participants rated FOK on not only unrecalled items but also the faces which were correctly recalled, it can be articulated that retrieval of such semantic information might play role as cues. Accordingly, confident FOK judgments might derive from these cues.

Previous studies (e.g.Hosey et al., 2009) did not point to a difference between cue-familiarity and target-accessibility hypotheses in terms of FOK accuracy. They found that the given FOK ratings using familiarity and accessibility were equally accurate. On the other hand, Peynircioglu and Tekcan (2000) found that although FOK ratings are influenced by both cue familiarity and accessibility, accuracy of FOK is influenced solely by cue familiarity. Unlike previous findings, the present study showed that FOK accuracy is influenced by the amount of accessed identity-specific information for famous faces. We found that the whole-face accessibility group significantly differed from the half-face accessibility group in terms of FOK accuracy. This makes sense in a way that, remembering partial information about the person improves feeling of knowing decisions for future memory performance (Isingrini et al., 2016). When more partial information is retrieved, it becomes easier to make an inference about whether that unrecalled name exists in one's memory. Moreover, an advantage is found for whole-faces in terms of FOK accuracy. When subjects were presented the whole-faces, their FOK accuracy improved than subjects who saw half-faces. Therefore, it is possible to propose a conclusion regarding effects of holistic requirements during face processing on the FOK accuracy. Since the whole-faces as stimuli provided participants more information (e.g. eyes, nose, mouth can be seen), it is very likely that subjects felt more accurate about their future memory performance. As a result, the whole-face group had more accurate judgments compare to the other groups.

All in all, results provided three main conclusions regarding the FOK accuracy during face-recognition. It was hypothesized that the whole-face groups will make more accurate judgments than the half-face groups. The findings were consistent with our expectation. Firstly, it is found that the whole-face groups were

more accurate in their future memory performance. Secondly, retrieval of identity-related semantic information improved the FOK accuracy. Finally, overall vigorous accuracy of FOK can be explained with the FOK-rating-on-all-items method.

In terms of the magnitude of FOK, it was predicted that the whole-face group will have higher FOK judgment compare to the half-face groups. We did not find significant difference between whole-face and half-face groups under both conditions. Both whole-face and half-face groups under familiarity and accessibility conditions, did not differentiate from one another in terms of rating FOK. However, we found that accessibility levels had a main effect on subjects' FOK decisions. When subjects were presented half-faces, they could not retrieve identity-specific information which in turn influenced their FOK decisions negatively. It is very likely that the participants could not gather sufficient information to make prediction regarding future memory performance when they saw the half-faces. This further allowed us to conclude that access to partial information affected FOK decisions.

Previous studies (e.g. Bacon et al., 2018; Koriat, 1993) showed that accessibility has a predictive value on determining the magnitude of FOK judgments. In parallel with literature, it is found that accessibility of partial information played a crucial role in determining the bases of the FOK judgments. Moreover, it was contemplated that when the whole-faces were presented, subjects could retrieve more information which, in turn, allowed them to be more confident about their FOK decisions. On the other hand, the reason why familiarity ratings for the famous faces did not significantly influence the FOK magnitude can be further interpreted in a way that solely making familiarity judgments for the faces did not improve the process for making inferences about what is and is not stored in their memory. This is because, making such strong FOK decisions requires deep processing. These findings accord

with previous studies (e.g. Liu et al., 2007) which stated that higher FOK levels rely on accessibility of partial information rather than familiarity of the cue whereas lower FOK was affected by subjects' familiarity judgments regarding the items.

4.3. TOT States During Face Recognition Task

It was hypothesized that the likelihood of experiencing TOT will be higher in the whole-face groups than half-face groups under both conditions (namely, familiarity and accessibility). Our results did not support our hypothesis because we did not find significant difference between whole-face and half-face groups under neither familiarity nor accessibility conditions.

