Senses and the Nervous system: Touch

Purpose: To investigate the relationship between the memory of touch, timing and location on the body.

Hypothesis: The longer the time, the poorer the memory will be because the brain forgets where the location is, also there are different memory levels because different parts of the body have different receptors.

The body touches something and the receptor responds by turning it into electrical (impulses) that travel through the nerve bundle to the center cerebrum. (Major system of the body, 2002)

Variable:

- Independent:

  -time (5,10,15 second)

  - location (hand ,arm and leg)

  -subjects (10 people, grade 10a class, boys and girls)
- Dependent:

  - how accurately the subject can identify the point of the original spot and the subject's chosen spot.
- Control Variable:

  - same location (of the point)

Apparatus:

- subjects
- probe (pen)
- stopwatch
- result table
- ruler

Method:

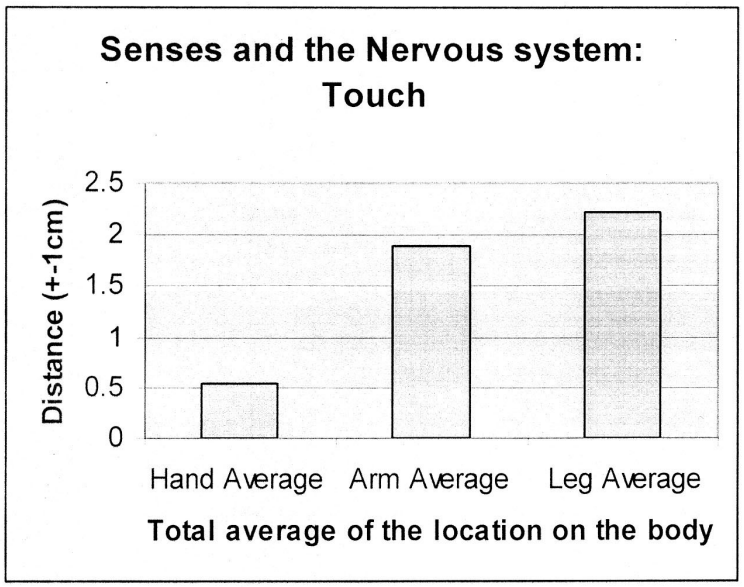
1. draw a result table
2. get apparatus
3. get one subject and start doing the experiment on them by first asking them to close their eyes
4. first touch them on their hand
5. (eyes is still closed) give them five second and give he/she the pen to mark the spot
6. measure the distance between the original spot and the subject chosen spot and write it down on the result table.
7. Repeat that three times to get the most accurate result
8. repeat from step three to step seven with the arm and the leg.
9. Take the results and draw a graph

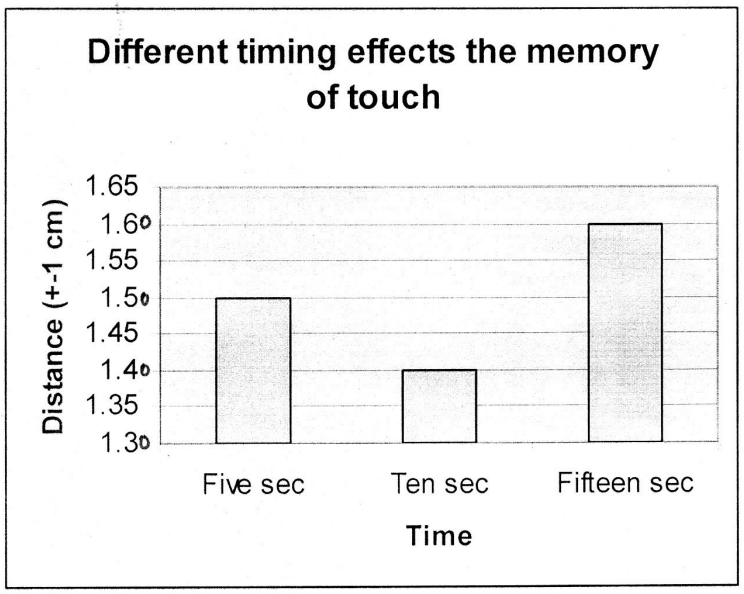
Safety Precautions: In this experiment there are not safety precaution requirements.

Subjects	hand (+-1 cm) First try 5 sec	[redacted] seconding 10 sec	third try 15 sec	arm (+-1 cm) 1st try 5 sec	2nd try 10 sec	3rd try 15 sec	Leg (+-1 cm) 1st try 5 sec	2nd try 10 sec	3rd try 15 sec
1	0.8	0.3	1	5.2	1	4	0.1	1.9	1
2	0.3	1	0.2	1	2.5	1	3.2	3.1	3.4
3	0.1	0.2	0.5	1	1.2	1.8	0.3	6.4	1.8
4	0.3	0.1	0.4	2.5	1.7	2.4	2	1	1.5
5	0	0.4	0	1.2	2.5	1.7	1.5	1.8	2
6	1.3	0.7	1	3.5	0.7	2.5	4	1.5	2.3
7	1.5	0.2	0.1	4.5	1.1	0.8	0.5	2.7	1.5
8	0.8	0.1	0.7	1.2	0.1	1.3	2.5	2	2.1
9	0.5	0.6	0.7	1.2	1.1	5	1.6	3.1	4.4
10	0.2	1.1	0.7	2.8	0.3	0.7	2.3	1.5	4

