Face recognition

Face recognition are processes involved in recognition of faces. Explanations of face recognition include feature analysis versus holistic forms. Remembering and recognising faces are an important skill one applies each day of their lives. It is important to the social interactions, to work and school activities, and in peoples personal family lives. Although most of the research in this area has been undertaken on ‘ faces’ it is in fact rare in real life that we need to identify someone from their face alone. Information from a person’s clothes, voice, mannerisms etc, and the context in which we encounter them all help in the identification process Sometimes we fail to recognise someone because they are not wearing the clothes we normally see them in or because they are in an unexpected context.

Holistic form theory is an unconventional to feature analysis approach to face recognition. Although features are important in describing faces and therefore do have some role to play in face recognition, dependence only on bottom – up processing for such a complex activity is very unlikely. Bruce and Young (1986) proposed a top – down approach to face recognition in which they argued that recognising a face is a highly complex process involving stored knowledge of semantic and emotional information and is therefore much more than adding together the sum total of a face’s features. According to the Holistic approach a face is recognised as a whole, analysing not just the separate features but also the configuration of the face, the relationship between the individual features, feelings aroused by the face and semantic information about the face. Such an approach is sometimes referred to as a template model (Ellis 1975) whereby we have a stored template or pattern for each person as we know and when presented with a

face try to match this stimulus to our mental template. Several studies illustrate how recognition depends on the layout or configuration of the face as a whole.

Young and Hay (1986) demonstrated the importance of configurable processing of faces. They cut pictures of famous faces horizontally and ensured the participants could recognise the two separate halves. Then they combined two separate halves together and measured time taken to and accuracy of, naming the top and bottom halves of the composite figures. This proved very difficult for participants as the composite seemed to produce a new holistic face in which it was difficult to perceive the separate halves. A particularly intriguing find was that if the composite faces were inverted participants could name the to half much better than when the faces were the correct way up, despite the fact that inverted faces are normally much harder to recognise.

Similar research involves disrupting the configuration of the faces in other ways, either by scrambling the facial features or by inverting the face.

Haig (1984) showed how recognition times increased for faces of famous people where the spacing between features or the configuration of features had been altered. Yin (1969) found that inverted faces are much harder to recognise. Although errors are found when attempting to recognise any object that has been inverted, faces seem to produce particular difficulties. Cohen (1989) suggests that this demonstrates that faces “ are normally recognised holistically, and inversion destroys the global pattern

relationships between features.” Thus, such findings could be interpreted as evidence for the holistic approach to face recognition. Mohammad

A consensus has developed that the process underlying face identification (meaning the process by which a person recognizes a visual stimulus as being “ Aunt Bertha,” “ my mail carrier,” or “ Arnold Schwarzenegger”) and the process underlying most forms of basic-level object recognition

(Meaning the process by which a person recognizes a visual stimulus as being a “ table,” a “ boat,” or a “ human face”) are different. A number of lines of evidence showing dissociations between face identification and basic-level object recognition support this conclusion. For example,

faces are more difficult to identify in photographic negatives than are basic-level objects (Bruce & Langton, 1994; Galper, 1970; Galper & Hochberg, 1971; Phillips, 1972), and faces

show greater recognition costs when turned upside down than do basic-level objects (Carey & Diamond, 1977; Scapinello & Yarmey, 1970; Yin, 1969; see Valentine, 1988, for a review).