Both the half-face familiarity and the whole-face familiarity groups did not differentiate in rating TOT. It was expected that when subjects will give higher familiarity ratings, the likelihood of experiencing TOT will increase. This expectation was in line with the 'recognition threshold' notion proposed by Hart (1965). According to this notion, when a cue (e.g. face) is familiar enough to exceed the 'threshold', TOT state will be experienced. However, our results did not point to such relation between familiarity and TOT states. Therefore, we did not support the cue-familiarity hypothesis regarding TOT mechanism (Schwartz & Metcalfe, 1992). According to this hypothesis, when a cue is highly familiar to the subject, the likelihood of experiencing TOT increases. Unlike this assumption, our results did not point to such mechanism underlying TOT. Since we did not find any difference between whole-face and half-face groups' TOT ratings, it is possible to conclude that the insignificant result may derived from the reason that face manipulation did not affect subjects' TOT ratings.

Under accessibility condition, accessibility levels (high vs low) had a significant effect on subjects' TOT ratings. Particularly, it was found that when the half-faces were shown, subjects failed to retrieve partial information, and therefore they rated negative TOT more than the whole-face accessibility group. Cleary and Specker (2007) articulated that access to identity-specific information for the target faces lead eliciting TOT. Here we found a relation between negative TOT and lower accessibility. When participants, who saw the half-faces, could not retrieve any partial information, the likelihood of experiencing TOT decreased. However, accessibility did not improve the likelihood of experiencing TOT.

All in all, our results regarding TOT-states showed a main conclusion. We found that TOT ratings were not influenced by subjects' familiarity judgments for the faces. Accessibility levels did not influence TOT judgments either. These findings can be explained with psycholinguistic perspective. Unlike metacognitive approach, psycholinguistic view holds that we cannot explain the mechanism of TOT phenomenon by cue-familiarity or target-accessibility hypotheses. In fact, TOT experiences are products of a failure in speech production rather than memory-retrieval failure (Kathleen Oliver et al., 2019). In the present study, we did not observe significant effects of cue-familiarity and target-accessibility on the likelihood of experiencing TOT. It is possible that subjects could access the 'name' information, but due to failure in speech production they could not significantly differed in experiencing TOT.

4.4. '*I recognize your face but can't remember your name':* Relation between FOK, TOT, and Face Recognition

The well-known article by Yarmey (1973) entitled '*I recognize your face but cannot remember your name'* has been studied among metacognition and face recognition literatures frequently in order to investigate the underlying mechanism of incorrect face recognition and its relation with metacognition (e.g. Borghesani et al., 2019; Cleary & Specker, 2007; de Haan & Newcombe, 1991; Hosey, Peynircioğlu, & Rabinovitz, 2009; Schwartz et al., 2000; Schwedes & Wentura, 2019). Borghesani et al. (2019) investigated the role of anterior right temporal lobe in famous face recognition. Their prior aim was to find neural correlates of familiarity judgment and retrieval of partial information during famous face recognition. Cleary and Specker (2007) studied recognition without face identification phenomenon. They found that recognition without face identification is dependent upon TOT. Hosey et al., (2009) evaluated FOK in response to famous faces. They found supportive evidence for cue-familiarity hypothesis during face recognition task. However, they did not investigate the mechanism underlying processes during face-recognition. In the present study, while examining the mechanism of FOK, we also aimed to investigate holistic advantage during famous-face recognition. Particularly, the prevailing opinion for face processing accepts holistic face processing which claims that local regions of faces are integrated into holistic representation. However, there is an uncertainty regarding holistic processing. Developmental prosopagnosia patients performed normal during composite effect task (Le Grand et al., 2006; Susilo et al., 2010; Ulrich et al., 2017). Rossion (2013) showed that two identical top halves of a face are perceived as being different when their bottom halves belong to different faces. This indicated that the parts of a face cannot be perceived independently from the whole-

