Object recognition is often quite good even under conditions of incomplete visual information (e.g., when portions of the objects are deleted or occluded from view). Nonetheless, people are confused about the way they actually saw objects, often reporting that incomplete objects were seen as complete. In this chapter, we focus on the basis of this confusion, using new research on face identification as a case in point. This line of research points to the activation of imaginal filling-in processes, a form of closure, as a mediating mechanism for object recognition under conditions of partial viewing. Implications of this line of research for theories about developmental differences in face identification and for approaches to the assessment of eyewitness identification are considered.

On many occasions, the perception of an object is incomplete because portions of the object are occluded. Whether attempting to read a sign partially occluded by the branches of a tree, or to find a friend in a busy train station, people are able to accomplish their goals remarkably well. Similarly, catching glimpses of perpetrators dashing from the scene of accidents or crimes often involves viewing conditions that are visually incomplete. In these instances, face identification can be difficult, particularly when deliberate attempts are
made by the perpetrators to disguise themselves. How are people able to identify objects or faces under conditions of incomplete visual information?

Several explanations suggest mechanisms for how these identification processes might be accomplished (e.g., Bruce & Humphreys, 1994; Snodgrass & Feenan, 1990), but one of particular interest to us invokes the activation of closure processes. From this point of view, people are described as filling in missing visual information in their mind’s eye, closing missing lines to render visually incomplete forms as complete (Gollin, 1962; Hearst, 1991; Leeper, 1935; Murray & Kennison, 1989; Ramachandran, 1992; Snodgrass & Feenan, 1990; Snodgrass & Surprenant, 1989). In picture-fragmentation tasks, for example, when people are shown a series of pictures of incomplete objects that are made increasingly complete, they are able to identify these objects before the final, complete version is presented (e.g., Gollin, 1962; Snodgrass & Feenan, 1990). Similarly, in priming tasks, incomplete pictures of objects, including those created by occlusion, are effective for priming the targets (Sekuler & Palmer, 1992; Sekuler, Palmer, & Flynn, 1994). Performance on both picture-fragmentation and priming tasks of this sort is thought to be mediated by filling-in closure processes (Sekuler et al., 1994; Snodgrass & Feenan, 1990).

**IMPLICIT IMAGINAL PROCESSING: ANY EVIDENCE?**

But is there any direct evidence suggesting that what mediates such performance here is some sort of imaginal filling-in process? Studies of source monitoring do suggest that information about imaginal processing is represented in memories and serves as a cue for source-monitoring judgments. For example, when orienting tasks involve explicit requests to generate images of objects presented as pictures or words, both adults and children are quite good at remembering the way in which the information was originally presented (Foley, Durso, Wilder, & Friedman, 1991). They experience little confusion when asked to remember whether an item had been previously presented as a picture or a word (Foley et al., 1991). According to the source-monitoring framework, cognitive operations that accompanied the deliberate creation of the images in response to the presentation of words are represented in memories for the words. Later, these cues help people distinguish between pictures and words. Evidence for the role of these kinds of operations in source monitoring is also observed in contexts involving anagram solving and word-association tasks (e.g., Johnson, Hashtroudi, & Lindsay, 1993; Johnson, Raye, Foley, & Foley, 1981).

More important for present purposes, studies of source monitoring also suggest that implicit imaginal processing occurs under some viewing conditions, and its occurrence leads to subsequent memory confusions. When asked to describe the function of objects presented as pictures or words, for example, adults and children subsequently report that they had seen pictures of objects when the items had actually been presented as words (Foley et al., 1991). This increase in confusion after describing the function of objects leads to a reduction in source-monitoring performance relative to situations in which orienting tasks involve explicit requests to generate images. On average, performance is 70% versus 90% for the two kinds of orienting tasks, respectively. This reduction in performance is interpreted as evidence that words automatically elicited images of the objects to which they referred in the function condition, and these images were later misremembered as presented pictures (Durso & Johnson, 1980; Foley et al., 1991). In these cases, imaginal activations occurred in the absence of pictorial referents. Indeed, the results of a number of studies of source monitoring support the conclusion that a mental image may be mistaken for a perception, particularly when the image is elicited in a relatively automatic fashion (e.g., Finke, Johnson, & Shyi, 1988; Johnson, 1991, in press; Johnson, Foley, & Leach, 1988; Johnson, Foley, Suengas, & Raye, 1988; Johnson et al., 1993; Johnson, Raye, Foley, & Kim, 1982; Kimer, Foley, & Quiros, 1996; Markham & Hynes, 1993).

