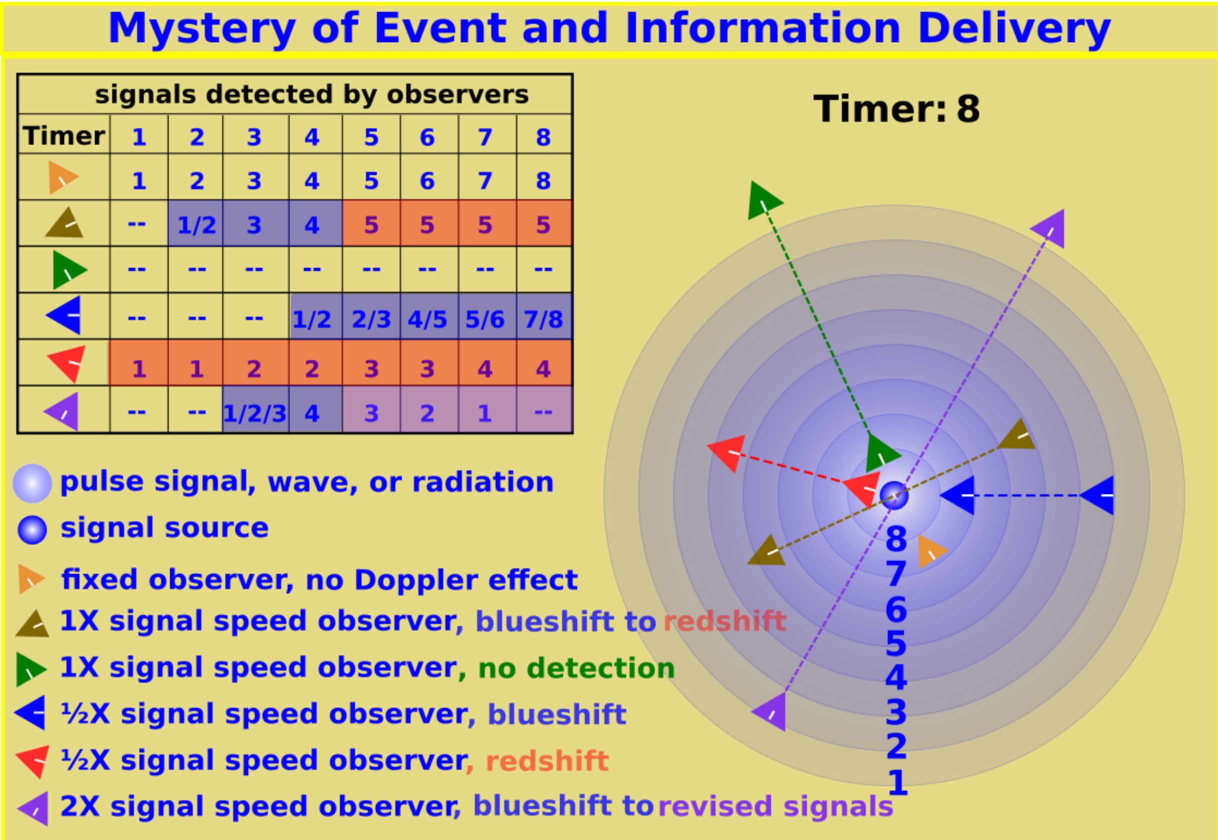
Event and Information

事件與資訊

Illusion Of Information Delivery

Cres Huang



Event and Delivery of Information

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Abstract

Our perception of the universe rarely is direct physical interaction. Instead, it is the information of the physical events collected by detectors. Information is only the description of the event, not the source event. A butterfly is an event. However, we perceive it's information transported by light. Other butterflies collecting the information of it's smell. However, neither the sight nor the smell tells the whole story of the butterfly. Essentially, observation is a special case of transportation of stream of packages of information. The order and interval of the arrival of signals would affect the perception of the observer. One important issue to consider is, not all packages are received by the observer. We can catch more packages with high-speed recorder, however, many mores are lost, not to mention there are packages of signals that is beyond us. We can be fooled by what we see.

Analogy	Game	Mail	Music	Observation
Sender	pitcher	addresser	stereo	object
Package	ball	letter	music	sight
Carrier	momentum	postal	air	E.M. waves
Receiver	catcher	addressee	listener	observer

When continuous packages are sent from different locations, and the receiver is moving from place to place; Packages would not necessarily reach the receiver in the same order and interval initiated by the sender.

Like transportation in real word, bottleneck can also happen when:

- Event is happening faster than the delivery speed of information, or
- delivery is faster than the response time of the observer.

It can overwhelm the observation and create multiple exposures of clouded information. Basically, an event can only be at a certain location and time, however, it's information can spread wide into it's environment to countless observers. Yet, even if the source has ceased to exist, it's waves can continue to traverse. The top speed information we detect is light. However, we are somehow confused by the information delivered at light speed and it's underlying event.

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1 Introduction

Our perception of the universe rarely is direct physical interaction. Instead, it is the information of the physical events collected by our sensors. Information is only the description of the event. It is not the source event. The issue is, sometime we can not separate the event and it's information, and even fooled by it. A butterfly is an event. However, we perceive it's information transported by light. So is other butterflies collecting the information of it's smell. However, neither the sight nor the smell tells the whole story of the butterfly.

Except the direct contact, information has to be delivered over a distance. Essentially, observation is also an issue of transportation. A real life comparison is illustrated in Table 1:

Analogy	**Game**	**Mail**	**Music**	**Observation**
Sender	pitcher	addresser	stereo	object
Package	ball	letter	music	sight
Carrier	momentum	postal	air	E.M. waves
Receiver	catcher	addressee	listener	observer

Table 1: Analogy of Transportation

We know pitching a ball forward on a forwarding vehicle will increase the speed of the ball. Yet, it seems that there is a confusion of the speed of light emitting from a moving source. The fact is, the combined momentum of the pitcher and the vehicle will pass onto the patched ball. However, the momentum of the source will not pass onto it's light or sound. Neither the delivery speed of it's sight nor sound would be changed by the velocity of the source. Basically, information of sight, sound, smell, and etc., will be delivered independently to the able observers in different speed subject to the carrier and the en-route environment.

The issue is, when continuous packages are sent from different locations, and the receiver is moving from place to place; Packages would not necessarily reach the receiver in the same order and interval initiated by the sender. Bottleneck can also happen when event is happening faster than the delivery speed of information, or the delivery is faster than the response time of the observer. It can overwhelm the observation and create multiple exposures of clouded information.

2 Event and Information

Here, an event is defined as any activity at a given location and time. The existence of an object is an event; It's activity is also an event. Action is activity, and inaction is also activity. A live butterfly is an event, it's activity is also an event. A event can be as large as the universe as a whole, or as small as a fundamental particle resides at one location at shortest duration.

An apple has limited physical structure. However, we can only collect few basic information, look, fell, taste, smell, sugar, water, vitamin, mineral, and etc. The activities in it's atomic level are beyond measure. It is impossible to observe or record the complete information of it's duration of existence. There are look-likes, nevertheless, never same apples. Logically and physically, no two particles can be identical. They will no act in absolute parallel and will not allow other to co-occupy the same location. The rest of the universe is the complement of an identified particle[1]. No other particle can have the same set of complement. This unique identification of any object is maintained from micro to macro world. It is also true that the rest of the universe is the complement an event.

On the other hand, a single event can have countless observers, and the information collected can be personal. The format and volume of the information can only be considered unlimited. It can spread wide to the furtherest reach of the universe. And, outlasts the existence of it's source event. Nonetheless, it does not tell the whole truth of it's underlying event. The issue is not only the perception of the observer, but also the transport of the information.

2.1 Information and Virtual Reality

With the information collected, we can simulate the physical events. We use the recorded sound to fool wildlife. We can create visual illusion of physical events with video projection, hologram, 3D display, or reenacting. We can even feed the signals into the brain to crease virtual reality. However, it is only the presentation of information, which is limited by the data collected. Nevertheless, virtual reality is only the replay of the information to make believe of targeted observers. And, information can be manipulated. It can be far from the truth of original event, the reality of the universe.

3 Event and Information Analogy

Here is a nice photo of stone skipping found on the web[1], Figure 1. The interesting part is the first water wavelet would arrive first to the thrower, however, the last wavelet would arrive first to the second observer on opposite site (Lady Pink). The third observer (Mr. Blue) at the side path of the stone would observe the wavelets arriving in more complicate pattern. The arrival is determined by the location and time the wavelet is created. Basically, the wavelet created earlier at closer location will arrive first, not necessary the same order and interval of creation.

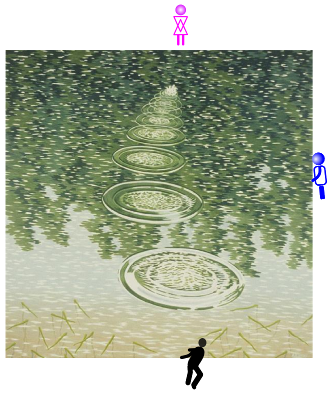


Figure 1: Stone skipping

Even we can only see the water waves in the photo. However, we know there is also disturbed air molecules by the skipping stone. Air is thinner fluid than water, however, it's wave behavior would comply the same physics of fluid dynamics. We know wind, water waves, and the stone would move in different speed. If it is a whistle stone, it's whistle would travel at the speed of sound.

Yet, all three observers can see the reflected light from the stone. Regardless of the speed of the stone, light would also travel at it's own independent speed. The motion of the stone can only affect the location of origination, not the delivery speed. The momentum of the stone will pass on to the air and water molecules along the trajectory, but not the sound or light.

Now, let say there is a fish in the lake watching the play. The under water view is depicted in Figure 2. It will see the underside of the surface interface of stone, water, and air; as well as the sight and sound of the action. It can also detect the change of water pressure. Nevertheless, the delivery speed of each information is also independent, and determined by the environment of liquid water. In addition, the quality of the information is also different. The question is, would the fish figure out what is going on?

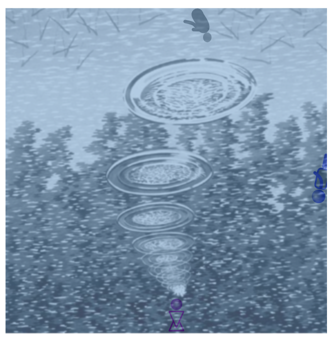


Figure 2: Underwater view

[1] http://www.alanbray.com/images/SkippingStones.jpg

4 Information Transport Analogy

The analogy of delivery can be illustrated with a catcher and his ball pitcher, Figure 3.

