A Term Project Report on

Perception of Time: Effect of Routine Nature of Task

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Contents

Abstract

We study the perception of time in humans by conducting some experiments on college students. The aim is to look at perception of time from the perspective of routine and non-routine tasks as well from an angle of retrospective and prospective recall. Two experiments are conducted, one based on memory recall and the other based on general perceptive ability. The results confirm our hypothesis of the nature of human time perception.

1   Introduction

Most of our perception relies on some kind of sense. For example, we can hear music, we can feel a touch and we can smell a scent. But when it comes to perceiving time which is an ever-changing phenomenon, we don't have any specific sense to turn to. Yet, we all feel the passage of time. What is it that allows us to perceive time as we do? Is it the occurrence of specific events makes this possible? If it is, in a way analogous to a bright scene changing our perception of color, may be a particular kind(s) of temporal event(s) can alter our perception of time.

Perception of time has always been a mystery and numerous theories have been proposed to this end. Indeed, the way temporal events unfold influences this perception in a big way. On a basic level this perception has been attributed to many factors like the type of task one is performing, the level of interest and attention in the task and the goals of the task.

What is even more intriguing is that our perception of time changes with age. As we learn more and more about the world, our concepts get stronger, our cognitive models are refined and our everyday experiences get assimilated into a kind of routine. A byproduct of this phenomenon is that we somehow feel that time has passed quickly and thus, our perception of time is altered. An exactly opposite thing occurs when we are asked to keep a track of time. As soon as the thought of keeping a track of time comes into picture, there is a change in its perception. This happens clearly in case of students in a boring class. The moment attention is given to time perception; somehow time seems to move slowly.

2   Objective

Thus, in this project we try and study some of these processes and the way they influence perception of time. In particular we focus on the way routine and non-routine nature of a task changes our perception of time. We also study the effect of retrospective and prospective estimates. The basic theme of the project is based on the paper by Babad and Ritov [1]. The aim of the project is to conduct psychological experiments in line with those by Babad and Ritov and to verify their hypothesis.

3   Prospective and Retrospective Analysis

Before going into the details of the experiments we would like to explain prospective and retrospective analysis in brief. A retrospective analysis of a particular data occurs when while doing the task we are not aware that the data is to be analyzed after the task. The analysis is done looking back or in other words in retrospect.

On the other hand prospective analysis occurs when the data analysis continues side by side with the task at hand. For example, with regard to perception of time, if a subject is told beforehand that he as to keep a track of time while performing a task then the estimate obtained then would be a prospective estimate whereas if he is not given any such information and is asked to estimate time after the task, then this would be a retrospective estimate.

4   Basic Hypothesis

The hypothesis given by Babad and Ritov in their paper [1] was that a routine task (where there is a pattern involved), the perception of time will be less as compared to the situation where a non-routine task is performed. This will happen for when the subject is not aware of the passage of time and has not been asked to pay attention to it; in other words Retrospective analysis. Contrary to this, the authors suggested that if a subject is asked to keep a track of time, the perception will be the exact opposite. The routine task will seem to take longer than the non-routine task.

The argument behind this was while doing a routine task, there are cognitive resources to spare and thus, under prospective analysis there would be a greater amount of cognitive resource available to estimate time and hence the estimation would be more. This is analogous with the other argument that while performing a boring task, time appears to pass slowly. On the other hand for the retrospective routine case, the routine nature of the task brings about a regular pattern in the events which causes time to appear to move quickly.

5   Experiments

We conducted different experments to verify the above hypothesis

5.1   Experiment1: Sheet experiment

Procedure: Each participant was given a sheet of paper. On one side of the sheet there were rows of digits from 0-9 randomly generated. Each row consisted of 38 and there were a total 29 rows in each sheet. Other side of the sheet was blank. In each row there was a single digit which was underlined and at the end of each row a blank space was left. Participants were asked to count the number of times the underlined digit appears on the row. Initially participants were given a practice time of 20 seconds to get familiarized with the process. After that they were asked to do the same exercise for a fixed period of 90 seconds (time not disclosed) between utterance of start and stop by the experiment conductor. They were told that they will be judged based on the accuracy of there work. After the fixed time they were asked to report the time perceived by them. The group for the prospective analysis was told beforehand that they would be asked to give a time estimate at the end. Care was taken to keep instances of the underlined digits in corresponding rows of two sheets same,so as to keep the complexity of the task independent of the type sheet.