face (e.g, Murphy, Gray, & Cook, 2017). Moreover, while some studies showed evidence for the inversion effect on face recognition (e.g. Rossion, 2008; Yin, 1969); other studies (e.g. Murphy, Gray, & Cook, 2020) showed that both inverted and upright faces benefit from holistic face processing. Such inconsistencies highlighted the importance for investigating face processing with different methods. In the present study, we applied a different method on the famous faces by showing participants either half-upper-halves or whole-faces, which was similar to both composite effect (Young, Hellawell, & Hay, 1987) and 'part & whole' effect (Tanaka & Farah, 1993). Hosey et al., (2009) solely examined underlying mechanisms for FOK during semantic FOK and episodic FOK face recognition tasks. In the present paper, we further expanded their method.

It was hypothesized that target-accessibility but not cue-familiarity, will improve both face-naming and face-recognition performances. Also, whole-face advantage was expected for such performances. Our results pointed out that the whole-face accessibility group was significantly different from the half-face accessibility group in face-naming. They were more successful in spontaneously naming the faces. On the other hand, we did not find such significant difference between the whole-face and half-face groups under familiarity condition. Therefore, it is possible to conclude that while spontaneously naming famous faces, retrieving partial information improved the process. When participants could correctly recall the additional identity-specific information about the target faces, their naming performances improved. It appeared that accessibility enhances face-naming but if only the faces were presented in the whole-form. At this point, it is crucial to mention the role of holistic face processing because we found this difference for only the whole-face accessibility group. The holistic face processing states that faces are

processed as a whole rather than by their individual features (Tanaka & Farah, 1993). When the faces were presented as half-faces, subjects experienced difficulty in responding questions (e.g. what is the occupation of this person?, from where do you know this person?). Especially, in terms of face-naming, those subjects who were under the half-face accessibility group, could not recall the names correctly. These findings can be reflected in two possible explanations. First, such difference could occur because seeing half-faces was not sufficient to retrieve identity-related information. This is because, subjects failed to represent half-faces into a united whole and therefore, they could not retrieve information. Second, the strategy used while making FOK judgments could influence face-naming performances. If so, retrieving partial information, accessibility levels, have two different effects on face-naming abilities. Firstly, if the faces were shown in whole-version, accessibility facilitated the process of remembering the name correctly. On the other hand, if the faces were shown ashalf-faces , it became more difficult to remember the names of the faces. In both cases, we showed evidence for the role of accessibility (Koriat, 1993) and holistic advantage during face recognition (Richler, Cheung, & Gauthier, 2011).

In case of cue-familiarity condition, we did not find a significant effect of subjects' familiarity judgments for famous faces on their face-naming performances. Hosey et al., (2009) showed that during face recognition, familiarity of the cue increased and improved face-naming and face-recognition. According to their findings, when participants used familiarity strategy, the likelihood of experiencing FOK increased. However, we did not find any relation between familiarity and face-naming performances.

In addition to holistic processing for face recognition, previous studies showed that internal features of faces such as eyes or nose attract more attention while especially recognizing familiar faces correctly(Ellis et al., 1979). Similar to this finding, eye-tracking studies during the famous face naming task (e.g., Barton et al., 2006; Hsiao & Cottrell, 2008) showed that participants fixated more on the eye region while recognizing the faces. It seems that eyes are the most diagnostic feature in face recognition (Schyns et al., 2002). Accordingly, we showed half-faces which involves the eye-zone, to the participants during the semantic FOK task. However, our results did not support previous findings. If the eye region was sufficient to recognize the faces, then we would expect that there will be no difference between the half-face and the whole-face group. In addition, if presenting eye region was sufficient to evoke TOT states and accurate FOK decisions, there will be no difference between half-face and whole-face groups. On the contrary, our results showed a disadvantage for half-face groups. They had difficulties while retrieving person-specific information and recognizing correctly. To some certain amounts they could reach partial information and make familiarity judgments. Furthermore, they experienced TOT state more often than half-face groups. In terms of FOK judgments, we found that whole-face groups had higher FOK decisions compare to half-face group. When subjects saw the whole-faces, the likelihood of experiencing FOK increased. All in all, such advantage for whole-faces pointed to a specific conclusion. Previous studies (e.g. Hisao & Cottrell, 2008) showed that the eye-region is the most important area while successful face-recognition. However, we found that seeing solely the eye region is not sufficient for us to recognize that face. In fact, we are successful at face-recognition when the eyes were shown in whole-faces.

