A Cross-Cultural Study of Change Blindness in Turkish and American Students

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Abstract

Change blindness is a phenomenon that occurs when a person fails to notice changes in their perceptual field. Previous studies have shown that East Asians are sensitive to both contextual and focal changes while Americans are sensitive to focal but not contextual changes (Masuda & Nisbett, 2006). This difference was attributed to the fact that Americans have analytical and East Asians have holistic perceptions. This study questions whether Turkish students' attention to changes in pictures is more like Americans or East Asians. Half of the study was conducted in Turkey and the other half in America. Participants looked at photographs that flickered back and forth from an original picture and an edited photograph. The photographs were Turkish, American, or Neutral. Half were complex, half were simple, and half the changes were made in the foreground and half in the background. We found that both Turkish and American students found the foreground changes a lot faster than the background changes. These results suggested that Turkish people's perception is analytical like Americans'.

Keywords: Change blindness; cross-cultural research

Introduction

One reason that there are continuity errors in movies, which go mostly unnoticed by the audience, is that resource limits prevent us from attending to every element of a visual scene. In one famous study (Simons & Chabris, 1999), 192 participants were shown a video of 6 people in two teams passing a ball. The participants were asked to count and report the number of passes occurring between players of the same team. While they were doing this task, one of two unexpected things happened in the video: either a woman with an umbrella or a woman in a gorilla suit walked by. Overall, only 54% of the participants reported seeing the unexpected event. This means that 46% of them did not "see" a very odd event, immediately obvious to anyone watching the video unburdened by other task demands.

To systematically investigate the interrelation between attention and visual awareness, Rensink et al. (1997) created the "flicker paradigm". In the flicker paradigm two versions of a picture are shown one after another repeatedly with a blank screen in between (for a review, see Simons & Rensink, 2005). The two versions of the picture are generally identical except for one small change. In a typical application of this paradigm, participants are asked to find the changes between the two versions. They almost always find all the changes if they are given enough time, but depending on the sort, size, and placement of the change, it can take several minutes or more. This failure to quickly notice changes in one's perceptual field is called change blindness.

Rensink, O'Regan and Clark (1997) ran a series of experiments investigating change blindness. In their first experiment they had their participants find the change in a regular flicker task. They found out that the participants took twice as long to find the changes in the background than it took them to find the changes in the foreground. In another experiment they gave the participants verbal cues where the change was. When the participants' attention was directed, they were significantly faster at detecting the changes. Moreover, there wasn't a difference between the time it took them to notice changes in the foreground and in the background. They concluded from these experiments that the "key factor" to notice a change is attention.

The facts that people need to pay attention to notice a change and that we naturally notice changes in the foreground, taken together, should mean that people pay more attention to the foreground. Masuda and Nisbett (2001) challenged this idea. They thought that since Westerners and East Asians have different attributions (Westerns attribute outcomes to individual factors, whereas East Asians to situational factors), they could have differences in perceptual orientations. They showed Japanese and American participants clips of underwater scenes and then asked to recount what they saw. Their results showed that Japanese participants stated significantly more information about the background than the Americans, whereas there wasn't a difference in their statements about the foreground. Moreover, Japanese participants referred to an object's relationship to the background twice as much as Americans.

Masuda and Nisbett (2006) extended these findings using the flicker paradigm. They hypothesized that Japanese would be more sensitive than Americans would be to changes made in the backgrounds of the pictures. Their results showed that Japanese participants were just as fast as Americans to find the changes in the foreground and were a lot faster than Americans to find the changes in the background. When they asked their participants to recall as many changes as possible in briefly shown flickering scenes, Americans remembered marginally more number of

changes in the foreground, whereas Japanese remembered significantly more number of changes in the background.

Nisbett and Miyamoto (2005) have attributed these differences in the attentional processes of Westerners and East Asians to Westerners' having analytical perceptions and East Asians' having holistic perceptions. Analytical Westerners attend to salient objects and their category memberships, whereas holistic East Asians attend to contexts and relationships. The authors think the reason behind this difference is the differences in social structures: the East Asian social world is interdependent, while the Western social world is individualistic.

