Global Processing Improves Face Identification, But Only For a Sequential Lineup, And a Sequential Lineup Fails to Reduce False Identifications

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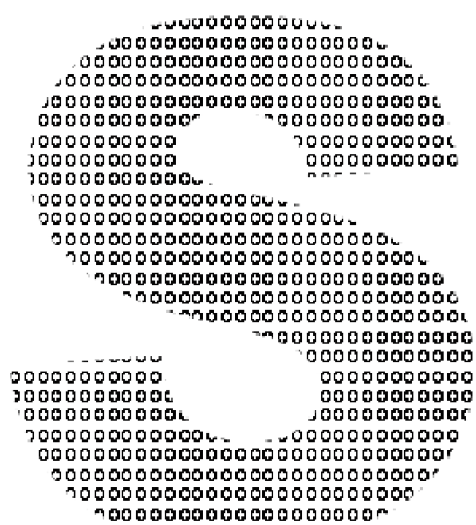
Abstract

An experiment on lineup identification of faces manipulated local versus global processing. The lineups tested either correct identification or avoiding a false identification and the test faces were presented either simultaneously or sequentially. The predicted global advantage occurred, but only for sequential lineups. Also, a predicted additional sequential lineup advantage for avoiding false identifications did not occur. These results may have been due to presenting the processing-manipulating stimuli at too wide a visual angle.

Face recognition usually relies on global processing, that is, processing the entire configuration of facial features, rather than on local processing, that is, focusing on individual features (Leder & Bruce, 2000). Accordingly, many studies have shown that describing a face, which shifts a person's processing style towards local processing, impairs face recognition (e.g., Ryan & Schooler, 1998; Schooler & Engstler-Schooler, 1990). Similarly, if, after seeing a face, people are presented with Navon letters, which are large letters composed of a different smaller letter (see Figure 1), and if they are required to name the larger (i.e., the global) letter, then their processing is shifted towards global processing, and they are subsequently better at recognizing the face. On the other hand, if they name the smaller (i.e., local) letter, they are subsequently worse at recognizing the face (Macrae & Lewis, 2002; Perfect, 2003; Perfect, Dennis, & Snell, 2007).

Figure 1. An Example of a Navon Letter



In a real police lineup, because the actual perpetrator that a witness is trying to identify may or may not be in the lineup, avoiding a false identification of an innocent person is as important as making a correct identification of a guilty person. Therefore, in order for shifting processing with Navon letters to be as useful as possible in such a situation, it is important that the global processing shift reduces false identifications as well as increasing correct identifications. On the one hand, using a sequential lineup, in which the witness must make a yes or no judgment on one face at a time rather than seeing all the faces simultaneously, has already been shown to reduce false identifications, although it does not increase correct identifications (Kneller, Memon, & Stevenage, 2001). On the other hand, as suggested by Burton and Megreya (as cited in Lawson, 2007), it has not yet been firmly established whether the Navon letter processing shift reduces false identifications in addition to increasing correct identifications. Indeed, in spite of the positive findings of Macrae and Lewis (2002) and Perfect (2003) whether such a manipulation even reliably increases correct identifications is still in doubt (Lawson, 2007). However, giving the former researchers the benefit of the doubt, if the manipulation does also reduce false identifications, then, whereas for correct face identifications one might expect a benefit from global processing for either a simultaneous or a sequential lineup, for avoiding false identifications one could expect both a global processing benefit and an additional sequential lineup benefit.

We conducted an experiment in which we used Navon letters to manipulate people's processing style either towards local or global processing. The experiment was conducted by means of interacting with people at a shopping mall, rather than by using subject pool participants in a laboratory. We varied whether the participant's processing orientation was shifted towards local or global processing, whether their lineup test was simultaneous or sequential, and whether or not the target person was in the lineup.

Method

Participants

The participants were 288 people (150 males and 138 females) who were approached while they were walking in a shopping mall. Based on data recorded for the first two thirds of the participants, their ages ranged from 18 to 66, but with the majority being in their early 20's. The mean age was 30, the median 24.5 and the mode 19. The ages of the last third of the participants were not recorded. People were randomly selected with the restriction that those who appeared to be too much in a hurry, or otherwise preoccupied, to participate were not approached.

Materials

The target person in this live interaction study was always one of 6 experimenters. All of the experimenters were undergraduate students serving as volunteer research assistants for the first author. The experimenters worked in 3 teams of two experimenters each. One member of the team acted as the target person and the other conducted the manipulation and lineup test.