Figure 3: Catcher and his ball pitcher

- The ball pitcher is fixed at 40 meters away.
- There are 3 balls to be pitched.
- It will pitch one ball per 10 seconds straight to the catcher.
- The average ground speed of the ball is 20 meters per second.

As depicted in left side of Figure 4, it takes pitcher 20 seconds to finish pitching all three balls.

1. First ball, red, is pitched at 00:00:00.
2. Second ball, green, at 00:00:10.
3. Third ball, blue, at 00:00:20.

It also takes catcher 20 seconds to finish receiving all three balls, right side of Figure 4.

1. Red ball is received at 00:00:02.
2. Green ball at 00:00:12.
3. Blue ball at 00:00:22.

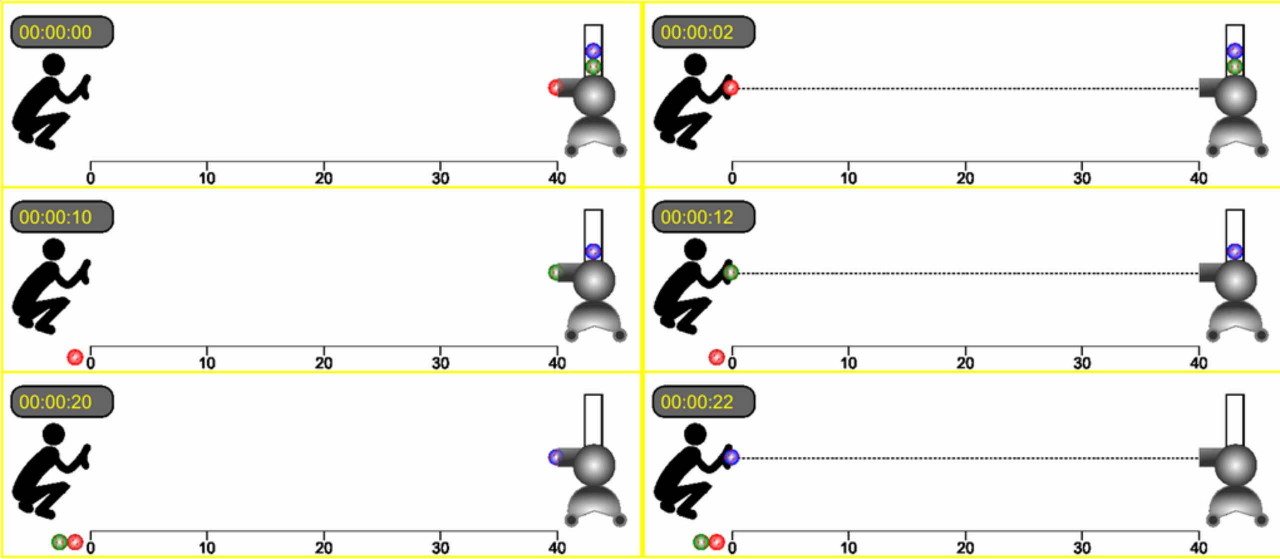


Figure 4: Catcher and his fixed ball pitcher

4.1 Approaching Ball Pitcher

Say, the pitcher is moving toward the catcher one meter per second on average, till last ball is pitched. The average ground speed of the ball remains 20 meters per second.

It takes pitcher 20 seconds to finish all three balls, as depicted in left side of Figure 5.

1. Red ball is pitched at 00:00:00 from 40 meters away.
2. Green ball at 00:00:10 from 30 meters away.
3. Blue ball at 00:00:20 from 20 meter away.

However, it only takes catcher 19 seconds to receive all three balls, right side of Figure 5.

1. Red ball is received at 00:00:02 from 40 meters away.
2. Green ball at 00:00:11.5 from 30 meters away.
3. Blue ball at 00:00:21 from 20 meter away.

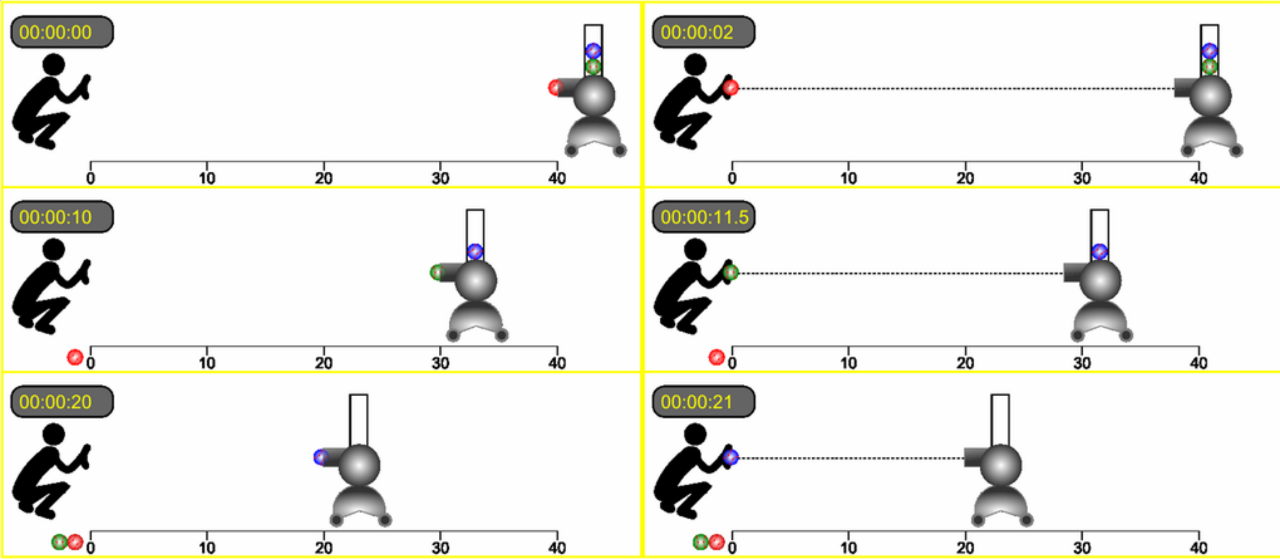


Figure 5: Catcher and his approaching ball pitcher

And the arrival rates are:

1. Green ball 9.5 seconds later after red ball.
2. Blue ball arrives 9.5 seconds later after green ball.

4.2 Departing Ball Pitcher

This time, the pitcher is located at 20 feet away. It is moving away from the catcher at the average speed of one meter per second, and it will stop moving when last ball is pitched. It is also assume the average ground speed on the ball remains 20 meters per second.

Again, it still takes pitcher 20 seconds to finish, as depicted in Figure 6.

1. Red ball is pitched at 00:00:00 from 20 meters away.
2. Green ball at 00:00:10 from 30 meters away.
3. Blue ball at 00:00:20 from 40 meter away.

However, it takes catcher 21 seconds to receive all three balls.

1. Red ball is received at 00:00:01 from 20 meters away.
2. Green ball at 00:00:11.5 from 30 meters away.
3. Blue ball at 00:00:22 from 40 meter away.

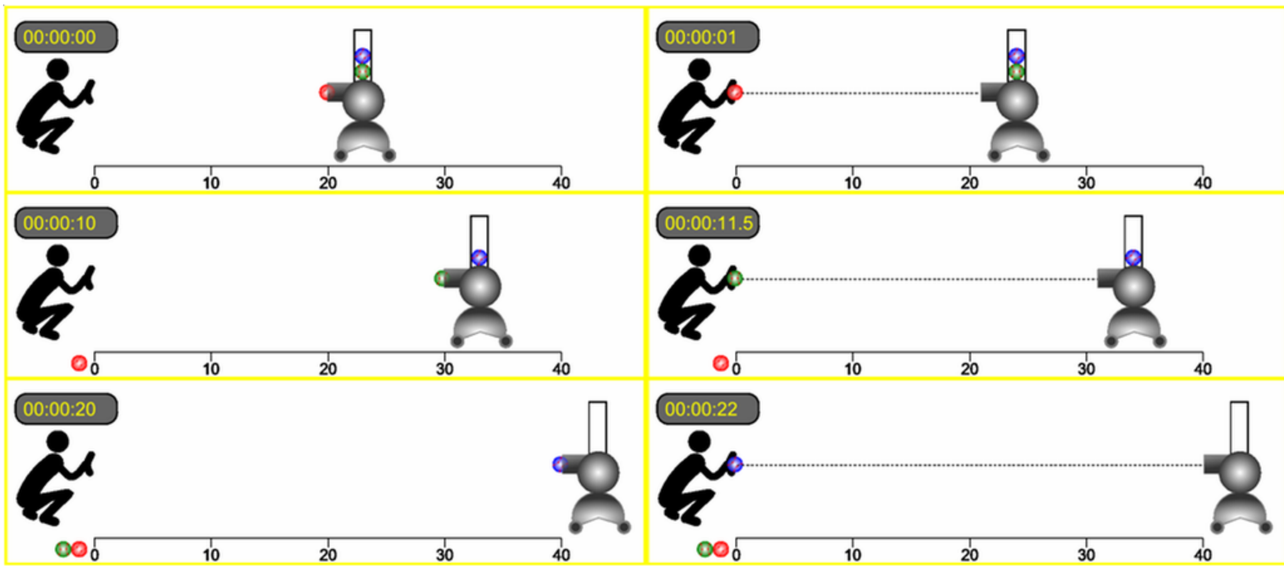


Figure 6: Catcher and his departing ball pitcher

And the arrival rates are:

1. Green ball arrive 10.5 seconds later from red ball.
2. Blue ball also arrive 10.5 seconds later from green ball.

4.3 Dynamic of Moving Pitcher

As depicted in Figure 7, let's say the ball pitcher is moving toward the catcher in identical ground speed with the ball.

- The ball pitcher is located at 1000 meters away.
- There are 3 balls to be pitched.
- It will loft one ball per 10 seconds to catcher.
- The average ground speed of the ball is 25 meters per second.
- The average ground speed of the ball pitcher is also 25 meters per second.
- Ball pitcher will stop moving when last ball is pitched.