Additional evidence that face identification and basic level object recognition are accomplished by different processes comes from work in neuroscience. Sergent, Ohta,

and MacDonald (1992), using positron emission tomography (PET), found regions of the right hemisphere that become active during face identification that are not active during basic-level object recognition. Further, a righthemisphere advantage for identifying faces is well documented (for

reviews, see Davidoff, 1982; H. D. Ellis, 1983), whereas the evidence for hemispheric specialization during basic-level object recognition is far less clear, with some studies finding a left-hemisphere advantage (Bryden &

Rainey, 1963; McKeever & Jackson, 1979; Wyke & Ettlinger, 1961; Young, Bion, & Ellis, 1980), others finding aright-hemisphere advantage (Schmuller & Goodman, 1980), and still others finding no advantage for one hemisphere over the other (Biederman & Cooper, 1991; Kimura & Durnford, 1974; Levine & Banich, 1982). Perhaps the most persuasive evidence that basic-level object recognition and

face identification are accomplished by different processes comes from studies of brain-damaged patients showing a neurological double dissociation between the two processes. Farah (1994) found 27 cases in the literature in which patient showed impaired face identification but intact basiclevel object recognition and 16 cases in which a patient showed impaired basic-level object recognition but intact face identification, arguing strongly that different neural subtract underline with two tasks Given that face identification and basic-level object recognition occur through different processes, the next logical question to consider is how the memory representations used for the two processes might differ. The most

common speculation in the current literature is that faces use configured or holistic representations, whereas basic-level objects use featural representations. Unfortunately, this method of characterizing the differences in the representations is rather vague, and as O’Toole, Abdi, Deffenbacher,

and Valentin (1995) and Bruce and Humphreys (1994) pointed out, it has different meanings for different researchers. When researchers say that face identification uses

Further support for a holistic model of face recognition comes from studies investigating the superiority of recognition over recall. People have been found to be consistently better at recognising faces seen before than they are at recalling them.

A study by Ellis et al (1975) illustrates the difficulties involved in recalling faces. Participants were shown six photographs of male faces for ten seconds and then asked them immediately to recall the face so that it could be reconstructed using photo fit materials. When judges attempted to pick out the target face from the photo fit reconstruction's only an average of 12. 5% identifications were correct indicating that the reconstructed faces did not closely resemble the original stimulus face. It seems that in order to describe a face we need to convert our stored mental representations of that face into words. The fact that this seems to be so difficult and so ineffective as illustrated in this study would indicate that we do store faces as wholes rather than as sets of separate features.

According to Bruce and Young's Holistic model of face recognition there are different types of information that can be obtained from faces, some of which are used for familiar faces and others for unfamiliar faces. When firstly we see a face it is encoded structurally, meaning that we encode the visual information, processing the look of the face. If this matches an existing face recognition unit (FRU) then this will be activated. The FRU contains not just

physical information but also semantic knowledge. Activation of the FRU triggers activation of the person identity node which enables access to a wealth of information about the person including their occupation, interests, where we normally encounter them, whether we are comfortable with them or not, whether we have friends in common or not. The final stage in the recognition process allows for name generation. According to Bruce and Young names are stored separately to the FRU and person identity nodes but can only be accessed via the identity nodes. This would explain the frustrating and embarrassing experience of knowing lots of details about a person we meet but not being able to think of their name.

Young, Hay and Ellis tested the Holistic model in 1985. They asked participants to keep a diary and record problems experienced in face recognition every day. Out of 1008 incidents there were no reports of naming an individual without knowing other information about them. But in 190 cases the opposite occurred, participants reported knowing information about individuals but could not name them. These findings are consistent with the sequence of events proposed by the holistic model where by names can only be accessed if semantic information been accessed first. Further analysis of the diary data showed that of the 1008 incidents there were 233 reports of experiencing familiarity without any personal information being available. Again this supports the sequential nature of the model as these would be cases where an FRU has been triggered causing the feeling of familiarity, but the identity Node has failed to activate, hence the lack of availability of any further information about the person.

Holistic form theory is an alternative to feature analysis approach to face recognition. Although features are important in describing faces and therefore do have some role to play in face recognition, reliance only on bottom – up processing for such a complex activity is very unlikely. According to the Holistic approach a face is recognised as a whole, analysing not just the separate features but also the configuration of the face, the relationship between the individual features, feelings aroused by the face and semantic information about the face.

There is also another theory called feature analysis theory which is an example of a bottom – up theory in which it is suggested that analysis if individual facial features plays a crucial role in face recognition.