Each experimenter developed their own set of stimulus materials. They used a photograph of them self as the target person in the lineup. Of course, as the encoding target, they appeared in person as they interacted with the participant. Figure 2 shows a posed photograph of one of the experimenters appearing somewhat as she would have appeared to the participant. They took photographs of 6 other people who were the same age and gender as themselves, and who were featurally similar in appearance to themselves to use as the foils. All of the photographs showed only the face, and were cropped to remove hair and clothing (see Figure 3).

Figure 2. A posed photograph of one of the experimenters.

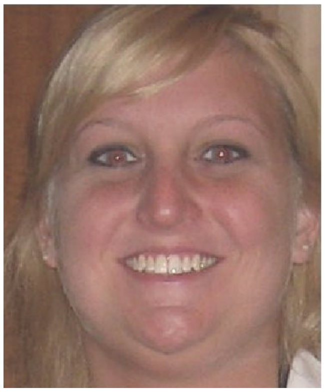
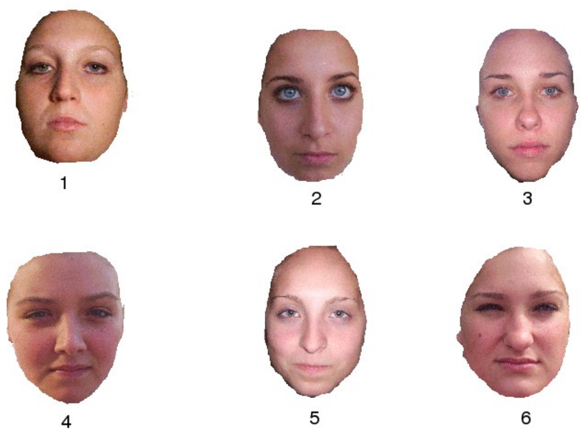


Figure 3. An example of a simultaneous, target present lineup (the target person shown in Figure 2 is in position 1).



For the simultaneous, target absent lineups, there were six different randomly selected arrangements of the six faces into two rows of three faces. For each of six simultaneous, target present lineups, a different foil was replaced by the target person. Those six faces were placed in six randomly selected arrangements so that the target face was in a different location for each lineup. There were six sequential, target absent lineups, and six sequential, target present lineups. For each of the sequential lineups, the faces were presented in an order corresponding to the six numbered locations as shown in Figure 3.

The lineup tests were presented on 8.5 by 11 inch paper in a landscape orientation. The pictures of the faces were about 1inch high, and a little less than that in width. They were the same size whether presented simultaneously or sequentially.

There were 60 Navon letters (see Figure 1). Each letter was also presented on 8.5 by 11 inch paper in a landscape orientation. They were about 5.5 inches high and 4.5 inches wide.

All stimuli were presented at about 18 inches viewing distance.

Procedure

The target person approached a potential subject and asked them what time it was, being sure to make eye contact for at least 5 seconds. Next, the target person left and the other experimenter approached the person and asked them if they would be willing to participate in a short psychology experiment. According to a prearranged randomization procedure, the participant was assigned to either the local or global condition, to either the simultaneous or sequential lineup, to either the target present or absent lineup, and to one of the six different placements or orderings of the faces in the lineup. This resulted in 24 conditions. The two members of each team alternated serving as the target. Each experimenter ran 2 subjects in each of the 24 conditions.

As in Perfect (2003), participants in the global condition were first presented with each of the 60 Navon letters and asked to name the small letter (a featural task), and then they were presented with the same 60 Navon letters again, in the same order, and, this time, they were asked to name the large letter (a global task). Participants in the local condition did the same two tasks, but in the reverse order. Thus, every participant did both tasks to equate for any potential difference in difficulty between the two tasks. However, their processing orientation when they took the lineup test was determined by the task that they had done just before taking the test.

Immediately after the Navon task, the participant took their assigned lineup test. For the simultaneous lineups, they were instructed to indicate which face was the person who had asked them for the time, if the participant thought that one of the faces was that person, or to indicate that none of the faces was the target person. For the sequential lineups, they were instructed to look at each face as it was presented, and to decide whether or not it was the person who had asked them for the time. If the participant chose a face, then the lineup was terminated at that point. The participant was not told in advance how many faces could be presented.