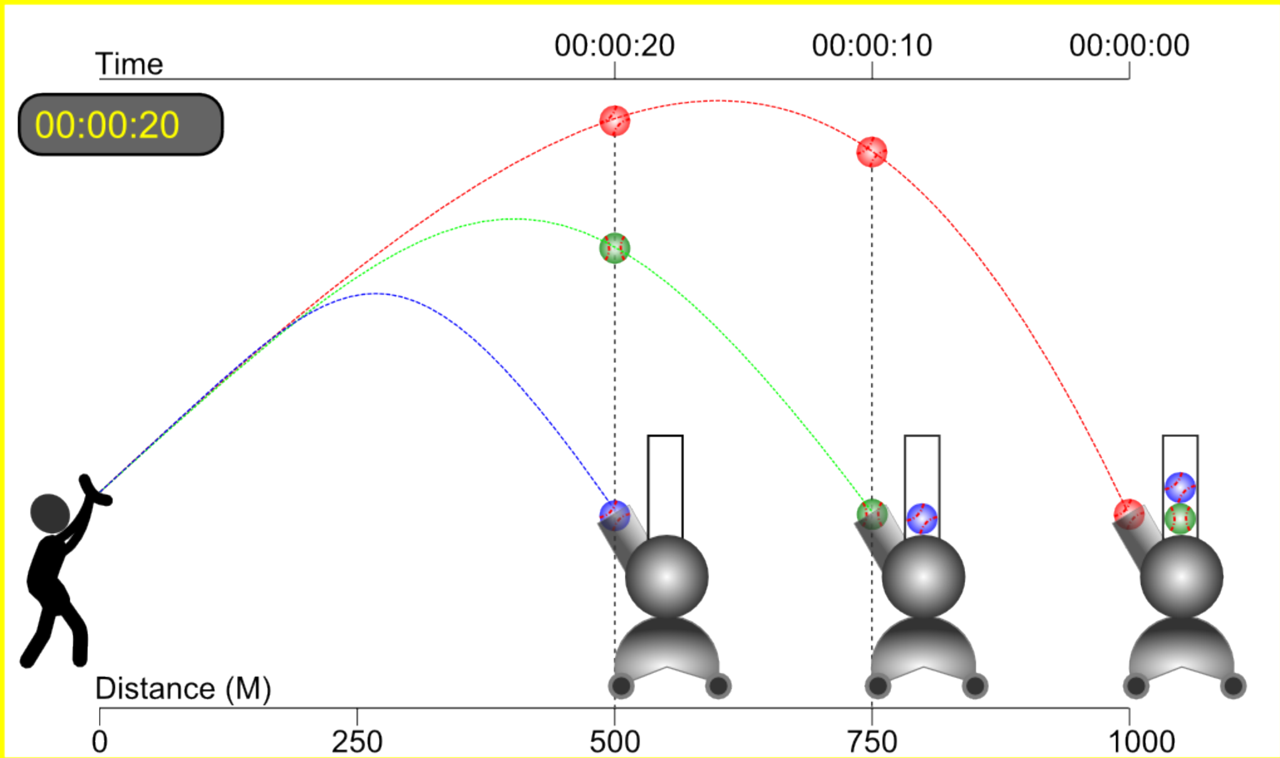


Figure 7: Ball pitcher and ball travel at same ground speed

1. Red ball is pitched at 00:00:00 from 1000 meters away.
2. Green ball at 00:00:10 from 750 meters away.
3. Blue ball at 00:00:20 from 500 meter away.

At 00:00:20, all three ball are aligned at 500 meter mark at the time the blue ball is launched. Assume all balls are off alignment from the side and no midair collision. They will arrive about the same time by 00:00:40, Figure 8.

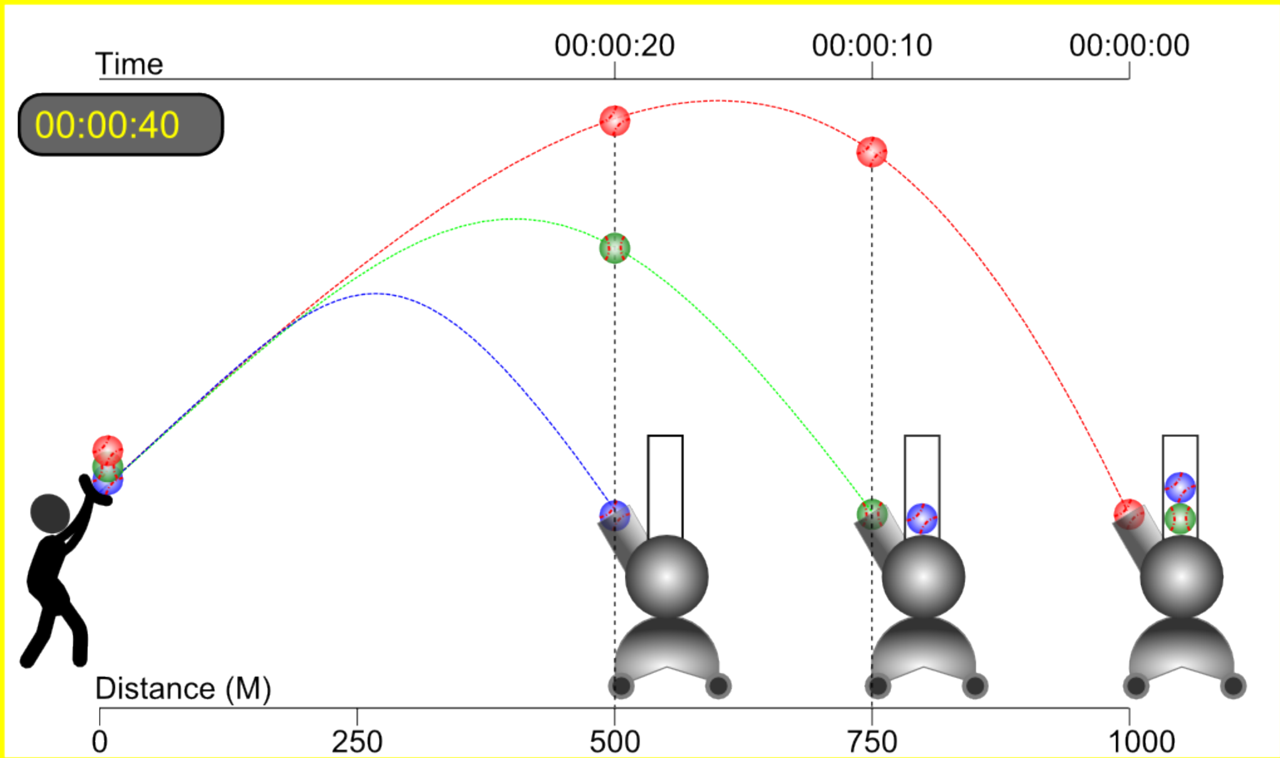


Figure 8: All arrival at the same time

Next, suppose the average ground speed of the ball is only 20 meters per second, and ball pitcher remains 25 meters per second on average:

1. Red ball is pitched at 00:00:00 from 1000 meters away.

2. Green ball at 00:00:10 from 750 meters away.

3. Blue ball at 00:00:20 from 500 meter away.

At 00:00:20, when the blue ball is launched at 500 meters away, green ball is 550 meters ground distance away, and red ball is 600 meters ground distance away, as depicted in Figure 9.

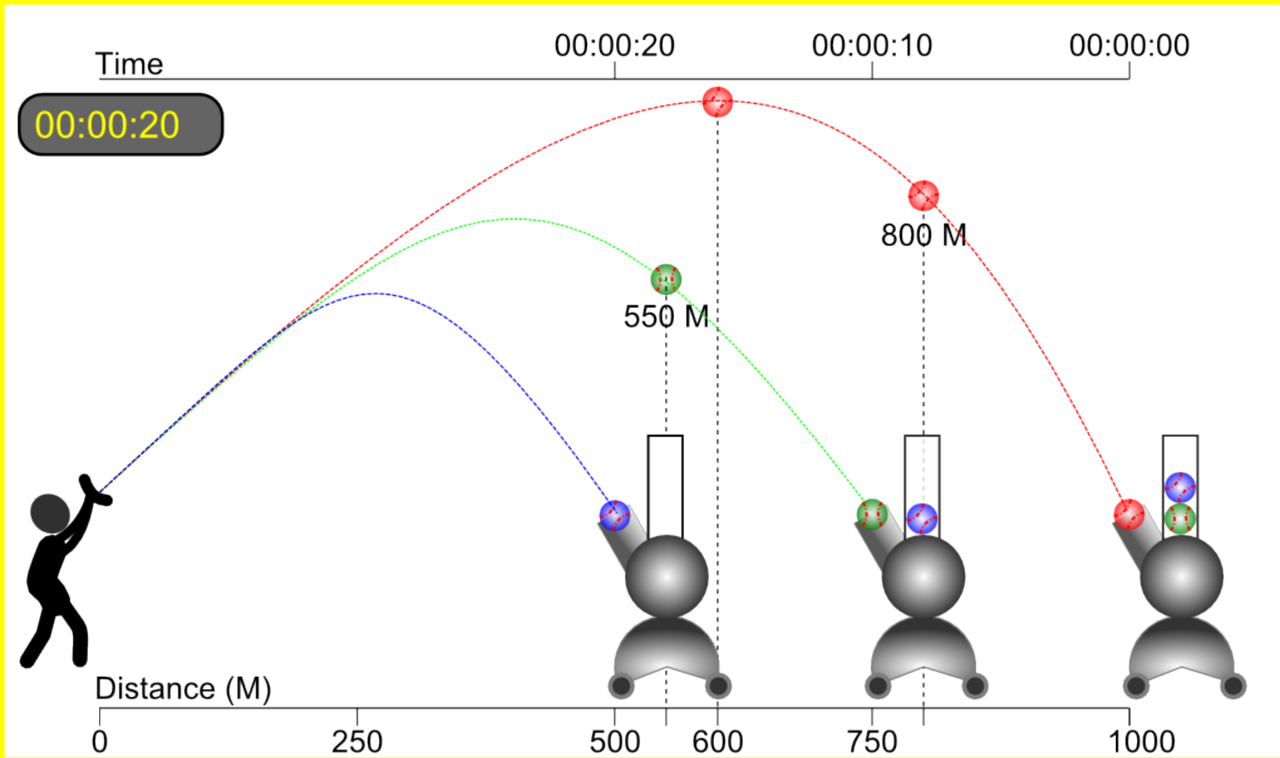


Figure 9: Ball pitcher travels at higher ground speed

However the receiving is not the same order of delivery, as depicted in Figure 10.

1. Blue ball is received at 00:00:45 from 500 meters away.
2. Gree ball at 00:00:47.5 from 750 meters away.
3. Red ball at 00:00:50 from 1000 meter away.

