

Abstract

This science fair project was performed to ascertain if memory retention can be improved by coloring pictures. The science project experiment involved participants who were shown flash cards that were colored red, yellow, blue and green.

Hypothesis

Coloring flash cards will not help to improve memory retention and recall.

Scientific Terms

Psychology, memory retention, short term memory, long term memory

Background

Memory

The memory is the ability of a person to remember or memorize information and being able to recall back the information when needed. Memories can be either short or long term. Short term memories are for things like the color of the shirt we wore to work two days ago or the name of the person we were introduced to last week. These are things that are not repetitive and have minimal importance to us. Long term memories include memories from our childhood, or our job skills. These things are of significant importance to us and are repetitive either currently or sometime ago in the past.

Psychologists have found that natural colored pictures or photos are able to enhance the ability of a person to remember the details of the photo. However, when their experiments were repeated using black and white photos, memory retention fell. Similarly when the experiments were performed using pictures that were colored with false, unnatural colors, the results did not differ much from the experiments conducted with black and white photos. Therefore we can conclude that it is the natural colors that help us to remember better, not the colors themselves.

Materials

The materials required for this science fair project:

- 10 participants
- 80 flash cards
- 4 crayons – red, yellow, blue and green
- 40 sheets of paper
- 10 pens
- a stopwatch

Procedure

1. For this science fair project, the independent variable is the color of the flash cards. The dependent variable is the ability of the participants to remember the contents of the flash cards. This is determined by asking them to write down what they saw. The constants (control variables) are the duration of time they are allowed to look at the flash cards and the number of flash cards used.
2. Four sets of flash cards are used in this science project. Each set contains of 20 cards. Each set of cards are colored using different colors - the first set is colored red, the second set yellow, the third set blue and the fourth set green.
3. The 10 participants are made to sit in the same room. The first set of flash cards is shown to them one card at a time. The participants are allowed to look at each flash card for only 10 seconds before the next card is shown.
4. After all 20 flash cards are shown to the participants, the participants are each given a pen and a piece of paper. They are given 10 minutes to recall what they saw on the flash cards and to write it down on the sheet of paper. After the 10 minutes is over, to collect their notes for analysis. The number of correct answers is counted and recorded.
5. The participants are given 30 minutes to rest. After that, procedures 3 and 4 are repeated using the second, third and fourth sets of flash cards.

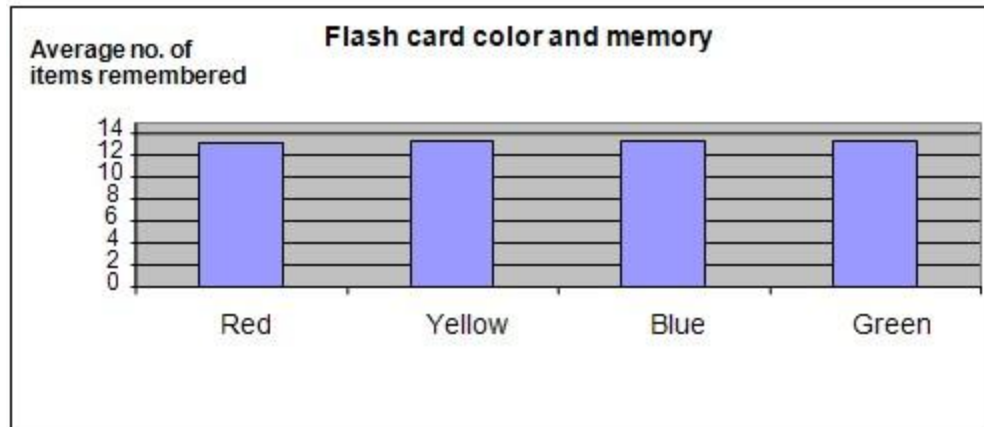
Observation

The results show that there was no significant difference in memory retention for any of the four sets of colored cards.

Flash card color Color of flash card and the number of correct memory recall Average

	1	2	3	4	5	6	7	8	9	10	
Red	12	13	13	14	13	12	15	13	14	13	13.2
Yellow	14	14	11	15	12	12	14	12	16	14	13.4
Blue	13	15	13	16	11	11	13	14	14	15	13.5
Green	12	14	12	15	13	12	14	14	15	14	13.5

The chart below represents the results of our science project experiment.



Conclusion

The hypothesis that coloring the flash cards will not help to improve memory retention, is proven to be true.

There are many books and training programs about how to improve our memory. Among the common techniques used are to repeat the words or names many times, creating a joke or funny sentence about what to remember or creating a picture in your mind about the things to remember. Also, the things we see around us are all in color. This is why looking at a picture in the natural color helps us to remember it better.