Types of sheets: There were two types of sheets

- **Routine Task**: Underlined digit was same in each row

- **Non-Routine Task**: Underlined digits are randomly selected.

5.2   Experiment2: Video experiment

Procedure: The group of subjects were shown a video containing 20 different noun words and 10 HPE(High priority event). We used names of Indian states as HPEs. A silent period of 15 seconds was given in starting marked by the word 'START' and the word 'STOP' in which a blank screen was there . After that nouns and HPEs started flashing. The time for which each word appeared was 1 second and the time between the words was also 1 sec therby making the total time of the experiment to be 60 seconds. The task was presented as a memory task and participants were asked to remember the HPEs which appeared on the screen. After words stopped flashing the word 'END' appeared on the screen and participants were asked to write the HPEs on the sheet. They were then asked to write

the estimated time for the duration in which words flashed not taking into account the silent period. The group for the prospective analysis was told beforehand that they would be asked to give a time estimate at the end.

Types of Videos: There were two kinds of videos shown to different subjects:

- **Routine Task**: HPEs routinely distributed in among the nouns.

- **Non-Routine Task**: HPEs randomly distributed in among the nouns.

6 Results

This section highlights the results obtained in each of the experiment that we conducted

6.1 Experiment 1: Sheet Experiment

Participants: The total number of participants for the sheet experiment was 92. All participants were students of IIT Kanpur in the age group of 17-35 years. This number was further divided into the following:

1. 32 subjects for routinte retrospective case.

2. 30 subjects for non-routine retrospective case.

3. 18 subjects for routine prospective case.

4. 12 subjects for non-routine prospective case.

The analysis can be divided into:

6.1.1 Routine Retrospective

The initial mean, median and standard deviation for the group was found to be 68.69, 70 and 20.77 seconds respectively. The time estimate distribution was then plotted into a histogram and the following plot was obtained. In all the histogram plots from here on the bin axis refers to time in seconds and the frquency axis refers to number of individuals whose estimate lied in the corresponding bin.
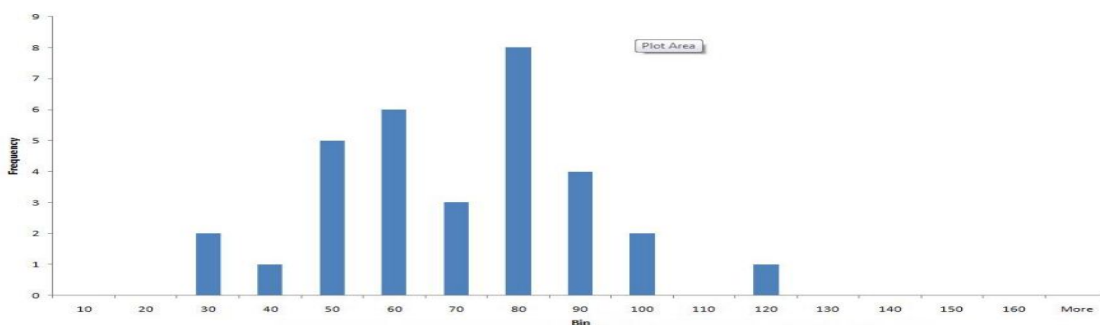