**IMPLICIT IMAGINAL PROCESSING: A MECHANISM FOR CLOSURE?**

If implicit imaginal processing is evoked in the absence of pictorial referents, it might also be expected to occur in response to the presence of incomplete pictorial information. In the presence of incomplete visual information, people may fill in the information that is missing from incomplete pictures, seeing completed images in their mind’s eye. This line of reasoning leads to a specific prediction about the direction of source monitoring errors. If people are filling in missing visual information, then, when later asked to report how they had seen pictures originally, they should be likely to report that incomplete pictures were presented as complete rather than the reverse.

In a new series of studies, we tested this possibility by using a variation of a source-monitoring task to index potential confusion (Foley, Foley, Durso, & Smith, 1997). In all of our studies in this series, participants experienced two kinds of visual information, that is, pictures of readily identifiable objects presented either in complete or incomplete form. After responding to these pictures (e.g., describing the functions of objects portrayed in the pictures), people were surprised by requests to report on the way in which they experienced the pictures originally (either in complete or incomplete form). Indeed, when we asked participants to remember the way in which they saw pictures initially, they experienced confusion, claiming incomplete pictures
were presented as complete, rather than the reverse (Foley et al., 1997). This bias to report complete is robust, observed across a range of visual materials (e.g., visually simple and visually complex pictures) and orienting tasks (e.g., describing objects’ functions, rating faces for their distinctiveness, rating faces for their resemblance to familiar persons).

In our initial studies, incomplete pictures were created explicitly by deleting the left or right half of the pictures. We wondered whether a similar bias would be observed when incomplete pictorial information was created more naturally, by occluding objects by other objects. We considered this question in the context of search tasks. Adult participants were asked to locate pictures of objects embedded in complex scenes. Whether asked to search for several pictures embedded in one complex scene (Foley et al., 1997) or to search for pictures of objects, each embedded in a different scene (Foley, Korenman, & Foley, 1998), adults were more likely to claim they experienced the incomplete pictures as complete rather than the reverse when locating them in the scenes. Thus, in these hidden-picture tasks, people seem to look beyond the occluding objects in the scenes, representing the targets as visually complete.

We have eliminated several alternative explanations for this bias to claim incomplete pictures were presented as complete, showing that the bias is not simply an index of poor memory. That is, recognition was comparable and generally good for both complete and incomplete pictures. A number of other findings weaken the persuasiveness of the second alternative that the bias is an expression of a more general response bias to say complete. First, the bias was only evident when pictorial renderings of familiar objects looked like the kinds of renderings we typically experience for these referents (Snodgrass & Vanderwart, 1980). Furthermore, the bias was not observed when people mistakenly claimed a new picture was one they saw before, nor when a naming task preceded the source-monitoring test (Foley et al., 1997). Finally, and perhaps most important, the bias to report complete was not more pronounced when test items were all completed pictures. In all of the studies reported in our first series, the test items were presented as words. But, in a new study, after seeing pictures of complete and incomplete pictures, during test the participants were shown pictures, all of which were complete in form. The bias to report complete was comparable in magnitude to that reported previously (Foley, Foley, & Smith, 1998).

In sum, the evidence from our first series of studies is strong in its suggestion that implicit imaginal processing occurs in response to the presentation of incomplete pictorial information, with people filling in missing information in thought. And, this occurrence subsequently leads people to mistakenly claim they saw complete pictorial information when, in fact, they did not.

3. A STUDY OF FACE IDENTIFICATION

FACE IDENTIFICATION:
ARE PEOPLE LOOKING BEYOND DISGUISES?

Findings in the face identification literature suggest that similar filling-in processes might also be at work when people view incomplete pictures of faces. In priming tasks, for example, partial photographs of unfamiliar faces are effective primes whether the portions deleted are internal or external portions of the faces (Brunas, Young, & Ellis, 1990). These priming effects suggest that the incomplete pictures of faces may activate more complete representations for the faces (e.g., Brunas et al., 1990; Sekuler et al., 1994), leading us to expect that people might claim incomplete pictures of faces were presented complete in form.