Also consider

This science fair project may be repeated, this time, using colored words instead of pictures.

Modify the science project experiment, using naturally colored photos.

References

Memory - <http://en.wikipedia.org/wiki/Memory>

What is memory retention - <http://ezinearticles.com/?What-is-Memory-Retention?&id=996416>

Color psychology memory affects - <http://www.yenra.com/color-psychology-memory-affect/>

Abstract:

Should you brush your retainers with toothpaste? Will it suffice to rinse them with mouthwash? This science fair project aims to investigate the methods available for minimizing the amount of bacteria found on dental retainers. This experiment is carried out by comparing the amount of bacteria found on dental retainers that have been subject to infrequent brushing, regular brushing with toothpaste and soaking in mouthwash.

Hypothesis

There will be greater amounts of bacteria on dental retainers if they are worn without being regularly brushed with toothpaste.

Scientific Terms

Microorganisms, bacteria, microbes, plaque

Background

Dental hygiene and retainers

Different types of microbes and bacteria can be found living inside the mouth cavity. These microorganisms live on remnants of leftover food in our mouth. Bacteria digests the starch and sugar found on the surface of our teeth and produce acids that can dissolve teeth enamel. This causes tooth decay. Bacteria in our mouths is also responsible for the formation of plaque and bad breath.

Brushing our teeth regularly with tooth paste and rinsing our mouth with mouthwash are important measures necessary for maintaining good dental hygiene. This also helps to remove plaque, prevent gum disease and tooth decay.

Dental retainers are used to maintain teeth positions after the removal of braces. . Dental retainers are usually worn more regularly just after the braces are removed, thereafter, they can be worn less regularly, according to the directions of the orthodontist. Dental retainers require daily cleaning just like our teeth do, in order to prevent food residue and bacteria from accumulating. .

Materials

The materials required for this science project experiment are:

- 12 agar Petri dishes
- 12 disinfected swabs

- 1 bottle of disinfected water
- 4 toothbrushes
- sterile gloves
- 4 participants who use dental retainers
- 4 cups of water
- 1 tube of toothpaste
- 1 bottle of mouthwash
- 1 marker pen and writing material

Procedure

1. The independent variable of this experiment is the conditions of which the dental retainers are subject to – non brushing, brushing with toothpaste and rinsing with mouthwash. The dependent variable is the amount of bacteria growth in the relevant Petri dish. This is approximately determined by measuring the size of bacteria growth using a ruler. The constants (control variables) are room temperature, amount of sunlight and the ingredients in the Petri dish agar.
2. Prepare 12 Petri dishes of agar and store them in the refrigerator. Bring them to room temperature before the start of experiment by taking them out of the refrigerator.
3. The experiment will be performed over the course of 3 days. Remember to always follow laboratory safety guidelines and always practice sterile technique when handling microbes. Never have any food or drink at your workstation and always thoroughly wash your hands with disinfectant soap or alcohol before leaving your workstation. Always dispose of used material in a biohazard bag. If none are available, the bacteria should be destroyed with bleach before being disposed of. To do this, you need to ensure that you have proper safety gear (gloves, goggles, etc). Prepare a bleach solution of at least 25% concentration (diluted with 3 parts of water). Soak the petri dishes for 24 hours in the bleach solution before disposal, always being mindful that bleach is corrosive and should be handled with care.
4. On the 1st day of experiment 4 participants are required to wear their dental retainers continuously for 24 hours without brushing their teeth. After 24 hours, the participants are requested to gargle with water for 10 seconds, and to spit out the water. This simulates conditions where a person does not brush his teeth but merely rinses his mouth with water.
5. Wash a cotton swab with sterilized water. Squeeze dry, then wipe the dental retainers with the washed cotton swab before rubbing the swab gently onto the agar surface in the Petri dish. Ensure that you cover the entire surface area of the dish (swab in at least 3 directions). This Petri dish is labeled “without brushing”. The Petri dish is then covered and incubated in a cool shaded place for 5 days, allowing the bacteria to colonise.
6. On the 2nd day, the participants will brush their teeth using toothpaste. Ensure that a regular brand/type of toothpaste is used - and have the participants use the same toothpaste. Wait for 4 hours after brushing, then

repeat procedure 5 with their dental retainers. Label the petri dishes as “after brushing with toothpaste”. On the third day, the participants will rinse with mouthwash whilst wearing their dentures (use any regular brand, and ensure that they all use the same brand), and then after 4 hours, the procedures in paragraph 5 above will be repeated. Label this batch of petri dishes as “after rinsing with mouthwash” .