Figure 1: Histogram Plot for Routine Retrospective Sheet Experiment

6.1.2 Non-Routine Retrospective

The mean, median and standard deviation for the group was found to be 80.37, 85 and 26.69 respectively. The histogram plot for this is given by Figure 2.
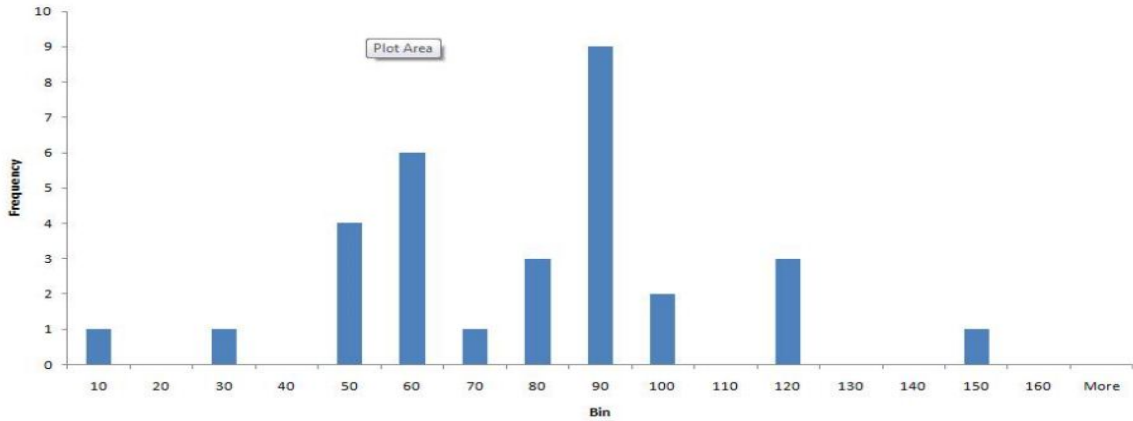

Figure 2: Histogram Plot for Non-Routine Retrospective Sheet Experiment

6.1.3 Routine Prospective

The mean, median and standard deviation for the group was found to be 80.83, 60 and 54.97 respectively. The histogram plot for the data is given by Figure 3.
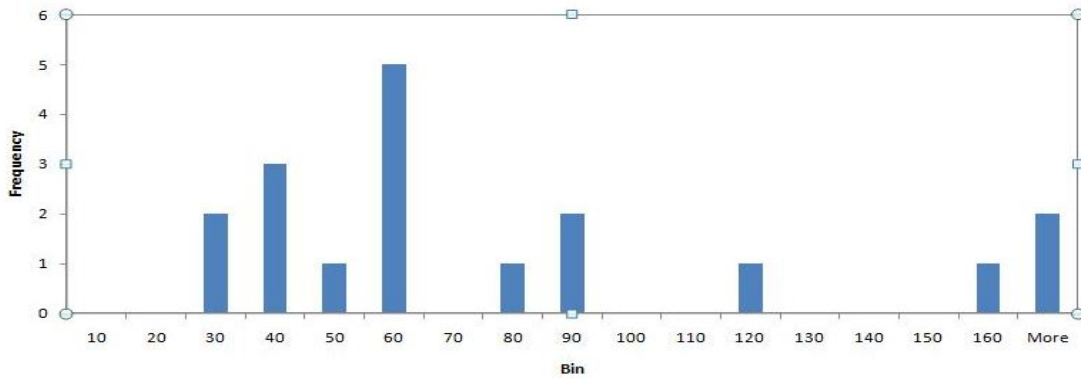

Figure 3: Histogram Plot for Routine Prospective Sheet Experiment

6.1.4   Non-Routine Prospective

The mean, median and standard deviation for the group was found to be 63.5 56 and 29.8 seconds respectively. The histogram plot for the data is given by Figure 4.
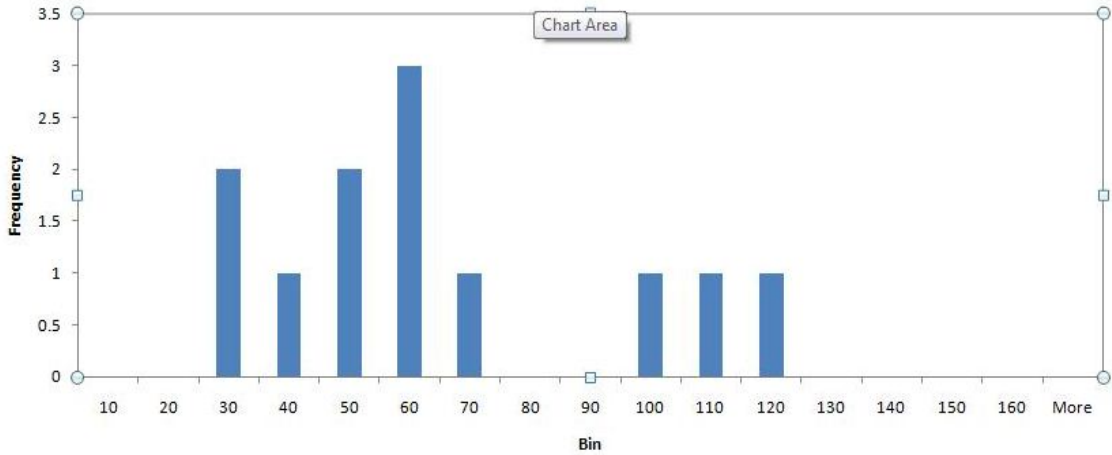