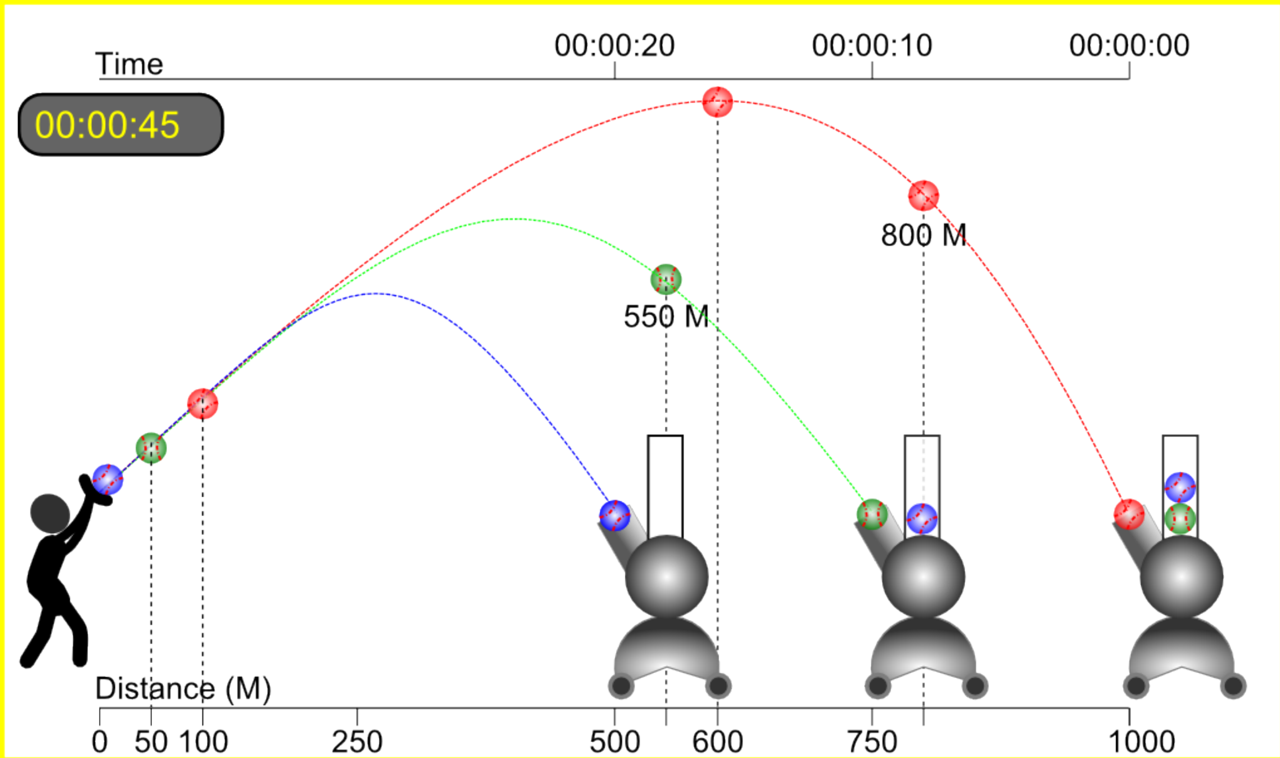


Figure 10: Reverse arrival of balls

Again it took 20 seconds to finish pitching all three balls, however it only took 15 seconds to finish receiving, and the arrival is reversed. The arrival rates are:

1. Third ball, blue, arrives 2.75 seconds earlier than second ball, green.

2. Second ball also arrives 2.75 seconds earlier from first ball, red.

5 Dynamic Observation Simulation

Suppose there are six observers detecting signals from a steady source, as depicted in Figure 11.

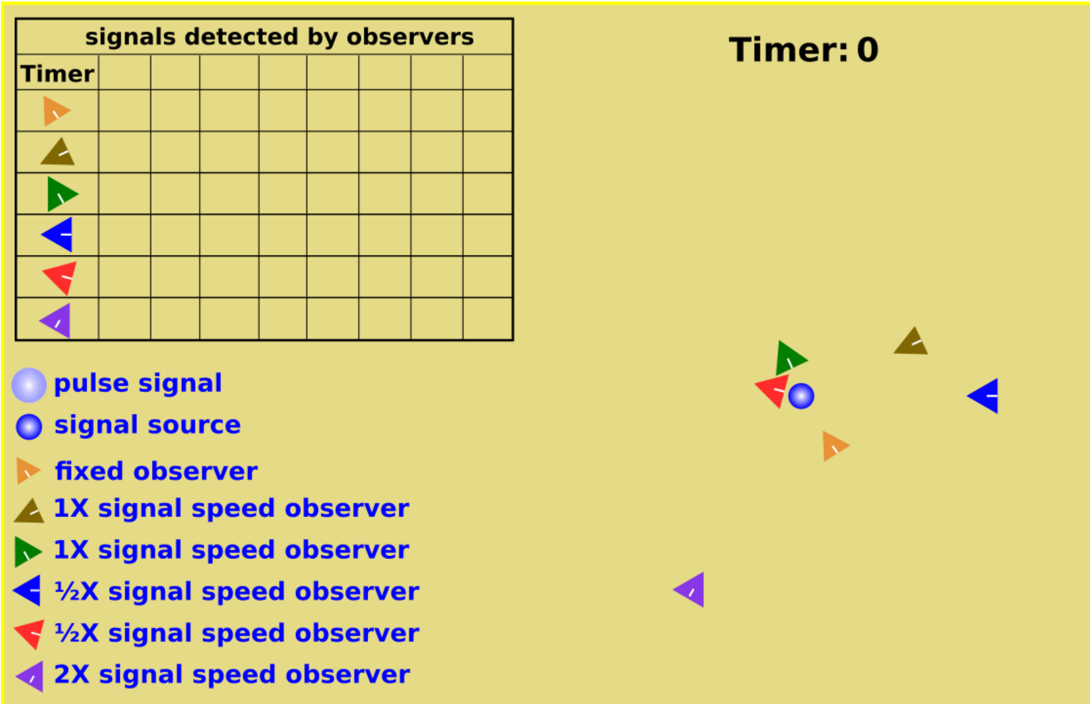


Figure 11: Signals and detectors

Here, observers are shown in color triangles:

1. Orange is anchored at a fixed distance from source.
2. Brown is coming from northeast toward the source at the same speed of the signal.
3. Green is moving away at the same speed of the signal.
4. Blue is coming from east toward the source at one half speed of the signal.
5. Red is moving away at one half speed of the signal.
6. Purple is coming from southwest toward the source at twice speed of the signal.

The table at the top left corner shows the number signal detected by each observer at each reference frame of time interval. Then, source starts to broadcast a sequence of numbers from 1 to 8, then silence.

At time 0, Figure 12.

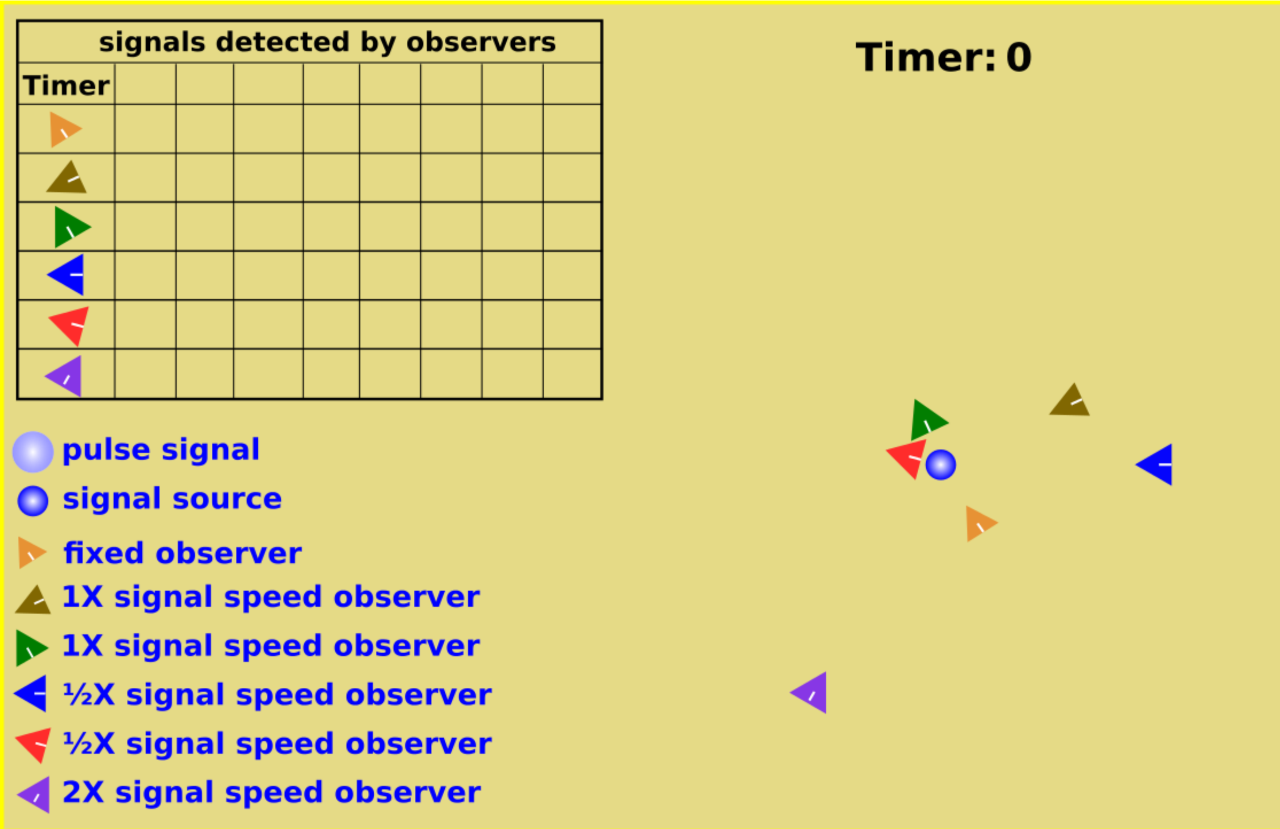


Figure 12: Signal and detection at time 0

1. Orange has no detection.
2. Brown has no detection.
3. Green has no detection.
4. Blue has no detection.
5. Red has no detection.
6. Purple also has no detection.

At time 1, Figure 13.