In terms of theoretical approach, our results about face-naming favored face recognition models (e.g. Bruce & Young, 1986; Burton & Bruce, 1992). According to the model, firstly familiarity judgment is made at PINs (person identity nodes); than access to semantic knowledge (e.g. occupation and nationality) occurs which is hold at SIUs (semantic information units). Retrieval of the name is the final stage of this process, according to the IAC (interactive activation and competition) model (e.g. Burton & Bruce, 1992). We found that for both accessibility and familiarity conditions, presenting whole-faces leads to an advantage in spontaneous face-naming. However, specifically retrieving person-specific information facilitated name recall. This is in line with the proposition that the name retrieval is the final stage of face recognition, according to the IAC model. As Brédart et al. (1995) stated, accessing semantic information is easier and faster than accessing the names. This can be explained in a way that semantic information such as occupation of the person, is common information and connected to other codes. However, names are novel and unique to the person. In the present study, the results showed that when participants could retrieve information about the whole-faces, their face-naming performance was significantly better than when they see half-faces.

Finally, in terms of recognizing the names on the forced-choice, our results showed consistency about the whole-face accessibility advantage. Our results showed that familiarity judgments of subjects did not affect their face-recognition performances. Similarly, we did not find a significant relation between FOK and face-recognition between whole-face and half-face groups under familiarity condition. On oppose to these findings, our results showed that face-recognition performances were influenced by the amount of partial information retrieved. Particularly, the whole-face accessibility group was significantly differen from the

half-face accessibility group in face-recognition. When subjects could retrieve identity-specific information, their recognition performance was better. Furthermore, when the half-face accessibility group cannot retrieve any partial information, their correct recognition performance was significantly better than the whole-face accessibility group. This may be because that when subjects saw half-faces, they were not provided much facial information. Because of lacking in facial information, they could not remember identity-specific information. However, when they were forced to choose correct name out of 4 options, their performance was significantly improved. They might use the options as cues to remember the person. It is likely that they imagined every option, when they have a match in their mind between the target face and correct name on the option list, they could recognize the faces. As a result, their face-recognition performance is enhanced.

In terms of FOK, TOT, and face-recognition, we did not find significant differences between whole-face and half-face groups under both familiarity and accessibility conditions. The effects of high FOK judgments on correct face-recognition performances were not significant in either group. Similarly, influence of experiencing TOT did not significantly affect subjects' face-recognition performances. Hart (1965) stated that FOK judgments are relatively accurate indicators of what is and is not stored within memory (see also Fleming & Lau, 2014). When we analyzed the accuracy of FOK judgments, we found a significant difference between the whole-face accessibility and the half-face accessibility groups. Results demonstrated that the whole-face group was significantly more accurate in making FOK decisions compared to half-face group under accessibility condition. When they rated as 'yes, I will definitely recognize the face in future', they could recognize the faces. Therefore, we showed that participants are accurate

about their future memory performance. This, in turn favored Hart's idea of that FOK is an important indicator of what is and is not stored within memory. Yet, we did not find such significant results for the FOK accuracy of familiarity groups. The whole-face and half-face familiarity groups did not show a difference in terms of FOK accuracy. As a result, we concluded that FOK accuracy is affected by accessibility. Moreover, this influence is seen when the participants saw the whole-faces. This, in turn, showed the holistic advantage in FOK accuracy.