To test this idea, we showed undergraduates photographs of faces of men and women (Foley et al., 1997). All of the faces were presented from the frontal perspective, but half were incomplete in form. Incomplete photographs were created by deleting the left or right half of the faces. Initially, participants made judgments about each face, indicating whether each was distinctive, had a distinctive feature, or resembled someone they knew. On a surprise source-monitoring task, participants were more likely to claim an incomplete face was originally viewed in its complete form, independent of the way in which the faces were processed originally, replicating our findings for pictures of objects. This bias suggests that people were completing incomplete faces in their mind’s eye during the encoding task, later misclassifying their memory for the completed image as a memory for a photograph (Foley et al., 1997). In this study of face identification, the removal of half of each of the faces was clearly intentional on the part of the experimenter. But what happens under more naturalistic viewing conditions? We are often asked to identify unfamiliar faces under conditions of partial viewing. We may catch a glimpse of what someone looks like as she dashes across our field of view, showing only one side of her face. Or we may be asked to help locate a guest speaker in a crowded airport, with many other faces and objects partially occluding our view. Of course, the guest speaker may also be bundled up with a warm hat, heavy scarf and sunglasses, concealing portions of his face.

The literature on face identification includes many variations of the study of incomplete visual information. For example, the effects on face identification of the deletion of facial features have clearly been identified by comparisons of consequences of removing internal (eyes, nose, and mouth) or external (hairline, chin) facial features (Brunas et al., 1990; Campbell, Walker, & Baron-Cohen, 1995). Similarly, the effects of the addition (or deletion) of features that might function as disguises (e.g., beards, eyeglasses, mustaches, hats) have also been studied. The addition or deletion of paraphernalia associated with faces such as hats, eyeglasses, and scarves as well as changes
in perspective detract from recognition performance (e.g., Bruce, 1982, 1988; Bruce & Humphreys, 1994; Bruce & Young, 1986; Ellis, 1992; Patterson & Baddeley, 1977), and the disruptive effects of these sorts of features are not comparable (e.g., McKelvie, 1993; Patterson & Baddeley, 1977; Terry, 1994). Further, the presence of full-face masking diminishes performance as well (e.g., Costen, Shepherd, Ellis, & Craw, 1994; Davies & Flin, 1984).

When explaining the ways in which adults recognize faces in these sorts of situations, investigators often invoke explanations based on holistic or configurational processing. Two versions of configurational processing are currently attracting the attention of such researchers, namely, first- and second-order configurational processing (e.g., Carey, 1992; Carey & Diamond, 1977, 1994; Chung & Thomson, 1995; Diamond & Carey, 1977; Rhodes & Tremewan, 1994; Tanaka & Farah, 1993). First-order configurational processing involves the abstraction of holistic or gestalt-like representations for faces (Carey, 1992; Tanaka & Farah, 1993). From this perspective, when faces are partially concealed by disguises, adults are thought to abstract holistic or gestalt-like representations. Second-order configurational processing is more precise in nature, suggesting that adults notice relationships among features that are relatively invariant (e.g., "large wide-set eyes for such a long narrow face," Diamond & Carey, 1986, p. 108). Some investigators have suggested that first-order and second-order configurational processes represent perceptually based and cognitively based encoding, respectively (Carey, 1992; Ellis, 1992), but the independent contributions of these two kinds of processes to face identification remain to be specified (e.g., Carey & Diamond, 1994; Chung & Thomson, 1995).

What intrigues us about explanations invoking configurational processing, however, is their suggestion that adults may look beyond surface features associated with faces. If adults are processing faces configurationally, it suggests that they are looking beyond disguises to see whole faces (or seeing relationships among features) partially covered by facial disguises. This looking beyond to see the shape of the face (or relations among its features) may well be mediated by closure processes. From our point of view, some facial features (e.g., beards, mustaches) or other features attached to faces (e.g., large floppy hats, scarves) represent a special group of occluders. We know that these kinds of occluders affect adults’ face identification, but we actually know very little about adults’ specific memory for the presence (or removal) of these occluders. Would adults remember the ways in which they originally saw faces (e.g., noticing the face now is complete? Noticing the face is disguised by a different set of features?) The bias to claim incomplete faces were presented as complete in form is at least consistent with the prediction that adults may not remember the exact way in which they experienced faces. If presented with a partially covered face the second time they see a picture,