While this proposal is compelling for two cultures that vary quite considerably in their social make-up, the predictions are less clear for cultures that may fall somewhere between classic "East" and "West" mentalities. In the present investigation, we seek to explore the attentional processes of just such a group: the Turkish. There have been very few studies done on Turkish people's perceptions. Hence, it is unclear whether Turkish perception is holistic or analytic. Turkey is located between the individualistic West and the collectivistic East. Moreover, although Turkish history is quite collectivistic, current trends and the growth of capitalism in Turkey suggest that people are becoming rapidly more individualistic (Çileli, 2000). Çileli administered surveys to hundreds of college-aged people in Ankara in 1989, in 1992, and in 1995. The participants scaled 36 values according to how they thought these values affected their lives. The values were divided into terminal and instrumental values; terminal values were about where one wanted their life to end up and instrumental values were about one's behaviors. The results in 1989 showed that most important values for the participants were self-respect, freedom, inner harmony, equality, independence, honesty, broad-mindedness and courage, whereas the least important values were having an exciting life, pleasure, national security, salvation, politeness, imagination, cleanliness and obedience. On the other hand, in 1992 and 1995 the results showed that most important values for the participants were inner harmony, happiness, mature love, exciting life, ambition, cheerfulness and capability, whereas the least important values were freedom, social recognition, comfortable life, true friendship, politeness, honesty, helpfulness and imagination. Çileli concluded from these results that Turkish people were becoming more hedonistic and competitive and hence more individualistically oriented. In short, Turkish people have a unique relationship with collectivistic and individualistic orientations, making them a particularly interesting test case for exploring how they perceive the world. The outcomes have implications for helping us better understand the social orientation of modern Turks and, furthermore, for providing additional support for proposals about how attention is involved in the visual perception of change.

In the current study we carried out a change blindness experiment with the flicker paradigm in which Turkish and American participants looked at some scenes which had changes in the foreground or background. Our experiment was intended to explore whether and how Turkish and American perceptions differ. We recorded how long it took for the participants to find the change. We expected Americans to be quicker at detecting changes in the foreground than the ones in the background and Turks to be quicker at detecting changes in the background than the ones in the foreground. In other words, we expected to find that Turkish people had holistic perspective because we assumed Turkish culture to be primarily collectivists since the trend of individualism was fairly new, whereas Turks have always been interdependent. We also looked into how the culture of photographs affected the participants' reaction times. We used photographs that were taken in the USA or in Turkey and some photographs were neutral, as in they could belong to either country. We thought that Americans would be quick at finding changes in American and neutral pictures but slower at finding changes in Turkish pictures and Turks would be quick at finding changes in Turkish and neutral pictures but slower at finding changes in American pictures.

Methods

Participants

Our participants included two groups: American and Turkish. The American participants consisted of 15 Franklin & Marshall College students who were only fluent in English. A sign-up sheet was posted so students could sign up independently to participate in our study. We stated the requirements (being American and being fluent only in English) in our sign up sheet and included questions about nationality and language proficiency in our demographic questionnaire. The Turkish participants were 15 college students in Bilkent University in Ankara, Turkey. Again, a sign-up sheet was posted for students to choose a time to participate in our study. A requirement on the sign up sheet to participate was that the participants should be Turkish and speak only Turkish fluently. As we did with the American participants, we double-checked this by including questions about nationality and language proficiency in our demographic questionnaire. The participants of both groups received class credit for participating in this experiment. Of all the participants we had to disregard 2 participants because of failure to follow directions and 3 participants because they were outliers (their reactions times were two or more standard deviations above or below the mean). The final number of participants was 12 American (8 women, 4 men, age range: 18-23, M = 19.8) and 13 Turkish students (10 women, 3 men, age range: 18-23, M = 20.8).