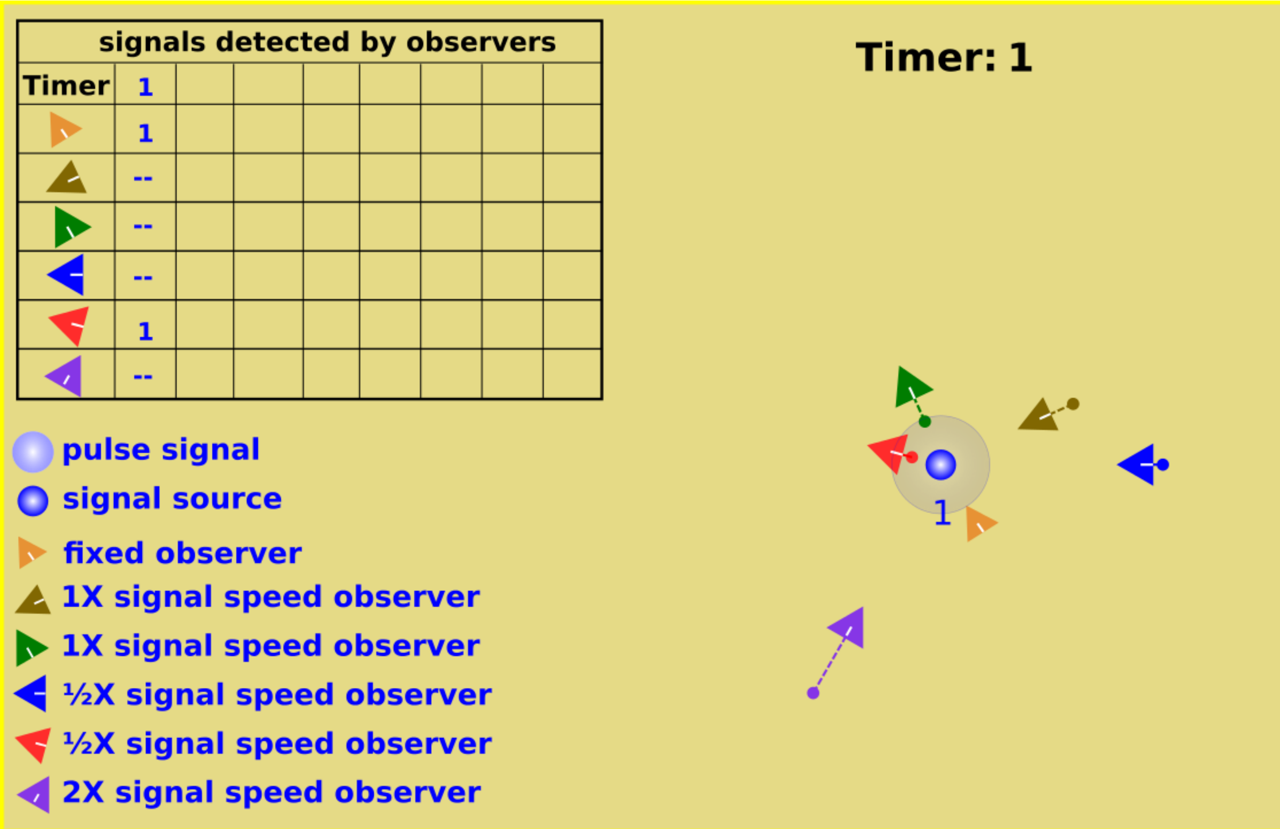


Figure 13: Signal and detection at time 1

1. Orange detects 1 from the source at time 1.
2. Brown has no detection.
3. Green has no detection.
4. Blue has no detection.
5. Red also detects 1.
6. Purple also has no detection.

At time 2, Figure 14.

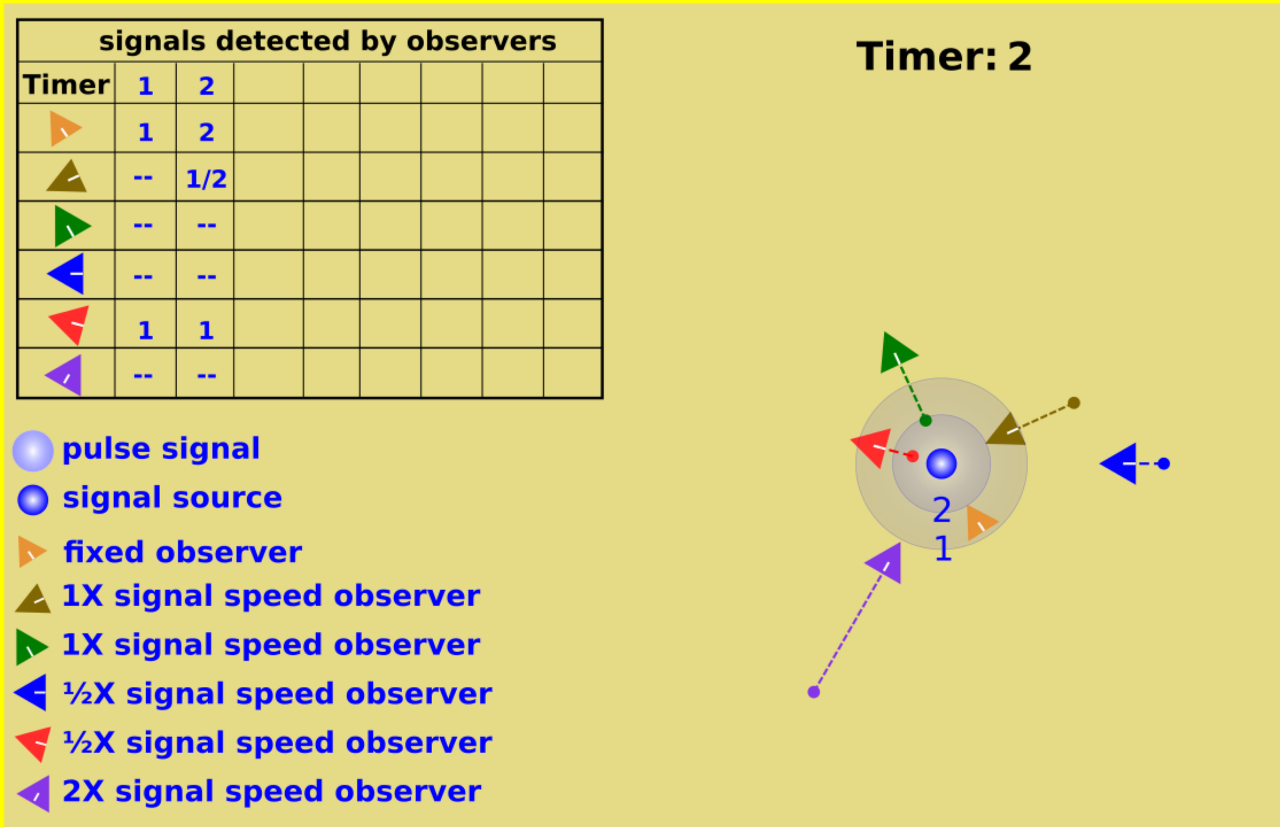


Figure 14: Signal and detection at time 2

1. Orange detects 2 from the source.
2. Brown would detect 1 and 2 within the interval.
3. Green remains no detection.
4. Blue has no detection.
5. Red still detects 1.
6. Purple also remains no detection.

At time 3, Figure 15.

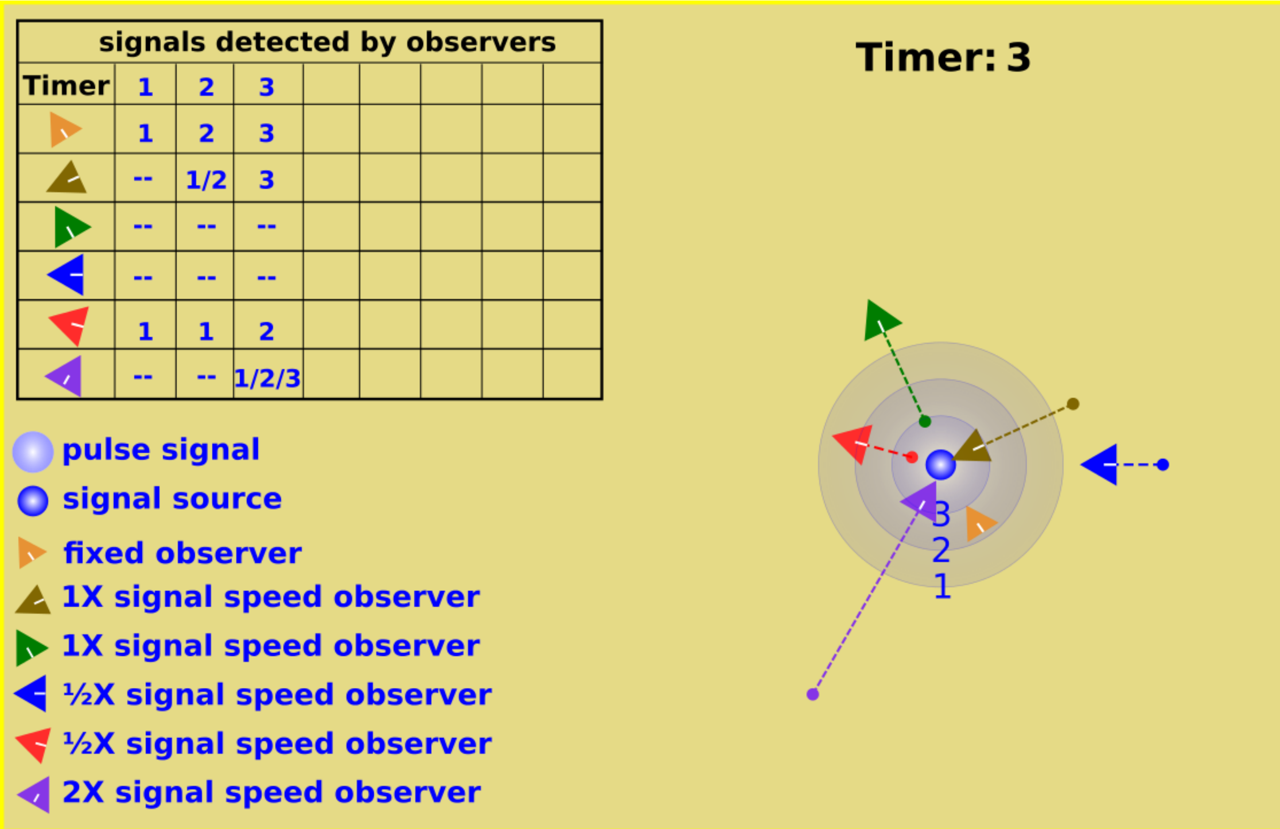


Figure 15: Signal and detection at time 3

1. Orange detects 3.
2. Brown also detects 3.
3. Green remains no detection.
4. Blue detects 1 and 2 within the interval.
5. Red also detects 2.
6. Purple would detect 1, 2, and 3 within the interval.

At time 4, Figure 16.