3. A STUDY OF FACE IDENTIFICATION

In our new studies of the effects of disguise, adults saw unfamiliar computer-generated faces (Mac-a-Mug). The faces were presented in full frontal view or they were partially covered by disguises. After completing an orienting task in which participants estimated the extent to which each face was criminal looking, they were surprised by a source-monitoring test. At test, some faces were experienced in the same way as they were originally seen, but others were changed. Some faces that were presented in full view were partially concealed at test. Some faces that were partially concealed initially were uncovered at test. On the source-monitoring test, people were asked whether each test face was a face they had seen earlier in the session. When they reported that they had seen a face during the encoding phase, participants were asked whether the face looked the same or different from the way it had looked the first time they saw it. In the study we report here, if a face was disguised at encoding and at test, the specific occluders remained unchanged from encoding to test (e.g., the same eyeglasses were used at presentation and test).

If adults are looking beyond disguises, what kind of source-monitoring performance might we expect? If they initially see unfamiliar faces, some would they notice the change in presentation mode? The answers to these kinds of questions should inform our theories of face identification, but, equally important, they should also inform the ways in which we guide witnesses in the process of facial reconstructions for perpetrators. We are exploring these questions in a new series of studies on face identification, one of which we report in this chapter.

For the most part, when incomplete information is presented either during encoding or test (e.g., by deleting portions of faces), researchers are interested in the effects on recognition of these kinds of variations (Bruce & Humphreys, 1994; Faw, 1992; Hole, 1994; Shapiro & Penrod, 1986). In the context of traditional recognition paradigms, people report "yes" or "no" to indicate whether they think they saw a face before or not. In the context of forced-choice recognition paradigms, people choose among a few alternatives to indicate the face they saw previously (e.g., Faw, 1992; Matthews, 1978). When researchers go beyond simple questions of recognition to ask people for more precise information (e.g., "Does this face look the same or different as it did the first time you saw it?") face identification may improve (e.g., Pezdek & Chen, 1982; Reynolds & Pezdek, 1992). However, in the small number of studies that have asked people to make these kinds of precise judgments, often people see only the original set of faces, without new faces serving as distractors, making it difficult to interpret the basis for their performance.
disguised and some not, they should later be confused about the ways in which they originally experienced those faces. Furthermore, confusion should be greater for faces that were initially disguised, independent of the way the faces were presented at test. The logic underlying this prediction is that when presented with a disguised face initially, if adults look beyond the disguises, they should encode the face holistically. When later presented with an undisguised version of the face at test, presumably this face will resemble the memory representation for the original version that they saw. This resemblance could lead adults to report "the face looks the same as it did earlier," an incorrect response. This kind of error would reduce source-monitoring performance. Along similar lines, if presented with the same disguised face at test, if its memory representation does not include the disguise, adults should report "it looks different," an incorrect response, again leading to a reduction in source-monitoring performance. For undisguised faces, we would also expect some source-monitoring confusion, with people making mistakes about whether faces look the same or different. We know that recognition for photographs or composites of unfamiliar faces is not particularly good (e.g., Faw, 1992). Thus, we would not expect particularly good recognition of faces in this study, nor would we expect excellent source-monitoring performance. But because the representations for undisguised faces seen at test would resemble the original versions adults actually saw, there should be less confusion about the way in which undisguised faces were viewed initially, producing better source-monitoring scores for these types of faces. In contrast, if features serving as disguises are encoded as part of the memory representations for faces, then when participants see the same face twice, disguised in an identical manner, source monitoring should be quite good. The study we report in this chapter is a preliminary test of these possibilities.

Method

Participants. Forty-eight college-age adults attending Skidmore College participated in this study, each receiving credit toward the completion of course requirements for their introductory psychology classes.

Materials. Eighty composite faces were created using Mac-a-Mug Pro software. The composite faces were created in various ways, combining six kinds of facial features (eyes, nose, chin, mouth, hair, and ears) along with nonfacial features (mustaches, beards, glasses, and hats). Except for repeating the use of a few of the noses and ears available in the software package, the facial features selected were unique to each composite face. For each composite face, two versions were constructed, that is, full view (undisguised) or partially concealed by secondary facial features (e.g., moustache, beard) and/or nonfacial features (e.g., eyeglasses, hats). Partially concealed versions were disguised by either one or two features. Examples are shown in Fig. 3.1.