Materials

The materials consisted of an iBook, various photos, and two computer programs (Adobe Photoshop and a Change Blindness application created at Franklin and Marshall College). The pictures were edited to be the same size and the focal/contextual changes were made with Adobe

Photoshop. They became flickering movies using the Change Blindness application. There were three categories of pictures: American, Turkish and neutral. American pictures were scenes only found in the United States and not in Turkey. American participants would be familiar with these scenes; whereas, Turkish participants would be unaccustomed to them. These scenes were a Halloween party, a street from Los Angeles, an intersection in the Times Square, a baseball figure, a football game, a house with Christmas lights, a statue of Abraham Lincoln, and a Hollywood star. Turkish pictures were scenes that could only be found in Turkey and not in the states. These scenes were familiar for Turkish participants but not for Americans. These scenes were people doing halay (a traditional Turkish dance), a saz ekibi (an orchestra of classical Turkish instruments), the blue mosque, a fancy evil eye, a chestnut stand on the sidewalk, a women making gozleme (big Turkish crepes), kina gecesi (the pre wedding celebration where the women put henna on their hands), and the kiz kulesi (a very known building in the middle of Bosphorus). The neutral pictures were scenes that can be found in both countries. All participants would be accustomed to these scenes. These scenes were a family dinner, a girl with a birthday cake, three people in skiing outfits, a dorm room, a beach, girls eating dessert, a guy playing electric guitar and a dining hall.

A control variable for all the scenes was complexity because it has been suggested that complexity of a scene can prime the viewer to perceive holistically or analytically (Masuda & Nisbett, 2006). The photographs were all altered so they were of equal size. Each category has an equal number of simple and complex scenes. The simple scenes were scenes either with a straightforward focal point or with very few objects to focus on. The complex scenes had many objects and the subject of the scene isn't clear. In order to assess whether others think the photographs are simple or complex, we had non-participating students highlight the area of each photograph that they thought was the focal point. Simple scenes were defined has having only 1 area highlighted by all the people who did this pre-test. Complex scenes had 2 or more different areas of the picture highlighted. Half of all the pictures got a focal change (one that is in the area of the photograph that is the focus) and the other half received a contextual change (one that is made more in the background). We used the highlighted photographs to help us decide where the focus of each photograph was. In this way we were able to know where to make focal and contextual changes. The changes that were made to the photographs were taking an object away from the photograph. Half of the photographs shown to the participants started with the object in question and half started without it.

Each picture was made into a movie using the Change Blindness application with both versions going back and forth and a gray scene between them (for the flicker effect). The outline for a movie would be the original picture (560 msec), a gray scene (120 msec), the modified picture (560 msec) and a gray scene (120 msec). The movie played in a loop until the change was found. The Change Blindness application also recorded the reaction time of each participants' identification of the change in each picture. Fifteen files were created, each containing all 24 movies in different random orders. Based on their ID number, participants viewed one of the fifteen files.

Procedure

Participants signed up in posted time slots. They came to the study and sat at a table with the computer and a mouse in front of them. All participants were informed of what will be asked of them in the study. They signed an informed consent form indicating their willingness to participate in the experiment. They were assigned ID numbers that correspond with their data and demographics so confidentiality was preserved. Participants were given a demographics questionnaire including questions on age, gender, year in school, country of birth, and language proficiency.

As soon as they were ready, the experimenter started the Change Blindness application with the correct file of photographs for that participant. The participant was asked to click the provided mouse when they found the change. The computer program would then pause and record how long it took the participant to find the change in that flickering picture. The recorded time would be the reaction time of that participant to that picture. Then the experimenter asked the participant to show the change. All data in which the participant identified an incorrect change was disregarded. The participant was shown the each flickering picture (8 American, 8 Turkish and 8 neutral). After the participant was done, the experimenter gave them a copy of the informed consent, which included the experimenters' e-mail addresses. The American participants did this study in Franklin and Marshall College's Barshinger Life Sciences Building. The Turkish participants did this study in Bilkent University's Psychology building. This part was carried out in Turkish since the participants' most fluent language was Turkish. Therefore, the experimenter's script was in Turkish, as were all instructions, the demographics questionnaire, and the consent form.