Figure 4: Histogram Plot for Non-Routine Prospective Sheet Experiment

6.2   Experiment 2: Video Experiment

Participants: The total number of participants for the sheet experiment was 81. All participants were students of IIT Kanpur in the age group of 17-35 years. This number was further divided into the following:

1. 62 subjects for routine prospective
2. 19 subbjects for non-routine prospective

The analysis can be divided into:

6.2.1   Routine Prospective

The mean, median and standard deviation for the group was found to be 58.64, 57 and 28.63 seconds respectively. The histogram plot for the data is given by Figure 5.
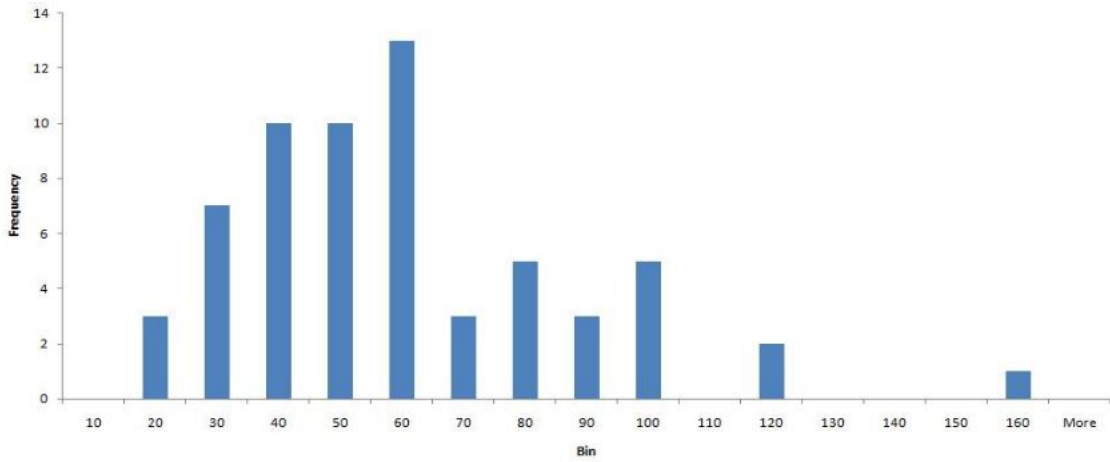
Figure 5: Histogram Plot for Routine Prospective Video Experiment

6.2.2 Non-Routine Prospective

The mean, median and standard deviation for the group was found to be 52.63, 45 and 30.52 seconds respectively. The histogram plot for the data is given by Figure 6.
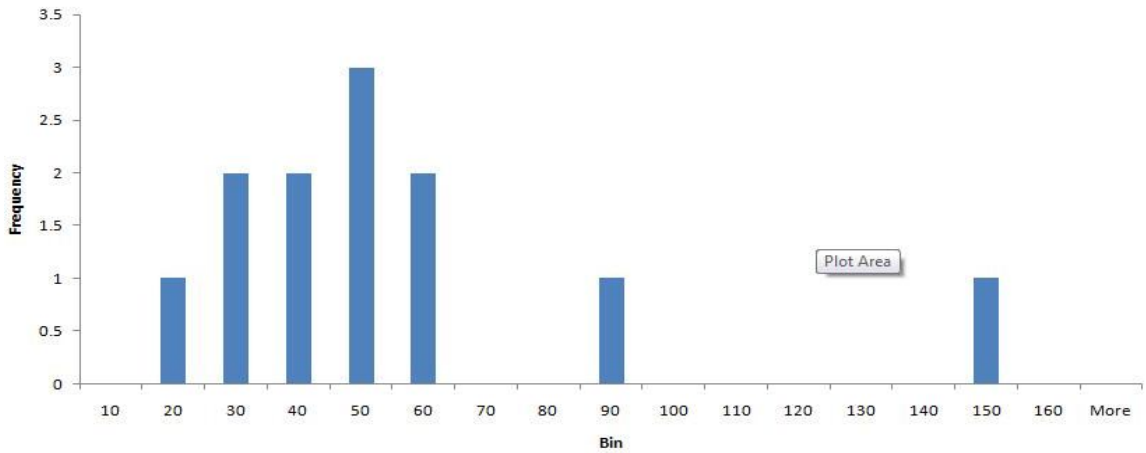