Result:

Subject: (name)	Hand (+-1 cm)				Arm (+-1 cm)				Leg (+-1 cm)			
	1st (5 sec)	2nd (10 sec)	3rd (15 sec)	Average	1st (5 sec)	2nd (10 sec)	3rd (15 sec)	Average	1st (5 sec)	2nd (10 sec)	3rd (15 sec)	Average
1	0.8	0.3	1	0.7	5.2	1	4	3.4	0.1	1.9	1	1
2	0.3	1	0.2	0.5	1	2.5	1	1.5	3.2	3.1	3.4	3.2
3	0.1	0.2	0.5	0.27	1	1.2	1.8	1.3	0.3	6.4	1.8	2.8
4	0.3	0.1	0.4	0.27	2.5	1.7	2.4	2.2	2	1	1.5	1.5
5	0	0.4	0	0.13	1.2	2.5	1.7	1.8	1.5	1.8	2	1.7
6	1.3	0.7	1	1	3.5	0.7	2.5	2.2	4	1.5	2.3	2.6
7	1.5	0.2	0.1	0.6	4.5	1.1	0.8	2.1	0.5	2.7	1.5	1.6
8	0.8	0.1	0.7	0.53	1.2	0.1	1.3	0.8	2.5	2	2.1	2.2
9	0.5	0.6	0.7	0.6	1.2	1.1	5	2.4	1.6	3.1	4.4	3
10	0.2	1.1	0.7	0.7	2.8	0.3	0.7	1.2	2.3	1.5	4	2.6
Total Average	**0.58**	**0.47**	**0.53**	**0.53**	**2.41**	**1.22**	**2.02**	**1.89**	**1.77**	**2.5**	**2.48**	**2.22**





Conclusion:

In this investigation I founded out that the location of the hand showed the best (effective memory) result of the memory of touch, arm is the second and leg is the less because there are different memory receptors in different parts of the body. In the timing, ten second showed the closest between the two probes location and than the five second and fifteen has the farthest. This is because the subjects have a longer time to think about where the location was. The locations results fitted with my hypothesis, however the timing did not fit because in my hypothesis I said that "The longer the time, the poorer the memory will be because the brain forget where the location was, also there are different memory because different parts of the body has different receptors." The timing result is not supporting my hypothesis. By look at my graphs it showed patterns, that the hand is more sensitive than the arm and the leg.

This table showed the receptors, location and its function.

Name	Location	Function
Hair Follicle Ending	Hairy Skin Areas	responds to hair displacement
Ruffini Endings	Dermis of hairy and glabrous skin	responds to pressure on skin
Krause corpuscle	Lips, tongue, genitals	responds to pressure
Pacinian corpuscle	Deep layers of demis in hairy and glabrous skin	responds to vibration sensitive at 150-300 Hz range
Meissner corpuscle	Demis of glabrous skin	responds to vibration sensitive at 20-40 Hz range
Free nerve endings	Throughout your skin	different types of free nerve endings respond to mechanical, thermal, or noxious stimulation
Merkel	Epidermis of glabrous skin	responds to pressure of the skin

Timing does effects the memory of touch. If there is too little time, than the person will not be able to remember where the location of the touch was and if it is too long than it is possible that the person can forget (or lose their memory), that is why after fifteen second (which was the longest time) showed that many of the subjects forgot where the touch was.

The different parts of the body, showed different results because there are different receptors in different parts of the body. In the hand there are a receptor that are sensitive to minute touches, they are called Meissner's corpuscles (they are also found in feet, lips, and genital organs). The Merkel cells can detect very light touch (they are located in the lower layer of the epidermis). There are many other receptors that located in different layers in the skin and each respond to different sensations, however they are not as sensitive to minute touches. This is why the arm and leg proved to be least sensitive. The subjects did not receive the message and could not remember. The hand has more receptors of minute touch, therefore the message was received strongly and the subjects could remember well. In conclusion, the arm and leg is the poorest location for memory and hand is the most effective location.

To be able to write this conclusion, I have used the book *21st Century Science, Major Systems of the Body*; *Biology for you* and *A natural history of the senses* to help me understand more information about the sense of touch.

Evaluation:

My method was reliable because I repeated the same experiment three times to get the average and I was experimenting on ten subjects, and all of them gave similar results, therefore the data is valid. If I was to do this again, I would change the time interval because I could see if that has more effect on the memory of touch, to get more accurate data of the time effect. I could also experiment on different age groups, to test if memory is linked to age. Also I could experiment on the male and female, to see the relationship between the sex of the subject and the sensitivity of the receptors.

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Book

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