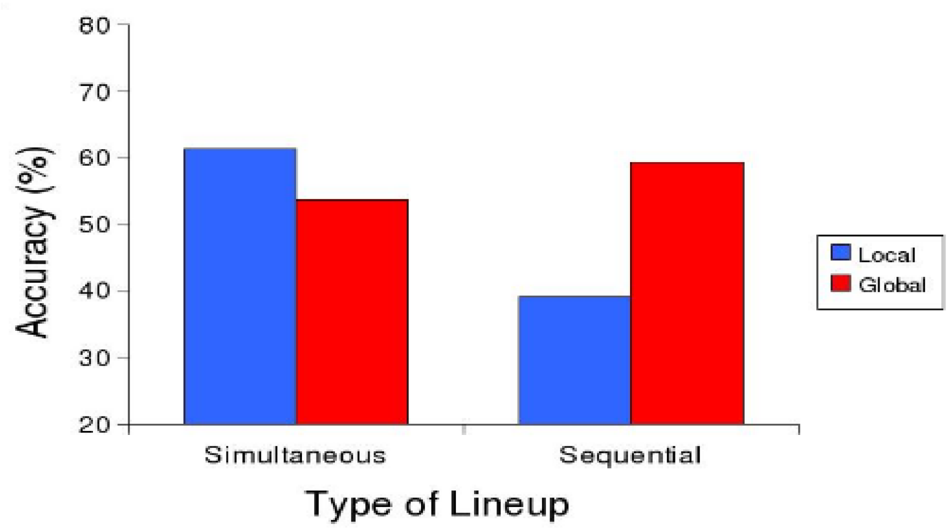
Design

The experiment was a 2 (local/global) by 2 (simultaneous/sequential) by 2 (present/absent) completely between subjects design. The face ordering factor was manipulated only for counterbalancing and was not analyzed. The dependent variable was accuracy on the lineup test. Participants in the target present condition were scored as correct if they selected the target person, whereas participants in the target absent condition were scored as correct if they indicated that the target person was not present.

Results

For a full factorial ANOVA, the omnibus test was marginally significant, F (7, 280) = 1.77, p = .094, MSE = .245. It revealed only a significant local/global by simultaneous/sequential interaction, F (1, 280) = 5.63, p = .018, MSE = .245 (see Figure 4).

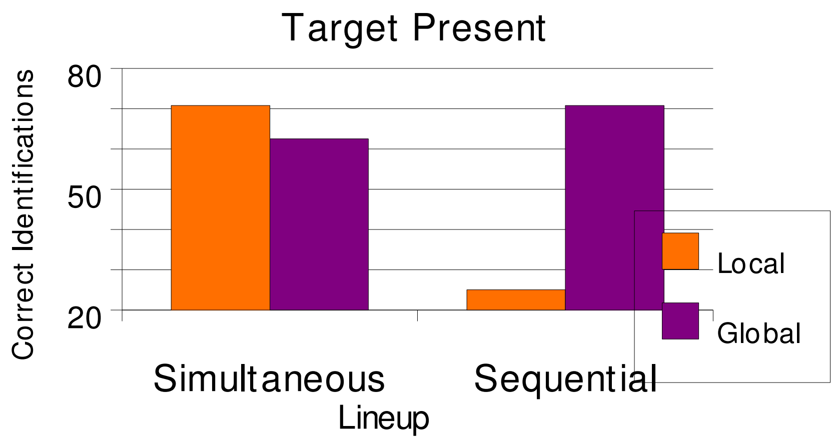
Figure 4.

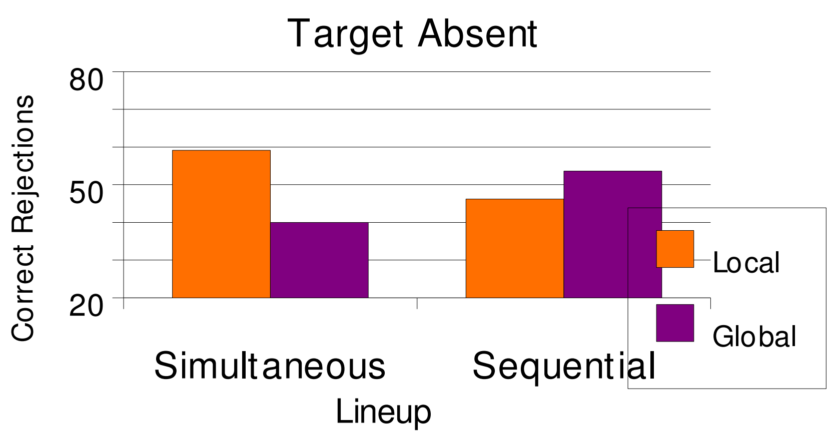


Simple effects tests showed that, for the sequential test only, the global participants performed significantly better than the local participants, F (1, 280) = 6.23, p = .013, MSE = .245, whereas for the simultaneous participants there was not a significant difference, F (1, 280) = .80, *n.s.*

Figure 5 shows the results for the target present and target absent lineups separately. In our data, the performance at correct identifications was better than performance at avoiding false identifications (correct rejections). Also, the global advantage for the sequential lineup was greater for correct identifications than for avoiding false identifications. However, there was no significant three way interaction to justify generalizing these findings beyond our data.