7 The diameter of the bacteria colony growth is measured for each batch of petri dishes, after 5 days of incubation, and recorded in the table provided below

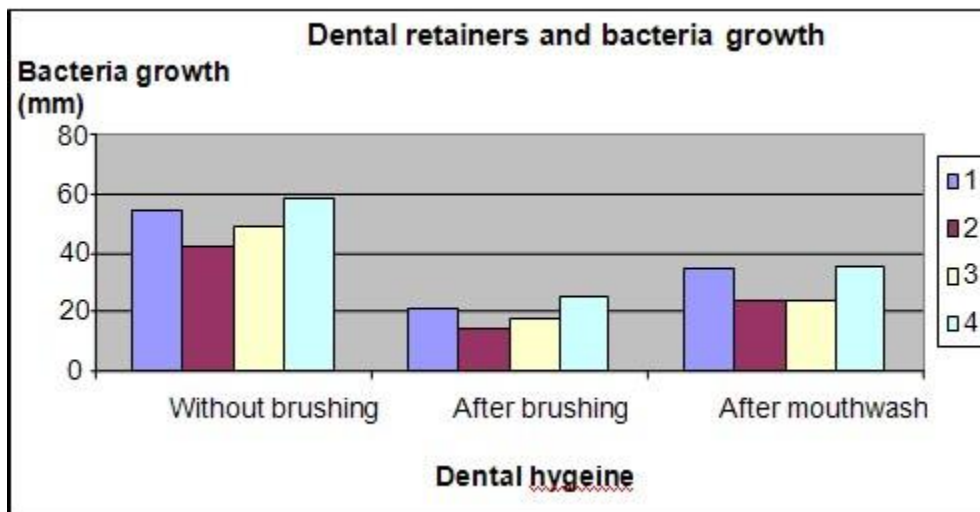
Observation

The results show that regular teethbrushing with toothpaste is able to reduce the amount of bacteria growth in the dental retainer. Mouthwash also reduces bacteria growth on the dental retainer, but is not as effective as brushing with toothpaste.

Participant no. Size of bacteria growth after 5 days (mm)

	Without brushing	After brushing	After mouthwash
1	53.5	21	34.5
2	42.5	14.5	23.5
3	49	17.5	24
4	58	25.5	35

Use the below graph to plot the results in the above table.



Conclusion

Our hypothesis was that there will be greater amounts of bacteria on dental retainers if they are worn without being regularly brushed with toothpaste. The hypothesis has been proven to be true.

Regular teeth brushing with toothpaste is important for maintaining our oral hygiene, such as helping to prevent tooth decay and reducing the amount of bacteria growth in our mouth cavities. Users of dental retainers will need to brush and clean their retainers regularly to remove the food particles that are stuck onto the surface.

Also consider

This science fair project can be repeated by varying the time allowed for the bacteria to grow - eg. 8, 12, 24 hours. It would be interesting to see how long we should or should not wait before brushing our teeth.

Try testing with different brands of mouthwash and toothpaste to see which of these are more effective.

References

How does toothpaste clean your teeth? - http://www.ehow.com/about_4596423_toothpaste-clean-teeth.html

What are dental retainers? - <http://www.wisegeek.com/what-are-dental-retainers.htm>

Retainers – what is a retainer? - <http://dentistry.about.com/od/dentalfactsfaqs/f/retainer.htm>

Abstract

This science fair project was done to find out how effective common household cleaning agents are against bacteria. The science project experiment involved using water, dishwashing liquid, Dettol and Clorox.

Hypothesis

Dettol solution is the most effective disinfectant, followed by Clorox.

Scientific Terms

Bacteria, immunity, hygiene, grease, blood agar

Background

Household cleaning agents

Bacteria are found all around us and cannot be completely eliminated from our homes. Our bodies have acquired immunity against most types of bacteria from the time we were born and therefore they are harmless to us. However there are still some bacteria around that can do us harm and that is why we have to ensure cleanliness and hygiene around us.

At grocery and department stores, so many types of soaps, detergents and disinfectants are sold. Some of these are used for personal hygiene purposes whereas others are used for floor cleaning, dishwashing or washing toilets. Some products are multipurpose cleaners that can be used to wash anything. It is best to leave the cleaning solution on the surface for a while, to allow it to become more effective in killing bacteria.

The presence of grease in the kitchen sink or other parts of the house attracts dust, mites and small insects. Grease is also the ideal place for bacteria to multiply and grow. Stronger cleaning agents are normally required to remove grease.