To sum up, unlikeHosey et al. (2009), we showed that there was a dissociation between cue-familiarity and target-accessibility hypotheses in the accuracy of FOK decisions during famous face-recognition. We can further conclude that retrieval of person-identity specific information lead to more accurate FOK judgments as well as correct face-recognition performances which supports the target-accessibility hypothesis proposed by Koriat (1993). We found that retrieving identity-related information increases the accuracy of FOK judgments. On the other hand, we did not find any proof for cue-familiarity hypothesis during face-recognition. The retrieval of partial information enhanced FOK decisions which allow us to make accurate judgments for future recognition performances.

4.5. Conclusion

All in all, the findings of the present study pointed a specific advantage for face recognition in relation with FOK judgments. Famous face recognition requires holistic face processing (e.g. Richler et al., 2011; Tanaka & Simonyi, 2016). Target-accessibility (Koriat, 1993) but not cue-familiarity (Schwartz & Metcalfe, 1992) plays a crucial role in successfully naming and recognizing a face as well as in making accurate FOK judgments.

4.6. Strength and Limitations of the Present Study

The present study contributed to the current FOK, TOT, and face recognition literature, by emphasizing the dominant role of accessibility which underlies FOK and TOT judgments on the amount of retrieved partial information during famous-face recognition. In terms of accuracy of metamemory evaluations, here we showed a significant dissociation between inferential hypotheses regarding the fundamentals of FOK judgments. Furthermore, findings associated with face processing contributed a valuable result for holistic requirements during face identification. However, there are limitations of the study. In the present study, there were two conditions, namely familiarity and accessibility. Therefore, we did not investigate the possibility of co-existence of both hypotheses while understanding FOK judgments in response to faces. Co-existence of these hypotheses claims that while investigating the bases of FOK, both familiarity and accessibility improve FOK decisions. The cue itself triggers subjective judgment for familiarity. Such familiarity judgment further initiates the retrieval of partial information. Therefore, Koriat and Levy-Sadot (2001) concluded that accessibility is mediated by familiarity judgment. Since we did not investigate the role of co-existence of hypotheses during face recognition, it can be accepted as a limitation of the study. Moreover, in the present study, we only compared whole-face and half-face conditions, and did not consider other effects, such as composite effect. The composite effect (Young et al., 1987) and parts/whole paradigm (Farah & Tanaka, 1993) can be further investigated by the semantic FOK task we used in the present study. The composite effect suggests we are more successful when horizontally divided face parts are aligned together than misaligned condition. In the parts/whole effect, we are better at recognizing someone when an isolated part (e.g. nose) is presented within the whole face than when it is presented

solely. Such effects can be further investigated. Furthermore, we did not find a significant difference between groups in ratings of TOT. This phenomenon can be further investigated with psycholinguistic perspective. Finally, in the present paper there were 4 groups, 15 participants in each group. This limitation can be seen as confounding for some of the insignificant results. Under familiarity condition we did not find much evidence for the role of holistic requirements of face recognition during semantic FOK task. Results showed that both whole-face and half-face under familiarity condition, performed similarly during the task. With a larger sample, it is likely that different results can be obtained.

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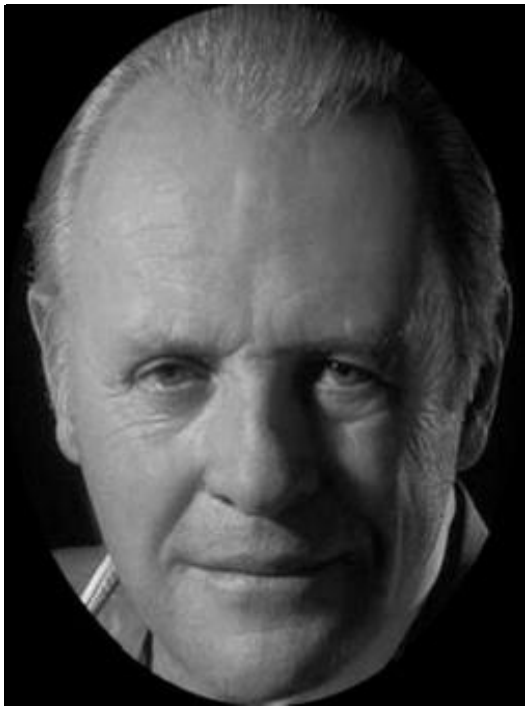
APPENDIX A