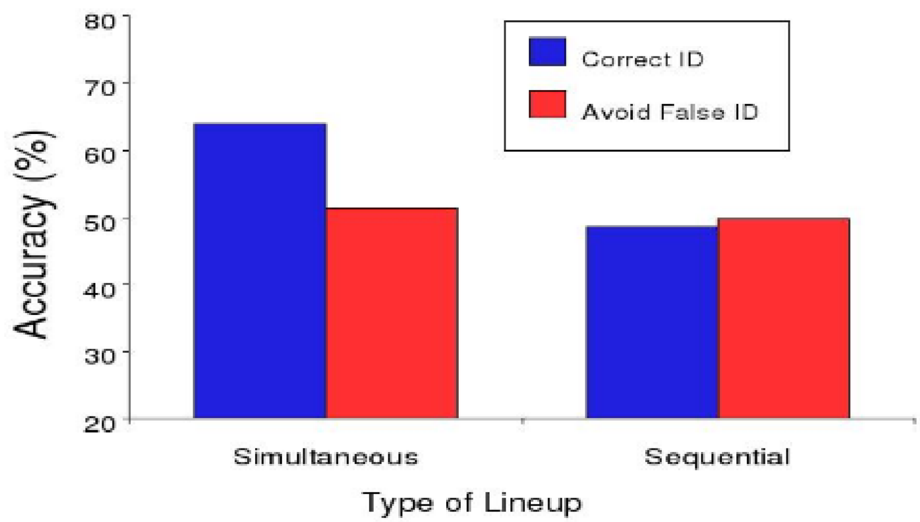
Figure 5. Mean accuracy as a function of local/global processing, simultaneous/sequential lineup, and target present/target absent tests.





As shown in Figure 6, the participants in the sequential condition did not avoid false identifications to a significantly greater extent than those in the simultaneous condition, as expected. In fact, the data was in the opposite direction, although not significantly so. It was also expected that subjects in the sequential condition would not differ in their correct identifications from those in the simultaneous condition. However, those in the sequential condition performed marginally worse at correct identification than those in the simultaneous condition, as shown by a simple effects test, $F\ (1, 280) = 3.43$, $p = .065$, $MSE = .245$.

Figure 6. Mean accuracy at correct identifications and at avoiding false identifications on the simultaneous and sequential lineups.



Discussion

Although our results were more encouraging than those of Lawson (2007), our data supported only part of our expectations. Combining the results from both the target present and the target absent lineups, we found the global processing advantage, but only for the sequential lineup, rather than for both lineups. For the target present lineups, in which we expected to see only the global advantage for correct identifications, but not the sequential lineup advantage, we did see the global advantage, but, again, only for the sequential lineup. As expected, we did not see any sequential advantage. For the target absent lineup, in which we expected to see both the global advantage and an additional sequential advantage for avoiding false identifications, we saw no effect of either global processing or of sequential lineup.

A possible interpretation of these results, which might even be considered a more parsimonious account, would be that there was a significant disadvantage for local processors on a sequential lineup. This reinterpretation of the results is supported by a finding about the effect of the visual angle of presentation on the processing of Navon letters. When they are presented at a visual angle of less than 7 degrees, the global letter becomes relatively more conspicuous, compared to the local letters, and thus, the global letter can be identified faster than the local letter. This global advantage for identification disappears when the letters are presented closer to the subject so that they subtend a visual angle of greater than 7 degrees (Kinchla & Wolfe, 1979). Thus, it may be that naming the global letter of Navon letters at a visual angle of more than 7 degrees may produce less, if any global processing shift. Similarly, at a larger visual angle, the smaller letters become relatively more conspicuous than the larger letters. Therefore, at a larger visual angle, naming the smaller letters might produce a stronger local processing shift (Love, Rouder, & Wisniewski, 1999). Given that Lawson's (2007) Navon letters subtended a visual angle of approximately 12 degrees, this account may help to explain her negative findings.

In our experiment, the Navon letters subtended roughly 16 degrees. Therefore, it may be that our task of naming the large letter produced only an unusually small global processing shift. On the other hand, our task of naming the small letters may have produced an unusually strong local processing shift. Such an explanation might account for the results of our study, although directly manipulating visual angle along with the other factors would be necessary to confirm this interpretation.

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