Forty of the 80 composite faces, along with 4 practice items, were included in the first part of the session. All 40 composite faces were presented from the frontal perspective, but half were partially concealed by facial disguises. Of the 20 partially covered composite faces, 10 were minimally concealed (i.e., covered partially by one additional feature) and 10 were more fully concealed (i.e., covered partially by two features). Each version of the composite faces was presented equally often across participants.

For the test phase, these 40 composite faces were randomly presented along with 40 new composite faces (half of which were partially concealed). Of the 40 original composite faces, 20 were presented in exactly the same way in which they were presented previously. Twenty other original composite faces were presented differently. Of the 10 faces that were originally presented in full view, 5 were now partially covered by one feature and 5 were partially covered by two. For the remaining 10 faces that were originally experienced partially covered by one or two features, all 10 were now presented undisguised. For the 40 distractors, half were disguised. Of the 20 disguised distractor faces, 10 were partially covered by one feature and 10 were partially covered by two. Virtually none of the features on the distractor faces had been used to partially conceal the target faces.

Apparatus. A Macintosh Quadra 800 computer running Super Lab software presented the composite faces and recorded responses.

Procedure. Undergraduates were initially told that the purpose of the experiment was to create a set of norms for composite faces to express impressions of criminality. They were asked to use a 7-point scale to rate the extent to which each composite face looked like a criminal face, with higher ratings indicating greater criminality. The rating task was self-paced, and both the ratings and time to respond were recorded automatically. During a 5-minute retention interval, participants were then asked to search for number series embedded in a complex array of numbers. Finally, they were surprised with the source-monitoring task. They were shown 80 test composite faces, and asked to indicate whether or not each face was one they had seen earlier in the session. For those faces classified as previously presented, participants were also asked whether they looked the same or different from the way in which the faces looked originally.
Results and Discussion

Source-Monitoring Performance. Responses on the source-monitoring tests were assessed by computing a proportion, that is, the number of targets whose presentation/test combination was correctly classified (i.e., as same or different) divided by the number recognized as old. For example, when faces were presented as undisguised during encoding, the numerator for the source-monitoring score was the number of undisguised faces correctly called same if they were presented the same way at encoding and test or the number correctly called different if their presentation was changed at test. The denominator in each of these examples was the number of undisguised faces recognized as old (whether classified as same or different in terms of encoding/test match). An analysis of variance was calculated on these scores, including as factors Presentation Mode at Encoding (Full view vs. Disguised) and Presentation Mode at Test (Full view vs. Disguised).

As shown in Table 3.1, participants were confused about the way in which they originally saw the faces, producing relatively low source-monitoring scores. This pattern produced a significant main effect for Mode of Presentation at Encoding, but no other effects were significant. The source-monitoring scores were significantly lower for faces that were originally disguised ($M = .51$) than for those that were not ($M = .72$), independent of the way the faces were presented at test. In fact, performance was close to chance for composite faces originally seen as disguised. As the analysis on recognition will show, however, this poor source-monitoring performance is not simply a reflection of poor memory for the faces. As mentioned earlier, disguised faces were partially covered by either one or a few features. For disguised faces only, source-monitoring performance was worse for maximally disguised faces ($M = .40$) than for minimally disguised ones ($M = .58$), independent of the way in which faces were presented at test.

Recognition of Faces. The source-monitoring test was rescored to create a measure of recognition, that is, the proportion of faces correctly recognized as target composite faces, ignoring whether or not they were correctly classified as looking the same or different. In an analysis including Presentation Mode at Encoding (Full view vs. Disguised) and Presentation Mode at Test (Full view vs. Disguised), three effects were significant. There was a main effect for Mode at Encoding, a main effect for Mode at Test, and a significant interaction. Subsequent tests showed that if the version of the faces participants saw the second time was the same as the version they saw initially, participants were equally good at recognizing undisguised and disguised faces ($Ms = .84$ and .80, respectively). However, recognition was hurt when faces were changed to look different at test, particularly when they were originally experienced as undisguised, consistent with a previous finding (e.g., Carey & Diamond, 1977). These findings are summarized in Table 3.2. Our results for recognition of target faces replicate previous effects on recognition memory, showing a decrement in performance when the way in which faces are presented at test differs from the way in which they were