Sample Material of Half-Face and Full-Face Conditions for Both Recall and Recognition Phases



APPENDİX B

Sociodemographic Form

Cinsiyet: □ Kadın □ Erkek

Yaş:

Doğum Tarihi (G/A/Y):

Medeni Durum: □ Evli □ Bekar

Eğitim Durumu: □ Üniversite Öğrencisi

□ Üniversite Mezunu □ Yüksek Lisans Öğrencisi

□ Yüksek Lisans Mezunu □ Doktora

Renk Körlüğü: □ Var □ Yok

Gözlük Kullanıyor musunuz? □ Evet □ Hayır

Kullanıyorsa; BozukluğunTürü:

Derecesi**:**

El Tercihi: □ Sağ □ Sol □ Her ikisi

Geçirdiğiniz önemli bir nörolojik rahatsızlık var mı? (örneğin epilepsi, kafa travması, beyin kanaması gibi)

□Evet □Hayır

Varsa Açıklayınız:

……

Geçirdiğiniz önemli bir psikolojik/psikiyatrik rahatsızlık var mı? (örneğin depresyon, kaygı bozukluğu, fobi, obsesif-kompülsif bozukluk gibi)

□ Evet □ Hayır

Varsa açıklayınız:

……

Sürekli kullandığınız bir ilaç var mı?

□Evet □Hayır

Varsa Açıklayınız:

……

Ailenizde psikolojik ve/veya nörolojik rahatsızlığı olan var mı?

□ Evet □ Hayır

Varsa açıklayınız.

Anne:

Baba:

Kardeşler:

Diğer:

Notlar:

APPENDİX C

Bilgilendirilmiş Onam Formu

Araştırmanın Adı: Ünlü yüzleri isimlendirme ve bilme hissi arasındaki ilişkiler

Araştırmacı: Özlem Merve Cansever

Tez Danışmanı: Prof. Dr. Metehan Irak

Sayın Katılımcı,

Bu çalışma Bahçeşehir Üniversitesi İdari, İktisadi ve Sosyal Bilimler Fakültesi Psikoloji Bölümü öğretim üyesi Prof. Dr. Metehan Irak danışmanlığında, Bahçeşehir Üniversitesi Sosyal Bilimler Enstitüsü Bilişsel Nöropsikoloji yüksek lisans öğrencisi Özlem Merve Cansever tarafından yüksek lisans tezi kapsamında yürütülmektedir.

Katılacağınız araştırma bir psikoloji araştırmasıdır. Çalışmanın amacı üst biliş süreçlerinden bilme hissi ile tanıdık yüzlerin isimlendirilmesi arasındaki ilişkiye dair bilgi edinmektir. Tek aşamadan oluşan bu çalışmada, sizden deney başlangıcında belirtilen görevleri yerine getirmeniz beklenmektedir. Araştırma yaklaşık 20-30 dakika sürecektir.

Araştırmaya katılımınız karşılığında size herhangi bir ücret ödenmeyecektir. Araştırma sırasında herhangi bir nedenden ötürü kendinizi rahatsız hissederseniz, istediğiniz zaman araştırmayı sonlandırabilirsiniz.

Araştırma sırasında verilen bilgiler kesinlikle gizli tutulacaktır. İsminiz hiç kimseye verilmeyecektir. Araştırma verileriniz isminiz ile eşleşmeyecektir. Araştırma yayımlandığı takdirde kişisel veriler kesinlikle yayımlanmayacak, grup verileri katılımcıların isimleri verilmeden yayımlanacaktır.

