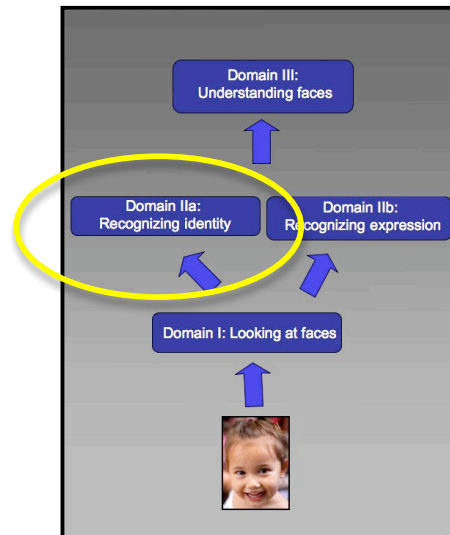


## Domain IIa Recognition of Facial Identity



In Domain I, faces are differentiated from other competing objects in the visual environment. This is the necessary first step of facial processing. However, once we attend to a face, it is important for us to identify to whom that face belongs. In Domain II, specific information about the face stimulus is derived regarding its identity and its expression.

### Identity

Our ability to recognize facial identity is remarkable. In a blink of an eye, we are able to know an individual's gender, race, and identity. Within a few hours of birth, infants show a preference for their mother's face as compared to the face of strangers<sup>(7, 47)</sup>. Thus, at a very early point in development, neonates can make within-category discriminations with respect to facial identity (e.g., this face belongs to a unique individual). By the age of six, typically developing children have extended their abilities to the recognition of faces which were unfamiliar before the testing situation and by the age of twelve, their face processing skills approach adult levels<sup>(9)</sup>.



#### Did You Know?

Newborns are able to determine that a face belongs to a unique individual and by age 6, typically developing children are able to recognize faces that were previously unfamiliar to them. However, children with autism may have difficulty recognizing the face of familiar individuals.

### Facial Identity Recognition and Autism

Recognition of identity appears to be compromised in individuals with ASD. Compared to typically developing individuals, individuals with ASD have difficulty distinguishing differences between faces<sup>(4, 60, 63)</sup> and recognizing the face of familiar individuals<sup>(5, 6, 21, 24)</sup>. These deficits are face-specific, as individuals with ASD are able to distinguish the identity of other non-face objects, such as cars and houses<sup>(38)</sup>.

### Inversion Studies

Inversion studies suggest ASD and typically developing populations have different strategies for facial identity recognition. Virtually all visual stimuli are more difficult to recognize upside-down than right side up. Yin<sup>(67)</sup> showed that when inverted, recognition of faces is differentially impaired relative to the recognition of non-face objects (e.g., airplanes, houses). It was suggested that the inversion of a face challenges the specific strategy we use to process faces. For example, inversion challenges a *configural* (holistic) strategy, where the processing of the spatial arrangement of features is more important than the features themselves (see Figure 1). Object recognition, on the other hand, employs a *featural* approach, which is more concerned with the individual parts of an object. Featural processing is less vulnerable to inversion effects presumably because the isolated parts are more important for recognition. When viewing an inverted face, the entire configuration of features must be mentally reorganized before the face is recognized.



*Figure 4. The Thatcher Effect.* This illusion illustrates the difficulty to detect local feature changes in an inverted face. The inversion of a face challenges our configural strategy of processing facial features (e.g. the spatial arrangement of facial features).

Hobson and colleagues<sup>(26)</sup> explored these facial processing paths in adolescents with autism. They asked ASD and non-ASD adolescents to recognize expression and identity in upright and inverted photographed faces. Although the autism group, like the

control group, had difficulty matching inverted faces according to facial expression, the autistic group was *superior* in matching inverted faces according to identity. These findings suggest that individuals with autism do not adopt a configural strategy when recognizing faces, but rely on a more object-based, featural approach. Hence, the cognitive operations that distinguish faces from objects in normal populations may not be as clear-cut for individuals with autism.

### **Part Face Task**

Other evidence indicates that the facial features individuals with autism use to pinpoint identity are different from the features used by neurotypical individuals. Furthermore, these perceptual strategies may not be optimal for face recognition. Langdell<sup>(34)</sup> asked children with autism and control participants to recognize the photographed faces of their peers presented in either full view or partially masked conditions. In the masked condition, the control children relied more on the eye features whereas children with autism recognized faces primarily by the mouth. In another study, both children with autism and control participants demonstrated evidence for holistic face recognition in that all of the children recognized a face part better when it was presented in the whole face than when it was presented in isolation<sup>(29)</sup>. However, the control children showed the largest holistic gains for eye features (e.g. eyes were better recognized in the whole face than in isolation) whereas the ASD children showed the greatest holistic gains for mouth features (e.g. mouths were better recognized in the whole face than in isolation). In addition investigations of eye movements revealed that children with autism perform more visual saccades and spend longer fixation times looking at the mouth of a face as opposed to the eyes (see Figure 5)<sup>(33, 49, 66)</sup>. These results suggest that individuals with autism have modified or even contrasting strategies for facial identity recognition.



Figure 5. Klin, Jones, Schultz, Volkmar, and Cohen <sup>(33)</sup> show that a viewer with ASD and a typically developing viewer of the film "Who's Afraid of Virginia Woolf?" focus their attention on different areas of the face. While the individual with ASD spends more time looking at the mouths of people in the film, a neurotypical individual focuses on the eye region.

### Quick Summary!



Neurotypical individuals use a configural approach to process faces. This approach focuses on the face as a whole (e.g. position of the eyes in relation to the nose and mouth), so when inverted, this configuration becomes altered and impairs their processing strategy. However, individuals with autism typically employ a featural approach to face processing, (e.g. focusing on the eyes, mouth, and nose in isolation) and are consequently, less affected by the changes in configuration that occur in an inverted face. Studies suggest that the strategies typically developing populations use to distinguish faces from objects in everyday life may not be the same as those used by individuals with autism.