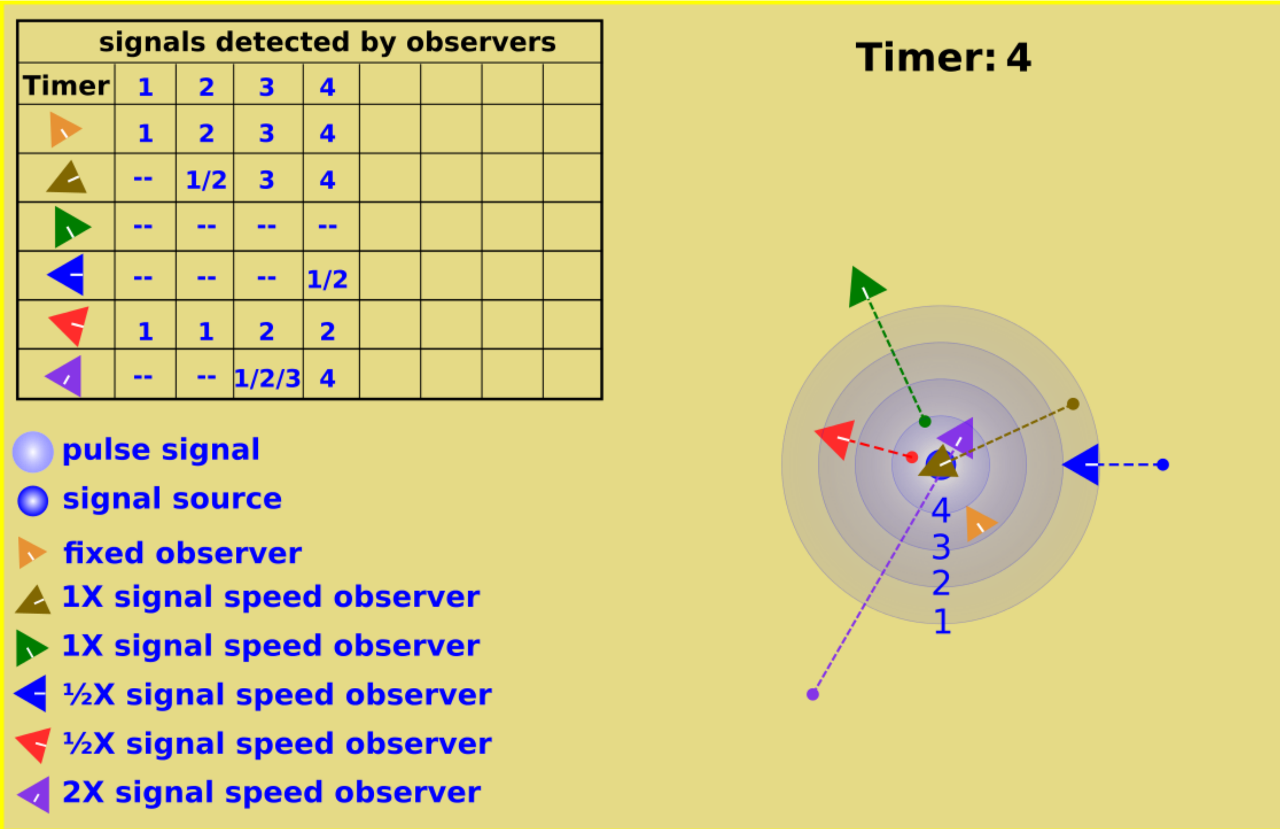


Figure 16: Signal and detection at time 4

1. Orange detects 4.
2. Brown also detects 4.
3. Green remains no detection.
4. Blue detects 2 and 3.
5. Red detects 2.
6. Purple detects 4.

At time 5, Figure 17.

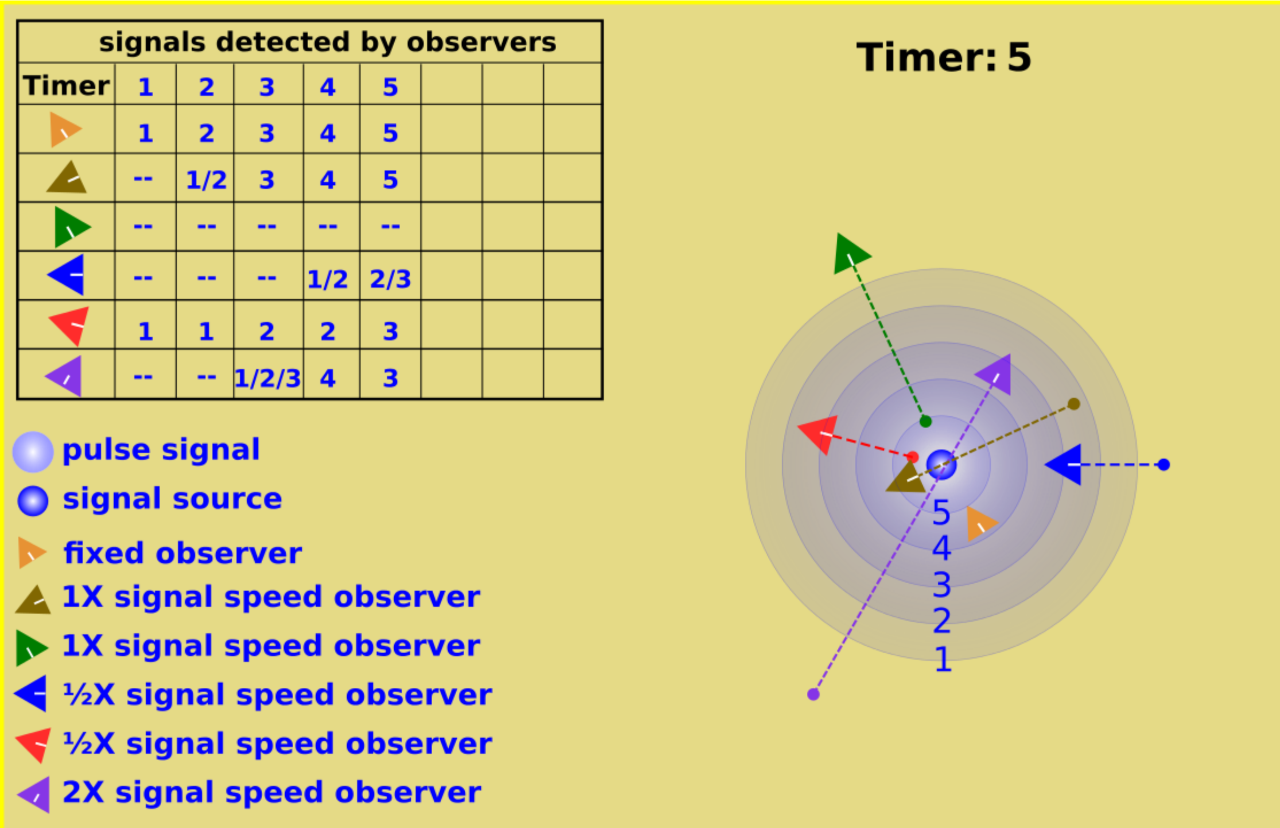


Figure 17: Signal and detection at time 5

1. Orange detects 5.
2. Brown also detects 5.
3. Green remains no detection.
4. Blue detects 4 and 5.
5. Red detects 3.
6. Purple detects 3.

At time 6, Figure 18.

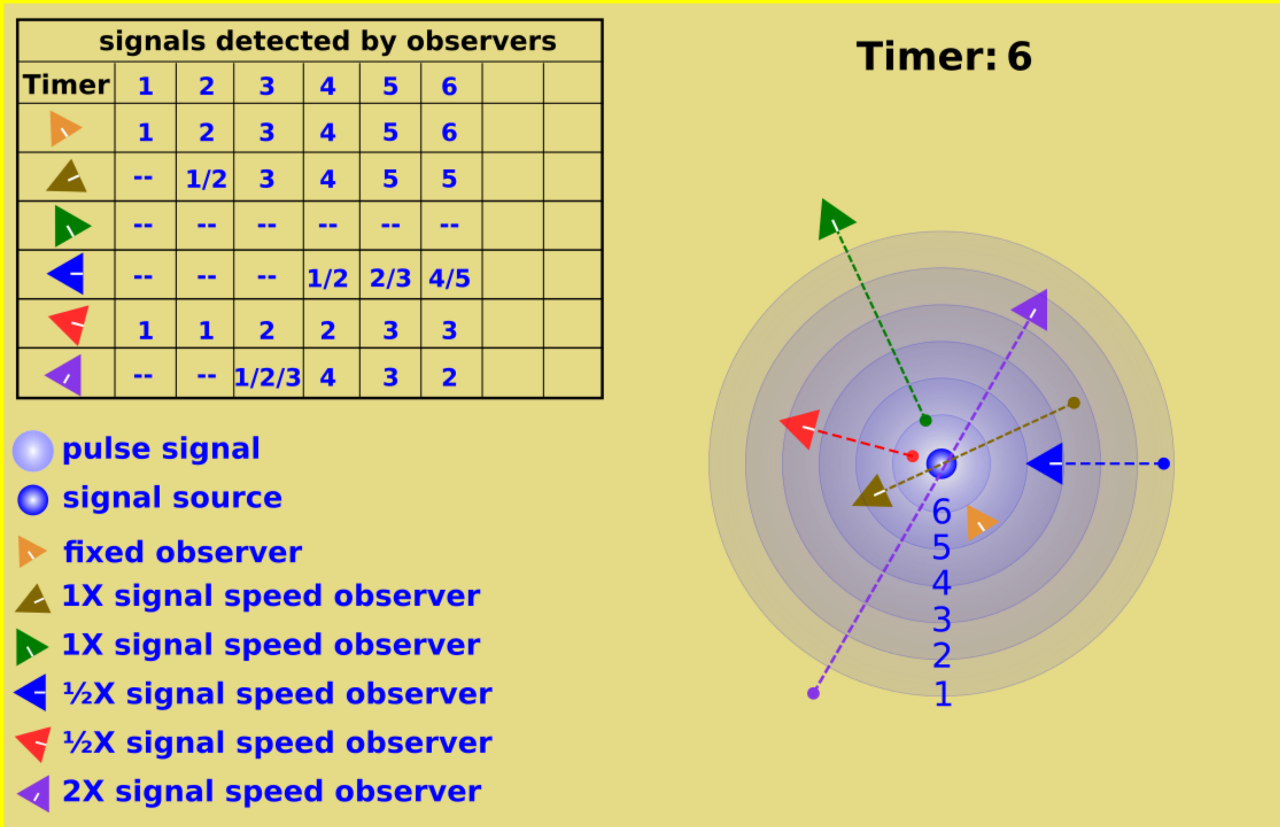
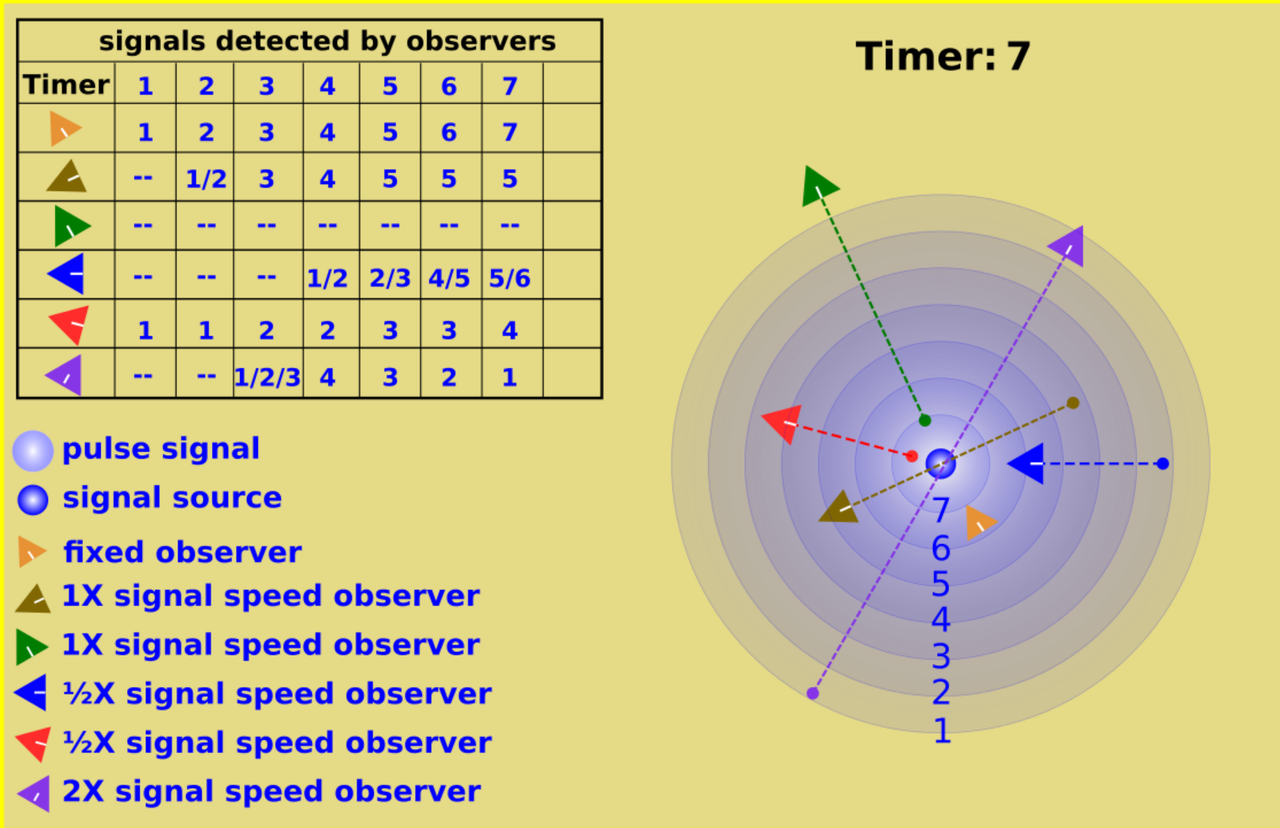