The dependent variable was the reaction time. The independent variables were the place of the change, the category of the picture and the nationality of the participant. We analyzed the results with a 2 (Foreground/Background change) X 3 (Turkish/American/Neutral photograph) repeated measures ANOVA with nationality (Turkish/American) as a between-subjects factor. Moreover, we ran a 2 (Foreground/Background change) X 2 (Simple/Complex picture) repeated measures ANOVA with nationality (Turkish/American) as a between-subjects factor.

Results

We did not expect to find similar results for American and Turkish participants; however, our results showed that there were not significant differences between them. In other

words there was no main effect of nationality F(1, 23) = .449, p = .510. There was not an interaction between nationality and place of the change F(1, 23) = .134, p = .717; however, there was a main effect of the place of the change F(1, 23) = 10.3, p = .004. As can be seen in Figure 1 American participants found the foreground changes (M = 22.5, SD = 3.51) faster than they did the background changes (M = 31.1, SD = 3.47) and Turkish participants also found the foreground changes (M = 24.0, SD = 3.38) faster than they did the background changes (M = 34.7, SD = 3.33).

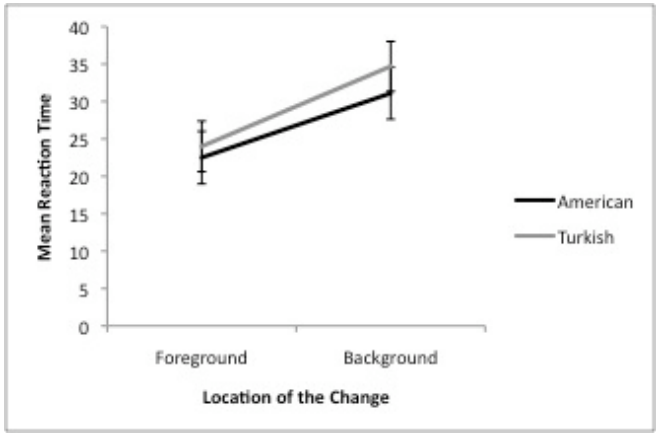


Figure 1: Mean reaction times of American and Turkish participants for finding the changes in the foreground and the background.

There was a main effect of the category of the picture F(2, 22) = 15.1, p < .001 ; however, there was not an interaction between nationality and category of picture F(2, 22) = 2.12, p = .143. That is to say Americans and Turks had similar reaction times within each category of picture. Americans were fastest in finding the changes in neutral pictures (M = 16.4, SD = 2.83) and took about the same time to find the changes in American pictures (M = 27.3, SD = 4.80) and Turkish pictures (M = 36.8, SD = 4.70) just like Turks were fastest in finding the changes in neutral pictures (M = 19.0, SD = 2.72) and took about the same time to find the changes in American pictures (M = 38.8, SD = 4.62) and Turkish pictures (M = 30.3, SD = 4.52). The mean times for finding the changes in the three categories of pictures for both nationalities are presented in Figure 2.

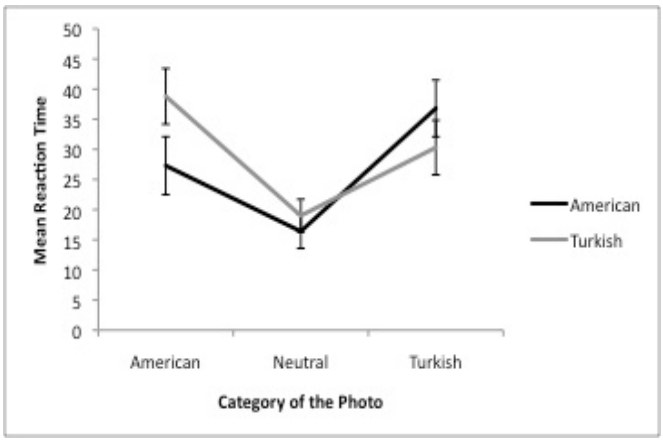
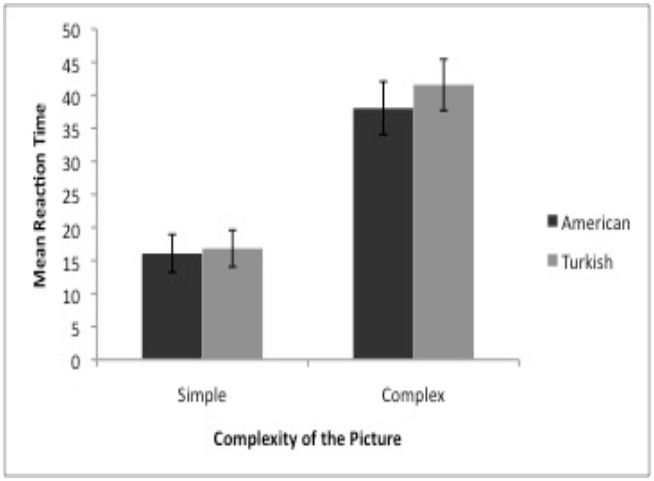


