

# ⊖ Paradox ( private beta )

Shimron Alakkal

*This paper engages with proving the existence of a theoretical paradox that are based on fundamentals of math concepts.*

Check out <https://www.github.com/ShimronAlakkal> for more updates on this paper.

## Introduction:

This experiment shows us a theoretical paradox of the relationship between an angle,  $\theta$ , made by a stretched line from two stationary points on a line from time  $t = 0$ s to  $t = t_s$ . (refer to figure 1)

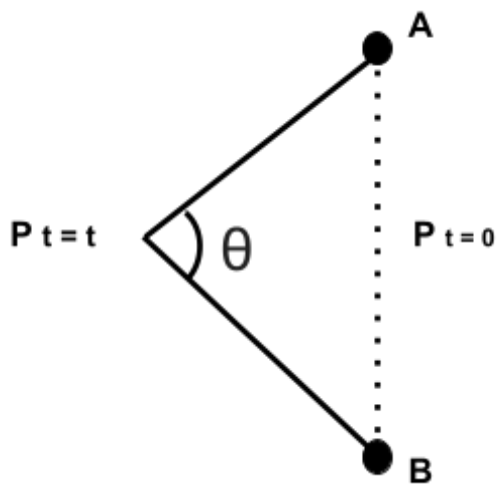


Figure 1

# Hypothesis

## Part 1 :

Assume that 'A' and 'B' are two stationary points on a single plane, separated by a constant distance 'x' ,

'x'  $\neq 0$  or  $0 < x \leq \infty$  (only considering 2D now), which are joined by a line 'AB', which is an infinitely stretchable line.

At a time  $t = 0s$  -- which is the initial time -- the angle  $\theta$  between the points is 180 degrees ( $\pi$  rad).

At a time  $t = t$  , i.e. when the line is stretched from a specific point (point of stretching ) and the angle is made between the points 'A' and 'B' , opposite to the direction of stretch of line which is always  $< 180$  degrees ( $\pi$  rad) and a perpendicular distance, say 'y' is made from the point used for stretching to the final destination at time  $t = t$  (which would be y).

(refer to figure 2.1 and 2.2)