Figure 6: Histogram Plot for Non-Routine Prospective Video Experiment

The overall results can be tabulated by Figure 7.

| | SHEET | | | | VIDEO | |
| | PROSPECTIVE | | RETROSPECTIVE | | PROSPECTIVE | |
	Routine	Non Routine	Routine	Non Routine	Routine	Non Routine
MEAN	80.83	63.5	68.68	80.37	58.64	52.63
MEDIAN	60	56	70	85	57	45
Std. DEV	54.97	29.7978	20.7	26.69	28.62	30.52

Figure 7: Overall results

7 Inferences

The following can be inferred from the experimental results:

1. **For Retrospective Experiments**: The time percieved for the retrospective routine experiments was observed to significantly less than that for retorspective non-routine case (a difference of around 12 and 15 seconds in the mean and median respectively). The standard deviation for both the cases was nearly the same and the data was also found to distributed uniformly

2. **For Prospective Experiments**: The time percieved for prospective routine experiments was observed to be marginally more than prospective non-routine experiments. While difference was 13(for mean) and 4(for median) seconds for the sheet experiment, the same data for the video experiment was found to be 6(for mean) and 12(for median) seconds respectively.

   In particular, the standard deviation for the sheet experiment for the routine case (58.96 sec). If we remove the data points repsonsible for this high value then the estimates for routine and non-routine cases become more or less equal.

3. **Hypothesis Verification**: The hypothesis for the retrospective timing is clearly verfied by point 1. in this section. The data however, doesn't support the hypothesis for the prospective case as much. But then again, the amount of data for the prospective experiments was far less than that for the retrospective ones. To be more specific, only 30 subjects contributed to prospective sheet experiment compared to 62 subjects for the same in retospective domain. For the video experiment the distribution between routine and non-routine tasks was extremely skewed (62 compared with 19).

4. **Estimated time was less than the actual time**: In all the experiments performed the estimated time was found to be less than the actual time. A average deviation of 16 seconds was observed for the sheet experiment and the same data for the video experiment was found to be 3 seconds. This was something that was not hypothesized by [1].

8 Future Scope

The results achieved by the experiments were quite promising and as hypothesized in terms of general behaviour of the human mind in time perception. More analysis of the subject can be done by increasing the number of variables.For example level of interest in the task, mental status of the person,accuracy of the task done and effect of age can be easily taken into account. Furthermore these studies can help us in designing training programs for people in various jobs like military etc better.

References

[1] Avni-Babad D.,Ritov I.,*Routine and the perception of time*, 2003 J. Exp. Psychol. Gen. 132, 543550

[2] Poynter, W. D., and Homa, D., *Duration judgment and the experience of change*, 1983 Perception and Psychophysics 33, 548560.

[3] Wittman M., *The Inner Perception of Time*, 2009, Phil. Trans. R. Soc. B 1955-1967 364 2009

[4] Azizuddin Khan, *Temporal Aspects of Prospctive and Retrospective Memory*, PhD. Thesis, Dept. of Humanities and Social Sciences, IIT Kanpur, 2005

A   Instructions

1. Write your name, age and gender on the back of the sheet. Don't turn the sheet yet

2. On the other side there are rows of digits.

3. In each row there is one digit that is underlined.

4. Your task is to find number of instances (including the underlined digit) of the underlined digit in a row and write it on the blank space at the end of the row

5. You will be judged based on the accuracy of your answers

6. You will be given a practice time of 20 seconds at first to get familiarised.

7. This practice time will be marked by a "Start Practice" and "Stop Practice"

8. Once you are done with the practice time please overturn the page and wait for further instructions

9. You can turn the page now

10. START PRACTICE

11. STOP PRACTICE

12. Now turn your pages

13. Now the actual experiment will begin

14. Now you are to repeat the same exercise (For Prospective timing: Also keep track of the time between the START and STOP. We will later ask you to estimate the time in seconds).

