

Rate Of Blinking Among Medical Students In Delta State Nigeria: Is The Eyelid A Polygraph?

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Abstract

The rate of blinking, which is the rapid closing and opening of the eyelid was studied in 24 volunteers students of both sexes, male (n=18) and female (n=6) of Delta state university medical school. Five different test modalities were used in this study, which include reading aloud a page of written prose, recounting of all meals and snacks taken in the past 24 hours, serial seven subtraction from one hundred, creation of false identity story and subject being asked about awareness of interruption of vision by blinking. Navigators have been known to use the eye blink method as a shortcut to roughly estimate distance-off. Also children with disabilities have also been known to use eye blink method to manipulate a computer. The aim of this study therefore was to find out if the eyelid can also be used as a polygraph. It was observed that the rate of blinking was lowest when a subject was focused on the paper and reading. This was used as Baseline. There was a large increase in the rate during activities which involve memory, calculation, and creating a story. This therefore can be used to detect a mental fabrication in Progress. Most subjects were not aware of the blinking activity. In conclusion: mental activities which involve memory recall, concentration and calculations and fabrications of stories increase the rate of blinking up to 25 times from the value when reading. This can be used to detect lies in an unsuspecting subject. It is therefore recommended that further studies aimed at corroborating these findings be carried out.

INTRODUCTION

If I see the sun and it makes me blink, what I see is not 93,000,000 miles and eight minutes away, but is causally (and therefore spatio-temporally) intermediate between the light-waves striking the eye and the consequent blinking ¹

Blinking is the rapid closing and opening of the eyelid. It is an essential function of the eye that helps spread tears across and removes irritants from the surface of the cornea and conjunctiva. On average, a blink takes approximately 300 to 400 milliseconds ² Blink speed can be affected by elements such as fatigue, eye injury, medication, and disease. A person approximately blinks once every two to ten seconds. The blinking rate is determined by the "blinking center", but it can also be affected by external stimulus. When an animal (usually human) chooses to blink only one eye as a signal to another in a social setting (a form of body language), it is known as winking. However, some animals (for example, tortoises and hamsters) blink their eyes independently of each other ³

Blinking provides moisture to the eye by irrigation using tears and a lubricant the eyes secrete. The eyelid provides

suction across the eye from the tear duct to the entire eyeball to keep it from drying out. Blinking also protects the eye from irritants. Eyelashes are hairs attached to the upper and lower eyelids that create a line of defense against dust and other elements to the eye. The eyelashes catch most of these irritants before they reach the eyeball ³. On the edges of the eyelids are a number of small glands, the Meibomian glands, which produce a fatty secretion that lubricates the eyelids themselves and the eyelashes. ⁴

Infants do not blink at the same rate of adults; in fact infants only blink at an average rate of one or two times in a minute. The reason for this difference is unknown, but it is suggested that babies do not require the same amount of eye lubrication that adults do because their eyelid opening is smaller in relation to adults. Additionally, infants do not produce tears during their first month of life. Babies also get a significant amount more sleep than adults do, and, as discussed earlier, fatigued eyes blink more. However, throughout childhood the blink rate increases, and by adolescence, it is usually equivalent to adults ⁵

Women and men do not differ in their rates of spontaneous

blinking ₆ averaging around 10 blinks per minute in a laboratory setting. However, when the eyes are focused on an object for an extended period of time such as when reading, the rate of blinking decreases to about 3-4 times per minute. This is the major reason that eyes dry out and become fatigued when reading ₃.

Eye blinking can be a criterion for diagnosing medical conditions. For example, excessive blinking may help to indicate the onset of Tourette syndrome, strokes or disorders of the nervous system. A reduced rate of blinking is associated with Parkinson's disease. Parkinson's patients have a distinct, serpentine stare that is very recognizable ₃.

There are multiple muscles that control the reflex of blinking. The main muscles, in the upper eyelid, that control the opening and closing are the orbicularis oculi and levator palpebrae superioris muscle. The orbicularis oculi closes the eye, while the relaxation and contraction of the levator palpebrae muscle opens the eye. The Muller's muscle, in the upper eyelid and the inferior palpebral muscle in the lower eyelid are responsible for widening the eyes. These muscles are not only imperative in blinking, but they are also important in many other functions such as squinting and winking ₅.

Navigators have been known to use the eye blink method as a shortcut to roughly estimate distance-off ₆. Also children with disabilities have also been known to use eye blink method to manipulate a computer ₇. We aim therefore to find out if the eyelid can be used also as a polygraph

MATERIALS AND METHOD

24 volunteers students of both sexes, male (n=18) and female (n=6) of Delta state university medical school were observed by an observer who carried out several activities. Age range of students used was between 20.73-24.04 years. The observer sat face to face with each volunteer and number of times each volunteer blinked in one minute of activity was counted with the aid of a stop watch. Five test activities were carried out thus

1. Reading aloud a page of written prose.
2. Recounting of all meals and snacks taken in the past 24 hours
3. Serial seven subtraction from one hundred
4. Creation of false identity story
5. Subject is asked of awareness of interruption of

vision by blinking

Results were recorded, analyzed and summarized below

RESULTS

Figure 1
Summary Of Results

B. R (reading)/min	B.R(recent Memory)/min	B.R(attn & conc)/min	B.R(Creative story)/min	Aware of vision interruption
1.7+/- 0.86	45.4+/- 16.2	39.8+/- 9.2	41.95+/- 9.8	20 NO, 4 YES

DISCUSSION

Rate of blinking was lowest when a subject was focused on the paper and reading. This was used as Baseline. There was a large increase in blinking rate during activities which involve memory, calculation, and creating a story. This therefore can be used to detect a mental fabrication in Progress. Further study would be needed to confirm this. Most subjects were not aware of the blinking activity

CONCLUSION AND RECOMMENDATION

Mental activities which involve memory recall, concentration and calculations and fabrications of stories increase the rate of blinking up to 25 times from the value when reading. This can be used to detect lies in an unsuspecting subject.

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