Fig. 3.1. Examples of composite faces.
TABLE 3.1
Proportion of Faces Correctly Classified as Looking Same or Different at Encoding and Test (Source Monitoring Performance)

<table>
<thead>
<tr>
<th>Presentation Mode at Test</th>
<th>Same</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face in Full View</td>
<td>.68</td>
<td>.76</td>
</tr>
<tr>
<td>Face Disguised (in Partial View)</td>
<td>.49</td>
<td>.53</td>
</tr>
</tbody>
</table>

Could our source-monitoring results simply reflect poor recognition memory for disguised faces? This seems highly unlikely because recognition of both disguised and undisguised faces was relatively good if the faces were experienced in the same way during encoding and test (about 80%, see Table 3.2). Furthermore, although recognition performance was comparable for faces experienced in the same way at encoding and test (whether or not the faces were disguised initially, about 82%, see Table 3.2), people were particularly confused about the way in which they had seen the disguised faces, producing low source-monitoring scores for these faces compared to those that were not disguised (see Table 3.1 again).

Do the recognition data suggest that adults are processing faces configurationally? If adults do process faces in this manner, should we expect recognition performance to be comparable independent of the versions seen at encoding and test? We think not. If people strip away the facial coverings in their mind’s eye, they should be seeing undisguised faces even when disguised. But when those unfamiliar faces were initially disguised, the versions people saw in their mind’s eye (e.g., the relation between the eyes and nose) may have differed from the version actually partially covered by disguises. Thus, at least some of the undisguised faces they see at test may not match the faces they saw when stripping away the partial coverings. In this case, then, recognition performance should be particularly reduced for disguised faces undisguised at test. And, this was indeed the case (see Table 3.2). A similar pattern was also reported by Davies and Flin (1984) who examined the effects of stocking masks on face identification. Of course, if the faces were familiar, we would expect this pattern to change considerably.

Recall the data on source-monitoring errors to new faces serving as distractors are important because they provide guidance in the interpretation of source-monitoring performance. In our previous studies, responses to new items provided convincing evidence that the bias to call an incomplete picture complete was not a general response bias to say complete. When misclassifying new objects as old, adults were more likely to report complete if any bias was observed (Foley et al., 1997).

In the present study, responses to new faces misidentified as old were analyzed in a similar way to see if there was any bias to report “looks the same” or “looks different.” In an analysis of variance including Mode of Presentation of New Faces (Disguised or not) and Type of Response Error (Same vs. Different), participants were more likely to say a new face looked different if it was misrecognized as old than they were to say it looked the same. This bias was more pronounced for new faces that were partially disguised, producing an interaction between Mode of Presentation at Test and Type of Response Error. These results are summarized in Table 3.3. Notably, the same tendency to say “different” more often than “same” was not evident in the source-monitoring errors on old faces. Had such a bias been present, then source-monitoring performance on faces presented differently at encoding and test would have appeared to be better because the bias to say “different” would have inflated performance. But this was not the case.
earlier, two possibilities can be gleaned from the face identification literature. Generating first-order configurations, or they may be seeing relations among faces, independent of the way in which faces were presented at test. This line of work should help inform our choices among theoretical explanations for face identification. If people are looking beyond disguises when processing faces if they have first processed those faces configurationally, they should be less sensitive than children to the type of occluder (e.g., kind of hat, kind of magazine).