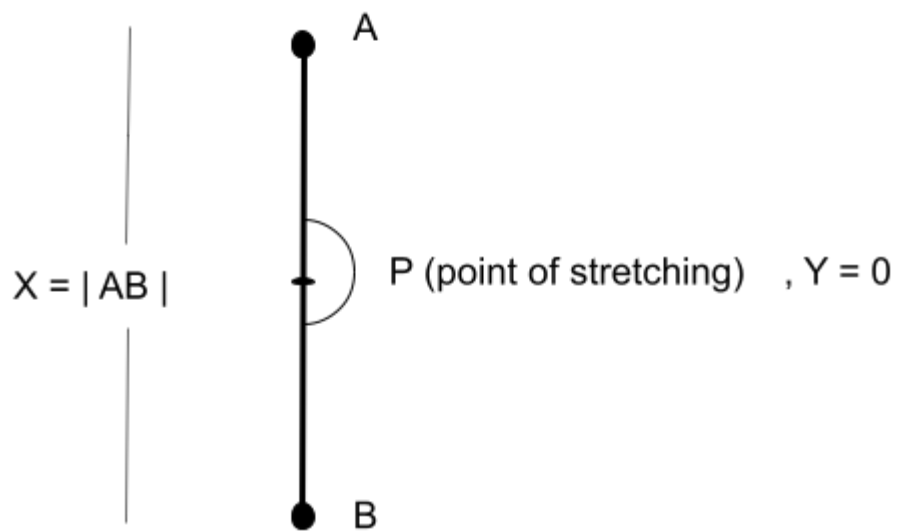


Figure 2.1, Initial state of line

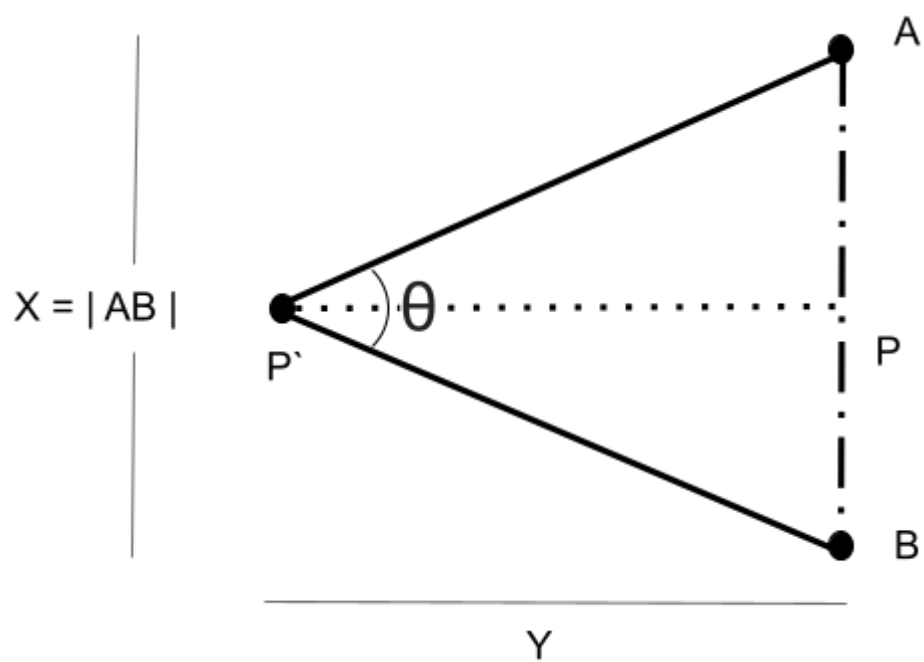


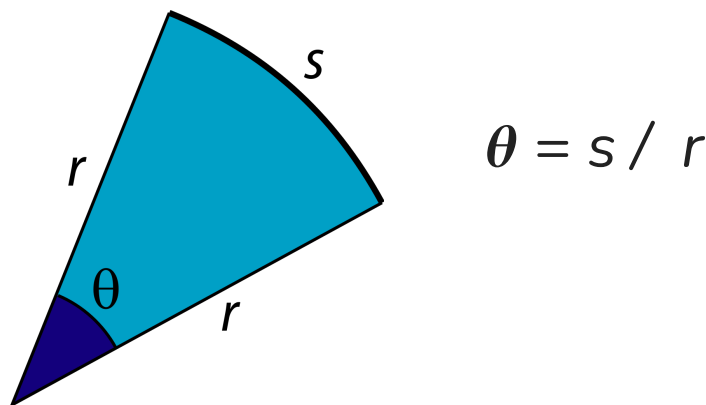
Figure 2.2, final state at a time  $t = t$ ,  $\theta < 180$

As long as **y** is stretched the angle  $\theta$  is always  $< 180$ .  
 The graph of the relation between angle as a function of distance from **P** to goes similar to that of a  $f(x) = 1/\log(x)$  graph.

From figure 2.2, we get (eq 1):

$$\theta \approx AB / PB = AB / PA = x / PB$$

It is known that central angle in a circle subtended by an arc length ( in radian ) = Arc length / radius



When a circle has an infinite radius, a tangent to a part of the circle would be parallel to the circle, passing through the circle itself. Therefore, A

## CIRCLE WITH AN INFINITE RADIUS IS A STRAIGHT LINE.

When the line (stretchable line between points A and B taken above) is stretched so that the magnitude of the perpendicular vector distance between the initial point of stretching and the final point is infinite, the angle **AP'B** is  $0^\circ$ . (refer to figure 3)

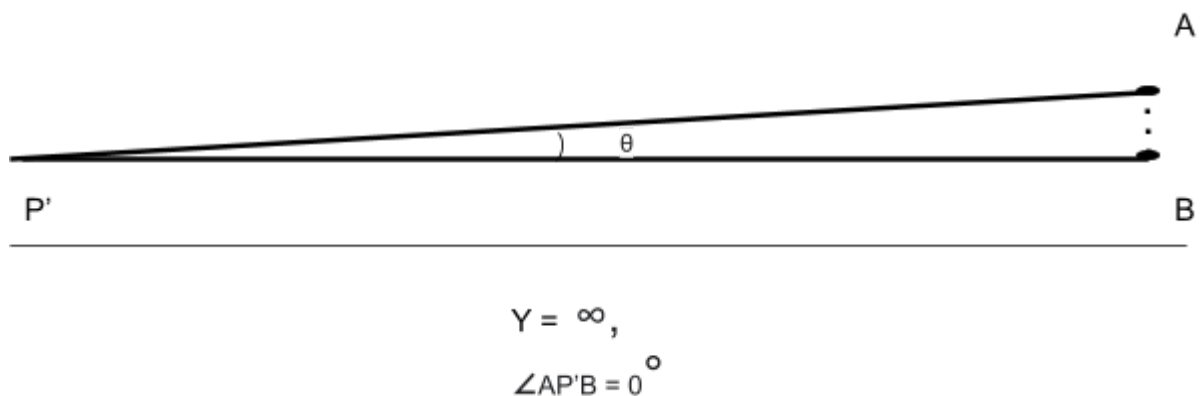


Figure 3

The above picture shows **P'** extended from a point **P**, which is the midpoint of **AB** (taken for ease of solving).

The above image is also scaled to pictorially represent an infinite distance. The magnitude of **AB** is still **X** units and will always be throughout.

## Math:

From figure 3, when  $y = \infty$  .

$$\theta = AB / P'B \quad \dots \text{ [ circle with infinite radius is a line ]}$$

Here **AB** can be a part of a circle with a radius =  $y = \infty$  ,

Central angle subtended by an arc on a circle =

$$\theta = AB / P'B = x / P'B$$

$$\therefore \theta = x / \infty$$

$$\therefore \theta = 0 \text{ rad} = 0^\circ \quad \dots \text{ [ Any number divided by infinity is equal to 0 ]}$$

Since the distinct parts of the lines, namely **P'A** and **P'B** from the point **P'** are originating from the same point and since  $\theta = 0^\circ$  (**angle between P'A and P'B**), it is safe to say that these are the same lines when  $y = \infty$ .

$$\text{i.e} \quad |P'A| \cong |P'B|$$

. i.e. the lines  $P'A = P'B$  and are both one and the same and they start and end at the same point  $P'$  and  $P$ , respectively.

**BUT** we've always had a stationary distance separating these lines, 'x' which is not changing throughout the process, which is never going to be **0** even when the distance  $y = \infty$ .

$$\Rightarrow 0 < x \leq \infty$$

$$\Rightarrow \theta \neq 0, \text{ or } \theta > 0$$

**But  $\theta$  is 0** at an infinite value for  $y$  which make rise a Paradox.



Please contact Shimron Alakkal using the below link for any corrections or other opinions  
<https://www.instagram.com/shimron.alakkal> or [shimron.alakkal1804@gmail.com](mailto:shimron.alakkal1804@gmail.com)