Figure 2: Mean reaction times of American and Turkish participants for finding the changes in the three picture categories

There was a main effect for complexity of the picture F(1, 23) = 61.6, p < .001 as shown in Figure 3. As one can see from Figure 3 the participants took significantly less amount of time to find the changes in the simple pictures than they did in the complex pictures. There was not an interaction between nationality and complexity F(1, 23) = .315, p = .580 which means that Americans' and Turks' reactions time were similar for both complexity conditions. There was not an interaction between complexity and location either F(1, 23) = 4.02, p = .057. The participants found the changes in the foreground fastest in both complexity conditions. There was not a three-way interaction between complexity, location and nationality F(1, 23) = .187, p = .669.



Firgure 3: Mean reaction times of American and Turkish participants for finding the changes in simple and complex pictures.

Discussion

As the past research suggested we found that Americans find the foreground changes faster than background changes. We also found that this pattern of results held for the Turkish participants. These results did not support our hypothesis that Turkish people have a holistic perspective. These results suggest that Turkish people have an analytical perspective.

This finding can perhaps be explained by the changes Turkey has been going through. Capitalism is growing in Turkey, which encourages people to be more individualistic and hence more analytic. Every day Turkish people are trying harder to be more like Westerners. American movies influence what is shown in Turkish movie theaters and on Turkish television. Traditional Turkish dances are being regarded as lame, whereas hip-hop and break dances are being regarded as cool. A lot of Turkish values are getting lost and Western ideas are becoming more popular. In a study a group of Turkish high school students were shown the video clip of Rammstein's "We are all living in America" and were asked about their thoughts (Pehlivan, 2007). The general consensus of the students was that the USA was more advanced than Turkey and also than various African or East Asian countries. In other words they associate that advancement with the West. One of the students even called Turkey "an orphan" since he reasoned the Western countries were so much better than Turkey. These current individualist attitudes might account for our results.

A reviewer has pointed out to us that our results also might be taken to mean that people from collectivistic cultures can have analytical perspectives, and that the relativistic viewpoint of Masuda and Nisbett (2006) should perhaps be questioned. We believe our reviewer's concern is a valid one since there has been some evidence found in the favor of it. For example, de Fockert et al. (2007) have found that people from a very traditional culture in South Africa had extremely analytical perceptions. We do not agree with this point of view for the following reason. Past research has suggested that Turkish youth are becoming more and more individualistic. We believe that is why our results suggest that Turkish people have analytical perspective. To confirm our hypothesis it might be useful to compare older Turkish people to younger ones in this paradigm. We expect that older adults might be more collectivistic and therefore show a different pattern in a change blindness study. A clear-cut difference between the patterns of older and younger Turkish people would indicate two things. Firstly, it would indicate that our results from the current study could be explained by the transition Turkish culture is going through. Secondly, it would indicate that the idea that holistic cultures might have analytical perspectives did not hold true in the case of Turkish people. The current study is only a preliminary to further research on Turkish people's perceptions.