Figure 18: Signal and detection at time 6

1. Orange detects 6.
2. Brown also detects 5.
3. Green remains no detection.
4. Blue detects 5 and 6.
5. Red detects 3.
6. Purple detects 2.

At time 7, Figure 19.



signals detected by observers							
Timer	1	2	3	4	5	6	7
(orange)	1	2	3	4	5	6	7
(brown)	--	1/2	3	4	5	5	5
(green)	--	--	--	--	--	--	--
(blue)	--	--	--	1/2	2/3	4/5	5/6
(red)	1	1	2	2	3	3	4
(purple)	--	--	1/2/3	4	3	2	1

Figure 19: Signal and detection at time 7

1. Orange detects 7.
2. Brown also detects 5.
3. Green remains no detection.
4. Blue detects 7.
5. Red detects 4.
6. Purple detects 1.

At time 8, Figure 20.

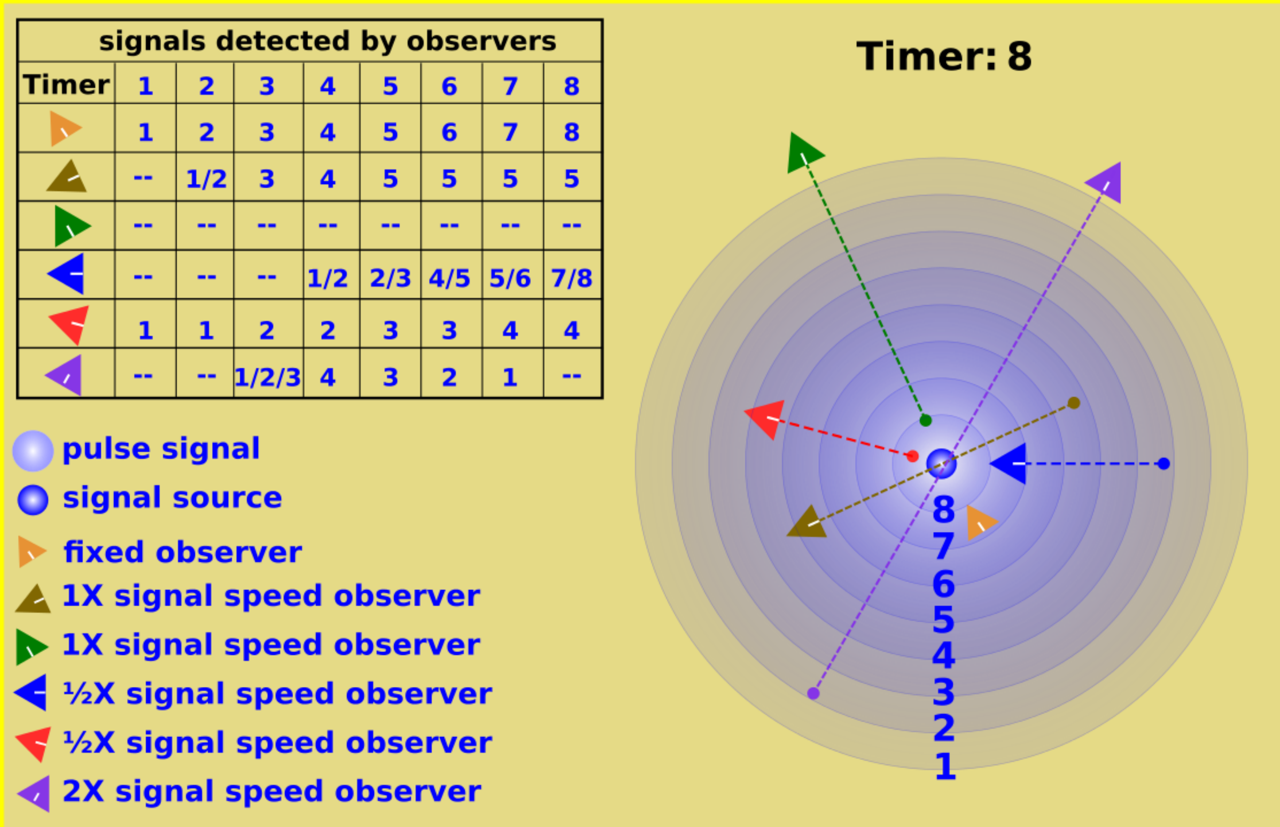


Figure 20: Signal and detection at time 8

1. Orange detects 8.
2. Brown also detects 5.
3. Green remains no detection.
4. Blue detects 8.
5. Red detects 4.
6. Purple has no detection.

Here is an animated illustration. Please note that not all PDF viewer will display it properly.

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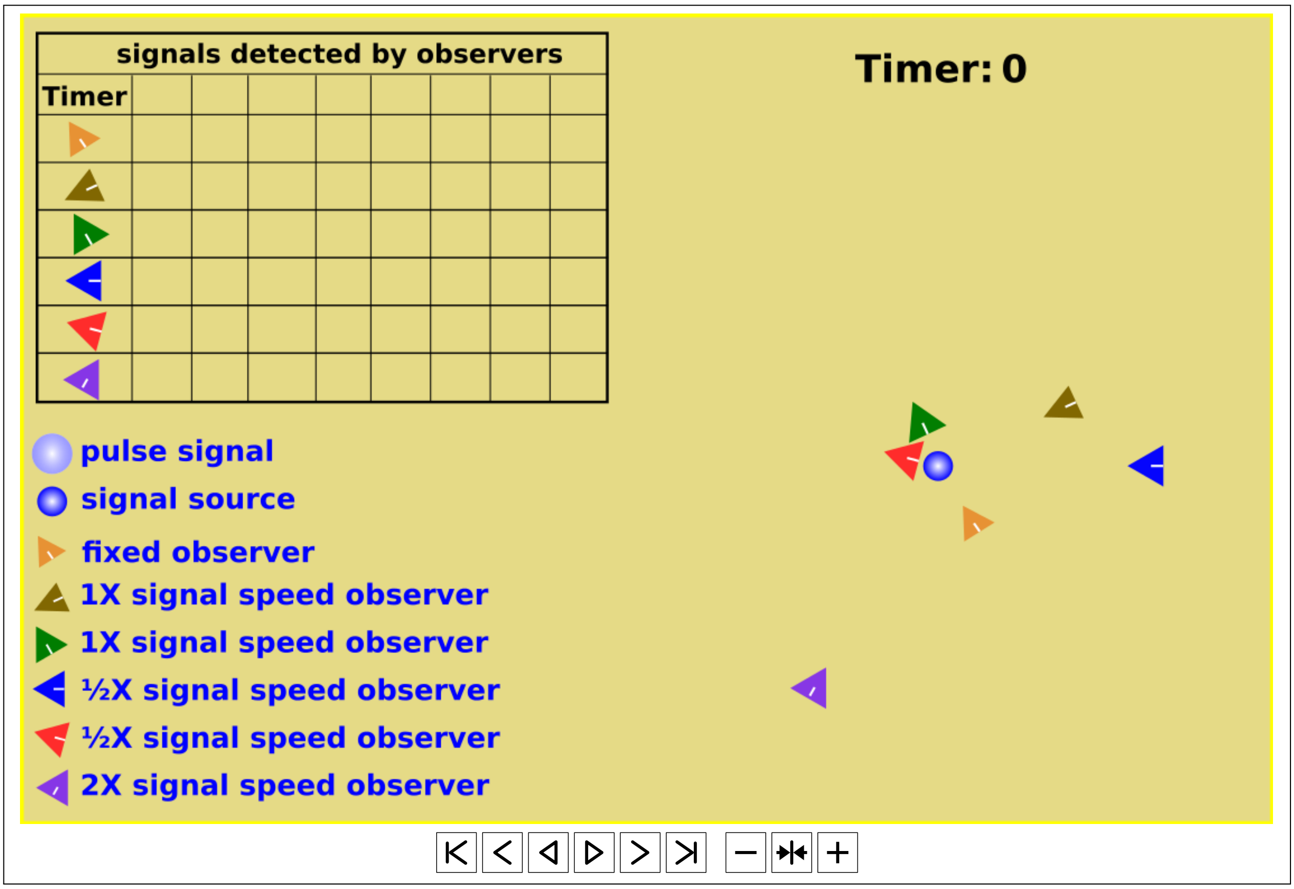

Figure 21: Signal and detection animation

Signal detection is further listed in Table 2:

Timer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Orange	1	2	3	4	5	6	7	8	–	–	–	–	–	–	–	–	–
Brown	–	1/2	3	4	5	5	5	5	5	5	5	5	5	5	5	5	5
Green	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Blue	–	–	1/2	2/3	4/5	5/6	7	8	–	–	–	–	–	–	–	–	–
Red	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	–
Purple	–	–	1/2/3	4	3	2	1	–	–	–	–	–	–	–	–	–	–

Table 2: Signals detected by observers

Here summarized the detections of observers:

1. Orange at fixed distance from the source would receive the signals in proper order in identical interval as transmitted. There is no Doppler effect of the signals.