The logic guiding our face identification studies also points to a provocative speculation about the basis for developmental differences in face identification. Developmental differences in the identification of unfamiliar faces are striking (Carey, 1981; 1992; Carey & Diamond, 1977, 1994; Carey, Diamond & Woods, 1980; Chance, Goldstein, & Schect, 1967; Diamond & Carey, 1977; Ellis, 1990, 1992; Ellis, Ellis, & Hodde, 1993; Ellis, Shepherd, & Davies, 1979; Flin & Dziurawiec, 1989). One explanation for these developmental differences posits encoding shifts with age, with children processing faces in a piece-meal fashion initially and shifting to configurational processing around 10 years of age (Carey & Diamond, 1977, 1994; Chung & Thomson, 1995; Diamond & Carey, 1977; Flin, 1985). Thus, young children are thought to focus on facial features, noticing details like bushy eyebrows (pieces of the face) rather than abstracting more configurational characteristics like "large wide-set eyes for such a long, narrow face" (Diamond & Carey, 1986, p. 108). Older children and adults, on the other hand, are thought to be better at identifying faces concealed by disguises because they are able to see beyond the disguises, abstracting representations for complete faces. Whether young children are incapable of configurational processing or are less likely than older individuals to process faces in this way is still a matter of some debate (Carey & Diamond, 1994; Chung & Thomson, 1995). In either case, if young children are indeed less likely to process faces configurationally, they may actually be less confused about the way in which they originally saw pictures of faces—especially when the target face is occluded with the same distinctive disguise at test. We are currently exploring this possibility in two new developmental studies (Foley, Foley, & Cormier, 1998).

Finally, the practical import of the line of work we report here should not go unnoticed. The discrepancy is often striking between what a perpetrator actually looks like once arrested and the composite faces circulated to attempt to find this person. These composite faces are reconstructed from people's reports of what perpetrators looked like or from their own selection of facial features available in reconstructive kits for representing faces. When people are asked to process faces by focusing on specific features (e.g., the size of noses), they are better able to provide accurate descriptions of these faces, but if asked to identify faces previously seen, this advantage is not observed (Wells & Turtle, 1989). In the latter context, people are better able to identify faces if they have first processed those faces configurationally (e.g., indicating whether a face looks like that of an honest person; Wells & Turtle, 1989). Could the very process of reconstructing faces contribute to the failure in the identification process, particularly when reconstructed faces include baseball caps and dark glasses? When asked to choose between two uncovered faces,

### General Discussion

The results of our new study of face identification are intriguing because they suggest that people are looking beyond disguises when processing faces—expressing confusion later when asked to remember the ways in which they saw those faces. In particular, they were more confused about disguised faces than undisguised ones, producing lower source-monitoring scores for disguised faces, independent of the way in which faces were presented at test. This pattern suggests that adults may have represented disguised faces without the occluding disguises. This line of work should help inform our choices among theoretical explanations for face identification. If people are looking beyond disguises when processing faces, what are they seeing? As we suggested earlier, two possibilities can be gleaned from the face identification literature. Adults may be seeing gestalt-like representations for the shapes of the faces, generating first-order configurations, or they may be seeing relations among features of faces (e.g., the eyes in relation to the nose and mouth), generating second-order configurations (Carey & Diamond, 1994; Chung & Thomson, 1995; Tanaka & Farah, 1993). The present study does not allow us to choose between these alternative versions of configurational processing, nor was it intended to do so. However, the study does suggest that the source-monitoring framework is a promising heuristic for exploring the bases of configurational processing. Because the representations resulting from configurational processing have not been fully specified, this is a worthy direction for future research. Currently, with several of our students, we are examining the effects on source monitoring of changes in disguise from encoding to test, rather than simple addition or deletion of disguise from encoding to test. Simultaneously, we are looking to see if the nature of the object serving as the occluder (e.g., floppy hat covering the side of a face, or a magazine functioning in the same manner) affects performance. If adults are indeed processing faces configurationally, they should be less sensitive than children to the type of occluder (e.g., kind of hat, kind of magazine).

<table>
<thead>
<tr>
<th>Type of Response Error</th>
<th>Disguised</th>
<th>Not Disguised</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Saw and looks the same&quot;</td>
<td>.04</td>
<td>.14</td>
</tr>
<tr>
<td>&quot;Saw but looks different&quot;</td>
<td>.38</td>
<td>.24</td>
</tr>
</tbody>
</table>

### Table 3.3

Proportion of New Faces Incorrectly Classified as Seen During Encoding
one of which was originally seen and one of which is the reconstructed composite (without the occluders), will people pick the person who they actually saw? Does the collaborative nature of the reconstructive process also bear on the quality of the identification process? Answers to these kinds of questions should lead to a clearer understanding of the specific kinds of information that people remember about unfamiliar faces. Recommendations for designing effective techniques for face reconstruction should follow as well.

REFERENCES


3. A STUDY OF FACE IDENTIFICATION


3. A STUDY OF FACE IDENTIFICATION