In fact, there is much more room for research in this area, which has in general been under-explored. A comparison experiment between Turkish people and East Asians could be done in order to further investigate the possibility that Turks have an analytical perspective. A study like Masuda and Nisbett's (2001) would uncover whether Turkish people pay attention to background or the relationship between objects similar to East Asians. Another way of taking this research further would by doing a real-life change blindness experiment like the study in which random people on the campus of Vanderbilt University were asked to remember the color of a binder the experimenter was holding, and the word inside the binder (Varakin, Levin, & Collins, 2007). The participants were unaware of many changes in their environment like the font of the word in the experimenter's binder. The participants in this study were all Westerners. The results could have been different if the participants were East Asian and even if they were Turkish. Just because Turkish people were similar to the Westerners at noticing changes in flickering images on a laptop does not guarantee that they would be similar to Westerners at noticing changes in real life change blindness experiments.

In our experiment we tried to get rid of confounds by having only American and Turkish participants so that the groups would be more homogenous, unlike the study in which different cultures of East Asia were grouped all these different cultures (Chinese, Japanese and Korean) under one group (Masuda & Nisbett, 2005). Furthermore, we tried to control for differences in the photographs as much as possible. We used half simple and half complex pictures in each category of culture of the photograph (American, Turkish, and neutral). Our purpose in controlling complexity was that we did not want to end up with one of our categories of pictures that consisted of only complex pictures. A reviewer has suggested that American and Turkish participants might have been affected differently by the complexity of the picture. Our results did not support this. We found that American and Turkish participants had similar reaction times for both simple and complex pictures.

In our experiment were expecting the participants to be fastest in the pictures they were familiar with. There was a main effect of the category of the picture but it was not like how we expected it to be. All participants found the changes faster in the neutral pictures than the Turkish or American pictures. This could be because the changes in the neutral pictures might be slightly bigger than the changes in the other categories since we only approximate the size of the change. This difference could also be due to the subject of the pictures. Only half of the Turkish and the American pictures were about people but almost all of the neutral pictures were of people. The changes were not always made to the people but it could be that the participants were better at detecting changes in pictures of people. This unexpected effect emphasized that the pictures and the changes should be even more controlled. More control on the changes could be accomplished by having a constant change in all the pictures. For example, a cup would be appearing and disappearing in pictures. This cup could be in the

foreground or the background; hence, keep the size of change same no matter where it occurs.

The current study aimed to get some insight into Turkish people's perceptions. We ran a change blindness experiment on Turks and Americans. We were expecting to find that Turkish people have holistic perceptions like East Asians; however, our results suggest that they have analytical perceptions like Westerners. We believe that there needs to be more research done in this area to understand how exactly Turkish people perceive the world.

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References

Çileli, M. (2000). Change in value orientations of Turkish youth from 1989 to 1995. *The Journal of Psychology, 134*(3), 297-305.

de Fockert, J., Davidoff, J., Fagot, J., Parron, C., & Goldstein, J. (2007). More accurate size contrast judgments in the Ebbinghaus Illusion by a remote culture. *Journal of Experimental Psychology: Human Perception and Performance, 33*(3), 738-742.

Masuda, T., & Nisbett R. E. (2001). Attending holistically versus analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology, 81*(5), 922-934.

Masuda, T., & Nisbett R. E. (2006). Culture and change blindness. *Cognitive Science: A Multidisciplinary Journal, 30*(2), 381-399.

Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture: Holistic versus analytic perception. *Trends in Cognitive Sciences, 9*(10), 467-473.

Pehlivan, H. (2007). Are we all living in America?. *Elektronik Sosyal Bilimler Dergisi, 6*(22), 270-282. Retrieved April 26, 2008, from http://www.e-sosder.com/dergi/22270-282.pdf

Rensink, R. A., O'Regan, J. K., & Clark, J. J. (1997). To see or not to see: The need for attention to perceive changes in scenes. *Psychological Science, 8*(5), 368-373.

Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception, 28*, 1059-1074.

Simons, D. J., & Rensink, R. A. (2005). Change blindness: Past, present, and future. *Trends in Cognitive Sciences, 9*(1), 16-20.

Varakin, D.A., Levin, D. T., & Collins, K. M. (2007). Comparison and representation failures both cause real-world change blindness. *Perception, 36*(5), 737-749.