15. Note that there is a horizontal line in your sheets. Start answering from the row below it

16. You may turn the page now

17. START

18. STOP

19. Now turn your pages

20. We want you to estimate the time of the actual experiment that was given to you just now

21. Don't overturn your pages or refer to others

22. Write your estimate in seconds and NOT minutes

23. You may hand over your sheets now

9

7 3 3 4 **2** 3 2 7 0 3 0 1 0 8 4 7 4 4 1 4 2 1 4 7 4 8 9 7 0 9 6 8 9 5 9 8 0 3 ___

1 2 8 **3** 3 2 5 1 7 0 2 7 5 6 9 8 8 6 2 9 7 2 4 7 9 2 6 1 7 9 1 6 2 7 2 1 2 0 ___

4 8 5 9 0 7 9 4 6 2 0 1 6 4 3 5 3 6 0 2 0 9 6 2 7 3 7 8 3 1 1 9 5 5 4 7 3 8 ___

3 0 7 5 3 **8** 9 4 7 2 6 7 1 7 0 5 6 9 5 6 5 3 2 6 0 1 5 7 6 8 5 2 4 2 9 6 8 4 ___

1 0 5 **4** 7 9 2 5 8 4 1 1 9 9 7 6 3 3 5 0 8 5 2 9 8 1 7 4 8 1 2 8 7 7 4 2 9 3 ___

7 8 4 2 0 8 8 2 5 6 3 6 4 **5** 7 3 4 3 2 4 0 9 7 5 1 2 0 0 1 6 7 0 1 0 0 0 3 8 ___

5 6 8 2 9 4 1 8 7 6 **8** 1 8 7 3 9 7 2 6 5 9 4 7 6 0 1 5 8 6 0 5 6 0 9 0 6 2 4 ___

3 6 4 0 7 **0** 7 7 4 1 7 8 2 1 5 9 7 5 8 9 6 1 9 0 1 7 4 6 7 1 9 8 1 0 0 5 0 3 ___

9 3 8 4 8 0 4 7 8 0 6 0 7 2 1 2 7 8 1 9 3 6 4 3 **1** 0 7 8 1 6 5 2 7 2 9 1 9 3 ___

7 2 8 9 4 9 8 1 5 8 9 3 3 7 6 2 0 3 4 2 5 **3** 3 1 8 2 9 1 4 4 4 7 8 6 0 7 3 9 ___

3 4 8 1 0 2 9 4 3 6 1 0 8 1 4 0 1 2 8 3 **8** 7 7 6 7 7 9 9 8 5 0 5 9 8 2 5 2 6 ___

5 8 2 4 6 7 6 8 9 4 3 4 2 3 0 9 **6** 3 0 4 5 8 4 3 9 0 4 2 6 1 9 1 7 0 8 5 8 4 ___

4 8 2 7 3 9 6 7 2 2 7 6 7 9 1 1 7 0 3 **9** 0 0 5 3 7 6 1 2 4 6 1 4 4 6 5 1 1 9 ___

0 2 2 7 0 0 7 4 0 1 9 4 9 0 2 6 0 3 5 8 3 1 2 9 3 1 4 8 1 6 5 8 3 3 1 7 0 **7** ___

7 7 1 8 8 6 7 7 9 5 5 0 6 3 7 6 0 7 7 0 8 **2** 7 2 9 9 4 3 8 1 5 8 6 5 9 8 8 0 ___

9 9 5 9 9 9 6 9 4 0 8 8 4 9 6 6 2 1 3 2 5 2 1 9 7 5 7 4 9 8 7 7 9 7 9 4 1 **3** ___

8 8 5 5 7 1 4 2 7 5 9 9 **5** 4 5 3 8 9 1 3 8 4 0 6 9 5 1 2 5 5 6 7 6 4 2 9 3 0 ___