Araştırma sonuçlarının, yüz tanıma ve isimlendirme ile bilme hissinin arasındaki ilişkilerin incelenmesine ve bu konuda cevap aranan sorulara katkı yapması beklenmektedir. Katılımınız, bu bilginin edinilmesi için oldukça değerlidir ve önem arz etmektedir.

Araştırma ile ilgili daha detaylı bilgi edinmek isterseniz Bahçeşehir Üniversitesi Bilişsel Nöropsikoloji Yüksek Lisans öğrencisi Özlem Merve Cansever (e-posta: ozlemmervecansever@hotmail.com) ile iletişime geçebilirsiniz.

Katılımınız için teşekkür ederiz.

Gönüllü olarak katılmayı kabul ettiğim ve imzaladığım bu onam formuyla birlikte:

1. Çalışmanın amacı ve içeriği hakkında bilgi aldım.

□ Evet □ Hayır

2. Araştırma ve uygulamalar ile ilgili tüm sorularıma yeterli yanıt aldım.

□ Evet □ Hayır

3. Elde edilen bulguların ne anlama geldiği konusunda ileride sorularım olursa bunlar hakkında gerekli bilgi alabileceğim bana bildirildi.

□ Evet □ Hayır

4. Araştırma kapsamında, hakkımda toplanan tüm bilgilerin gizli tutulacağı ve araştırma ekibi dışında hiç kimsenin ulaşamayacağı ve güvenli bir şekilde saklanacağı bana bildirildi.

□ Evet □ Hayır

5. Araştırma süresince herhangi bir nedenle kendimi rahat hissetmediğimde çalışmayı yarıda bırakabileceğim ve bu konuda herhangi bir yaptırıma maruz kalmayacağım bana bildirildi.

□ Evet □ Hayır

7. Araştırmada yapılacak harcamalar ile ilgili hiçbir sorumluluğum olmadığı ve bana da ödeme yapılmayacağı konusunda bilgilendirildim.

□ Evet □ Hayır

Bu çalışmaya katılmayı kabul ediyorum.

Katılımcı

Mail:

Tarih:

İmza:

APPENDIX D

Groups' means (standard deviations) of FOK, TOT, spontaneous face-naming, and face-recognition for the famous faces (N = 43).

		Groups			
		Half-face familiarity (n = 15)	Half-face accessibility (n = 15)	Whole-face familiarity (n = 15)	Whole-face accessibility (n = 15)
	Variables	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)
	Low FOK	12.87 (7.15)	12.87 (6.97)	11.40 (6.30)	9.87 (7.32)
	High FOK	30.13 (7.15)	30.13 (6.97)	31.60 (6.30)	33.13 (7.32)
	Positive TOT	26.40 (7.34)	27.07 (8.08)	29.13 (7.29)	15.93 (8.08)
	Negative TOT	16.60 (7.34)	30.93 (6.81)	13.87 (7.29)	12.07 (6.81)
Incorrect naming	Positive TOT	5.13 (3.58)	7.00 (4.49)	6.00 (4.39)	5.27 (3.22)
	Negative TOT	16.27 (7.31)	15.07 (7.52)	13.40 (7.16)	11.60 (6.58)
High FOK	Correct recognition	27.80 (7.63)	27.53 (7.76)	29.40 (6.89)	31.40 (8.16)
	Incorrect recognition	2.33 (1.50)	2.60 (1.96)	2.20 (2.01)	1.73 (1.62)
Low FOK	Correct recognition	7.20 (4.60)	6.13 (3.34)	5.87 (4.21)	4.73 (3.20)
	Incorrect recognition	5.67 (4.29)	6.73 (4.50)	5.53 (4.16)	5.13 (4.78)