Materials

The materials required for this science fair project:

- 4 agar petri dishes prepared with blood agar
- 4 disinfected swabs
- 1 bottle of disinfected water
- 4 used plastic chopping boards

- tap water
- 1 bottle dishwashing soap
- 1 bottle of Dettol soap
- 1 bottle of Clorox
- 4 mackerel fish (or any other type of fish)
- 1 knife
- 1 marker pen

Procedure

1. For this science fair project, the independent variable is the type of cleaning agent used to wash the chopping board – water, dishwashing liquid, Dettol or Clorox. The dependent variable is the size of the bacteria colony in the petri dish. This is determined by measuring the size of the bacteria colony with a ruler. The constants (control variables) are the room temperature, the amount of sunlight and the ingredients in the petri dish agar.

2. The 4 petri dishes are prepared with the blood agar and stored in a refrigerator. The petri dishes are allowed to settle at room temperature before the start of the science experiment, by taking them out of the refrigerator. The petri dishes are labeled A, B, C and D.

3. The 4 plastic chopping boards are also labeled A, B, C and D. One fish is cut and de-boned on each of the chopping boards and left there for 30 minutes before the boards are washed.

4. The chopping boards are cleaned as follows (according to their number) :

1 – wash only with water

2 – wash with water and dishwashing liquid soap

3 – wash with water and Dettol solution

4 – wash with water and Clorox solution

5. The sterilized swab is first soaked with the sterilized water. The swabs are rubbed over the plastic chopping boards and rolled over the petri dishes according to the numbering. For example the swab used on chopping board 1 will be rolled over petri dish marked 1. Ensure that you roll the swab across the entire surface of the agar.

6. The cover is closed and the 4 petri dishes are kept in a cool shaded place for the bacteria to grow.

7. The diameter of the bacteria colony is measured daily for the next 5 days and recorded in the table below .



Figure 1 - Growing bacteria on petri dish

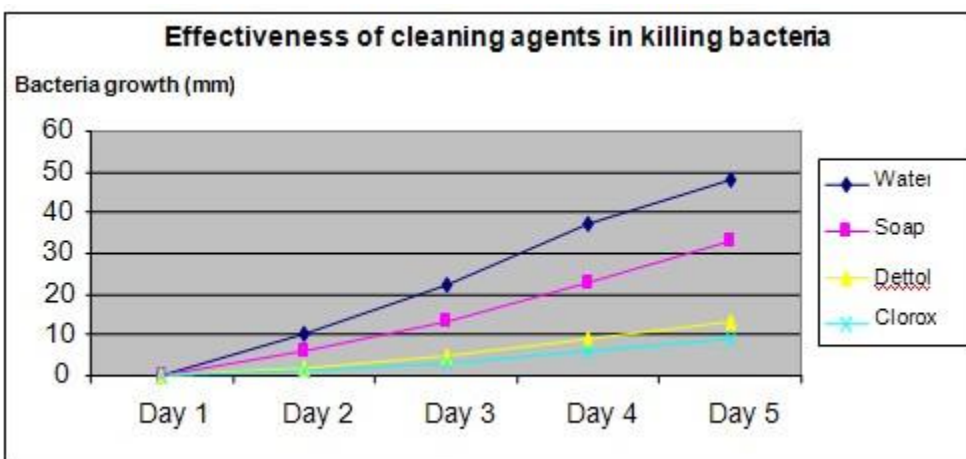
Observation

The results showed that the chopping boards cleaned with Dettol solution and Clorox solution have the least amount of bacteria remaining on the surfaces.

Cleaning Agent Size of bacteria growth over 5 days (mm)

	Day 1	Day 2	Day 3	Day 4	Day 5
Water	0	10	22	37	48
Dishwasher	0	6	13	23	33
Dettol	0	2	5	9	13
Clorox	0	1	3	6	9

The graph below represents the results of our science project experiment.



Conclusion

Our hypothesis that Dettol was the most effective disinfectant, was proven to be false. Clorox was the most effective disinfectant, followed by Dettol, and then the dish-washing soap.

There is rising concern that frequent use of antibiotics is causing bacteria to mutate and become more resistant. The same concern is being raised regarding overuse of antibacterial soaps and similar cleaning agents.

Also consider

Try to repeat the science fair project using other cleaning detergents like antibacterial soap, Listerine or Bleach.

References

How effective are alternative household cleaners? - <http://www.uwex.edu/news/2001/3/how-effective-are-alternative-household-cleaners>

Bacteria and household cleaners - <http://www.articlegarden.com/article.php?id=24882&act=print>