8 9 7 5 9 9 7 **4** 9 7 1 3 7 9 0 5 3 2 9 3 1 4 2 7 5 0 2 8 0 4 3 7 5 0 4 6 7 6 ___

7 6 6 0 2 8 7 3 8 9 3 2 1 9 9 6 **1** 1 3 7 7 6 3 9 3 0 6 8 0 2 1 2 3 5 7 0 7 9 ___

1 8 9 2 7 2 1 9 8 5 5 7 5 3 **0** 7 9 5 5 2 3 8 4 4 9 9 8 6 7 8 2 1 9 0 9 0 7 8 ___

9 0 1 1 6 7 8 6 8 3 8 8 **3** 6 9 0 6 3 9 5 5 2 3 3 8 4 5 1 7 5 9 9 4 7 4 0 3 9 ___

4 0 **8** 2 4 7 5 7 3 9 2 4 9 6 6 1 9 3 7 7 3 1 3 1 0 0 5 5 7 0 1 9 6 1 1 3 0 0 ___

1 7 8 6 3 0 7 4 9 4 0 9 6 2 2 **4** 5 7 5 8 5 4 9 0 1 0 8 7 7 2 0 2 7 5 3 6 3 3 ___

8 2 0 9 3 4 8 0 1 5 1 3 3 9 3 4 4 3 7 6 5 4 **2** 6 0 9 5 5 2 0 5 8 6 5 7 9 6 3 ___

0 6 4 9 3 3 7 4 0 5 5 9 6 9 7 8 0 3 9 6 7 3 7 6 9 6 8 **7** 7 4 9 8 0 6 6 7 2 5 ___

9 3 7 6 7 7 0 8 8 8 0 2 6 4 6 3 6 **9** 8 1 0 3 6 9 1 0 2 8 9 1 7 9 4 5 7 7 3 8 ___

7 **1** 8 0 4 8 6 8 1 0 6 3 6 8 7 8 2 4 4 5 0 1 1 9 0 4 2 6 0 4 5 3 7 4 5 3 4 7 ___

1 2 2 8 0 **3** 6 6 8 0 7 7 8 4 9 5 6 0 3 8 0 5 1 5 5 6 7 6 3 7 6 4 6 2 9 7 7 7 ___

7 1 **6** 4 9 9 1 3 0 8 2 5 1 4 6 5 8 2 1 7 9 9 5 2 8 2 1 9 9 2 0 3 8 4 8 3 9 1 ___

Sheet2

7 3 3 4 **2** 3 2 7 0 3 0 1 0 8 4 7 4 4 1 4 2 1 4 7 4 8 9 7 0 9 6 8 9 5 9 8 0 3 ___

1 **2** 8 3 3 8 5 1 7 0 4 7 5 6 9 2 8 6 6 9 7 1 4 7 9 3 6 1 7 9 1 6 0 7 3 1 7 0 ___

4 8 5 9 0 7 9 4 6 **2** 0 1 6 4 3 5 3 6 0 2 0 9 6 2 7 3 7 8 3 1 1 9 5 2 4 7 3 8 ___

3 0 7 5 3 8 9 4 7 **2** 6 7 1 7 0 5 6 9 5 6 5 3 0 6 0 1 5 7 6 8 5 2 4 2 9 6 8 4 ___

1 0 5 4 7 9 **2** 5 8 4 1 1 9 9 7 6 3 3 5 0 8 5 2 9 8 1 7 4 8 1 2 8 7 7 4 2 9 3 ___

7 8 4 **2** 0 8 8 2 5 6 3 6 4 5 7 3 4 3 2 4 0 9 7 5 1 9 0 0 1 6 7 0 1 0 0 0 3 8 ___

5 6 8 2 9 4 1 8 7 6 8 1 8 7 3 9 7 **2** 6 5 9 4 7 6 0 2 5 8 2 0 5 6 0 9 0 6 2 4 ___

2 6 4 0 2 0 7 7 4 1 7 8 **2** 1 5 9 7 5 8 9 6 1 9 0 2 7 4 6 2 1 9 8 2 0 0 5 0 3 ___

9 3 8 4 2 0 4 7 8 0 6 0 7 2 1 **2** 7 8 1 9 3 6 4 3 1 0 7 8 1 6 5 2 7 2 9 1 9 3 ___

7 2 8 9 2 9 8 1 5 8 9 3 3 7 6 **2** 0 3 4 2 5 3 3 1 2 2 9 1 4 4 4 7 8 6 0 7 3 9 ___

3 4 2 1 0 **2** 9 4 3 6 1 0 8 1 4 0 1 2 8 3 8 7 7 6 7 7 9 9 8 5 2 5 9 8 2 5 2 6 ___

5 8 2 4 6 7 6 8 9 4 3 4 **2** 3 0 9 6 3 0 4 5 8 4 3 9 0 4 2 6 1 9 1 2 0 8 5 8 4 ___

4 8 2 7 3 9 6 7 **2** 2 7 6 7 9 1 1 7 0 3 9 0 0 5 3 7 6 1 2 4 6 1 4 4 6 5 1 1 9 ___

0 2 2 7 0 0 7 4 0 1 9 4 9 0 **2** 6 0 3 5 8 3 1 2 9 3 1 4 8 1 6 5 8 3 3 1 7 0 7 ___

7 7 1 8 8 6 7 7 9 5 5 0 6 3 7 6 0 7 7 0 8 **2** 7 2 9 9 4 3 8 1 5 8 6 5 9 8 8 0 ___

9 9 5 9 9 9 6 9 4 0 8 8 4 9 6 6 **2** 1 3 2 5 0 1 9 7 5 7 4 9 8 7 7 9 7 9 4 1 3 ___

8 8 5 5 7 1 4 **2** 7 5 9 9 2 4 5 3 8 2 1 3 8 4 2 6 9 5 1 2 2 5 6 7 6 4 2 9 3 0 ___

8 9 7 2 9 9 7 4 9 7 1 3 7 9 0 5 3 **2** 9 3 1 4 2 7 5 0 2 8 0 4 3 7 5 0 4 6 7 6 ___

7 6 6 0 2 8 7 3 8 9 3 **2** 1 9 9 6 1 1 3 7 7 6 3 9 3 0 6 8 0 2 1 2 3 5 7 0 7 9 ___

1 8 9 **2** 7 6 1 9 8 5 5 7 5 3 0 7 9 5 5 2 3 8 4 4 9 9 8 6 7 8 2 1 9 0 9 0 7 8 ___

9 0 1 2 6 2 8 6 8 3 2 8 3 6 9 0 2 3 9 5 5 **2** 3 3 8 4 5 1 7 5 9 9 4 7 4 2 3 9 ___

4 0 8 9 4 7 5 7 3 9 **2** 4 9 6 6 1 9 3 7 7 3 1 3 1 0 0 5 5 7 0 1 9 6 1 1 3 0 0 ___

1 7 8 6 3 0 7 4 9 4 0 9 6 2 **2** 4 5 7 5 8 5 4 9 0 1 0 8 7 7 2 0 2 7 5 3 6 3 3 ___

8 **2** 0 9 3 4 8 0 1 5 1 3 3 9 3 4 4 3 7 6 5 4 2 6 0 9 5 5 2 0 5 8 6 5 7 9 6 3 ___

0 2 4 9 2 3 7 2 0 5 2 9 6 9 7 8 0 3 9 6 7 3 7 2 9 6 8 2 7 4 9 8 0 6 6 7 **2** 5 ___

2 3 7 6 2 7 0 8 2 8 0 **2** 6 4 6 3 6 9 8 1 0 3 6 9 1 0 2 8 9 1 7 9 4 5 7 7 3 8 ___

7 1 8 0 2 8 6 8 1 0 6 3 6 8 7 8 **2** 4 4 5 0 1 1 9 0 4 2 6 0 2 5 3 7 4 5 3 4 7 ___

1 2 **2** 8 0 3 6 6 8 0 7 7 8 4 9 5 6 0 3 8 0 5 1 5 5 6 7 6 3 7 6 4 6 2 9 7 7 7 ___

7 1 6 4 9 9 1 3 0 8 **2** 5 1 4 6 5 8 1 1 7 9 9 5 9 8 5 1 9 9 2 0 3 8 4 8 3 9 1 ___

Appendix 3: Snapshots of the video from our video experiment

START

END

Notebook

Glass

Haryana

Rajasthan