2. Brown would receive the signals at twice the speed before passing the source. Then, it is traveling at the same speed of signal 5 after, signals 6, 7 and 8 would never catch up. Signal 5 would remain still unless conditions have changed. It would catch with

earlier signals backward from 4 to 1, if it speeds up. On the other hand, it would receive later signals 6 to 8 in proper order, if it slows down.

3. Green is moving away from the source at the same speed of the signal from start, it would never detect any signal.

4. Blue is receiving the signals at 1.5 times the speed of the signal, it would detect compressed signals of Doppler blueshift at $z = -0.5$.

5. Red is receding at 1/2X speed, signals would be stretched, or Doppler redshift at $z = 0.5$. It would continue to detect signals until 8th signal catches up at time 16. It would take twice the time to receive all eight signals.

6. Purple is coming and leaving at twice the speed of the signal. It would receive blueshifted signal at triple speed before reaching the source. Then no new signals would be able to catch up. Instead, it would chase down the earlier signals in reverse order and surpass, however no Doppler effect of the signals, $z = 0$..

Here the signals can be circular water waves on the ocean surface, sound, light, or any broadcasting of information. It is also predicted by Lord Rayleigh in his book on sound; that if the source is moving at twice the speed of sound, a musical piece emitted by that source would be heard in correct time and tune, but backwards.[3].

We know no matter how fast a source travels, it does not increase the speed of it's sound going forward. Neither does it slow down the speed of it's sound going in opposite direction. Likewise, neither does supersonic jet alter the speed of it's sonic boom, nor the speed of light from it's afterburner. We also know the speed of sound can vary significantly when travel in different media. Yet, it is independent of the speed of it's source event.

The same principle has to be the same for fast speed signals, such as light. The motion of the source alters the location of the origination, and the motion of the observer alters the location of destination. The changing arrival rate would cause Doppler effect of the observation. However, neither the motion of the source nor observer can alter the speed of the electromagnetic wave. It can only be affected by the media it travels through.

Regardless of the type of the signals, any observer would receive the information delivered by the same principles of transportation. In atomic world, vast events and the information are happening in light-speed. Yet, the response time and sensitivity of the observer would cause more issues. To an observer, signals can be too weak, too strong, too fast, or too slow. Isn't confusion possible when information is incomplete?

6 Doppler Effect of Delivery

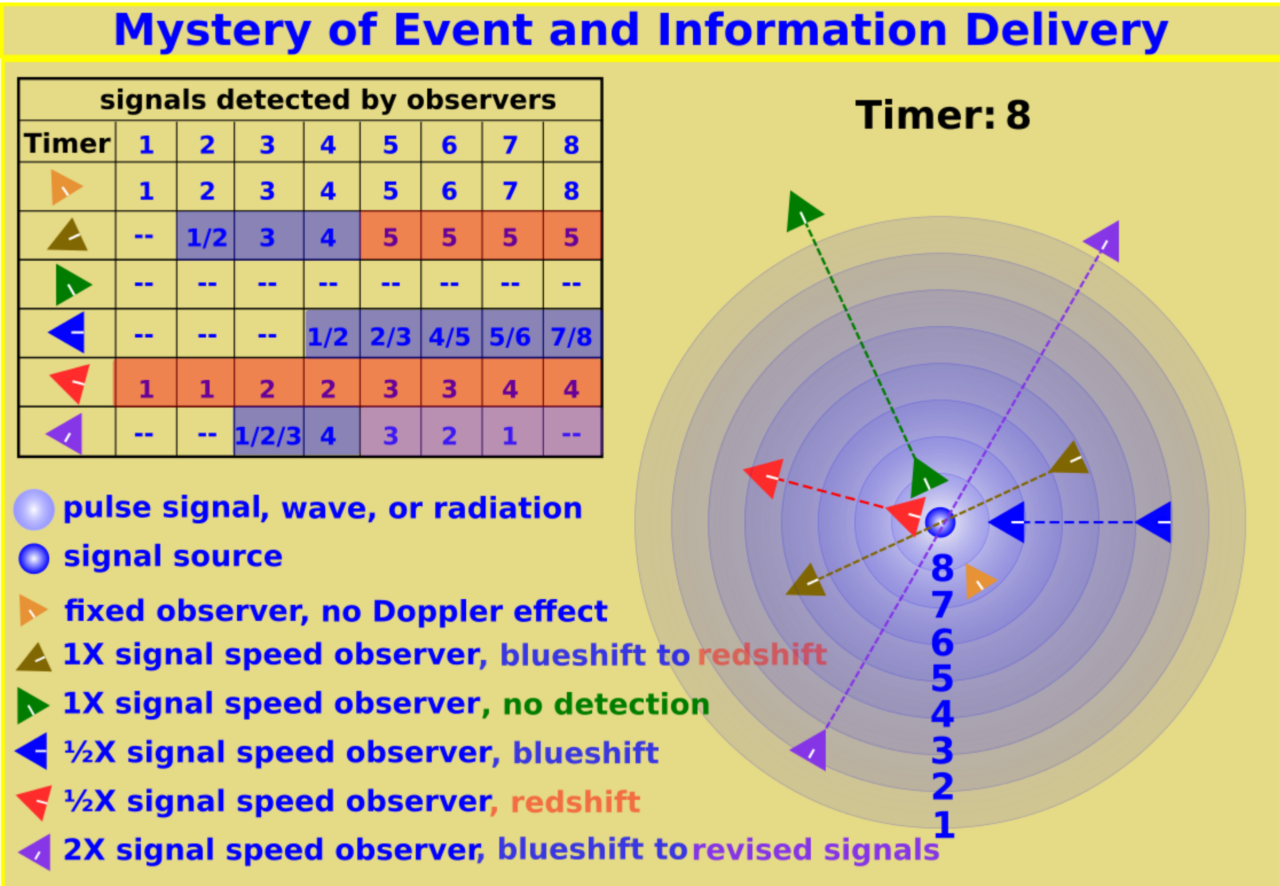

Figure 22: Doppler Effect of Delivery

Here, we summarize the Doppler effect of observers, Figure 12.

- Orange fixed observe, , would not experience any Doppler Effect. It would receive the signals in the same order and intervals as transmission after one unit of time.
- Brown 1X signal speed observer, , would experience blueshift approaching the source, and it switches to redshift when leaving.
- Green 1X signal speed observer, , would not detect any signal. It would not ware of the event unless it changes it's course or speed.

- Blue 1/2X signal speed observer, , would only experience blueshift, then the signal is turned off. It's distance to delivery is decreasing though out.
- Red 1/2X signal speed observer, , would experience only redshift since the distance to delivery is increasing through out.
- Purple 2X signal speed observer, , would experience strong blueshift approaching the source. However, it's will catch up the previous signals in reverse order.

7 Summary

Observation is a special case of transportation. It is a delivery stream of packages of information, unlike the delivery events in our transportation systems. The order and interval of the arrival of signals would affect the perception of the observer. One important issue to consider is, not all packages are received by the observer. We can catch more packages with high-speed recorder, however, many mores are lost, not to mention there are packages of signals that is beyond us.

- An event is subject to a certain location and progression of it's complement. It is space and time referenced activity. It has it's unique identification eternally. It can never repeat.
- The rest of the universe is the complement of an event. Altering the event will alter the universe as a whole.
- At any single moment, there is only one physical location for an event. However, it's information can be delivered to countless observers.
- An event can have many forms of information. However, an event can not be fully described by the combined information collected by all observers. The magnitude and speed of information for never replay events in the universe is beyond any observation. Even delivered information is not all perceivable by observer.
- Information is only the description of the event. It is not the event. For example, john is not you, and you are not john, even your name is John. John is only a nominal description of you. It can never be you, and you can never be john, John.
- Event has it's duration of existence, however, it's broadcasting can outlast it's existence, and never less.
- Physical event occurs as is, however, it's information can deviate from truth.

Some very interest issues are raised by this study. We know the top speed of the information is light, however, we do not really know how fast particles can go. A particle is considered point-like, and it's trajectory line-like. There is only one physical location at any moment for a particle. A particle can only physically strike the detector once. It can also escape without a trace. On the other hand, it's broadcasting is a sweep. It's waves would propagate to fill the space. Wave detection is an duration of impact by cumulated wavelets. It is much easier to detect waves. For instance, one second of electromagnetic waves is about 300,000 kilometers long; 150 km, or 93 miles, long per frame for a high speed camera of 2,000 frames per second. Unless we can physically identify a particle and it's trajectory, we can not be sure of how fast can it be. If there is a top speed in the universe, I believe it is, the total energy of the universe acts upon a particle at the shortest instant.

Still, same as transportation in real word, bottleneck can happen in light-speed information when:

- Event is happening faster than the delivery speed of information, or
- delivery is faster than the response time of the observer.

It can overwhelm the observation and create multiple exposures of clouded information. Yet, even if the source has ceased to exist, it's waves can continue to traverse. Action of a particle would have to cause the reaction of it's absolute complement, *i.e.* surroundings or environment. It also raises more issues of particle and wave, comparative to event and information.

7.1 Footnote of This Study

Just as Galileo's inclined plane to slow down gravity. Pulsation signal illustrated in this study is a slow motion of frequency. It would be detect as continuous light if the frequency of pulsation is faster than the response time of the detector. Light we see in our daily life is rapid pulsation faster than our eyes.

Suppose we use whistling balls on inclined plane, the change in pitch will concise precisely to the speed of the ball, determined by the incline angle. Doppler effect on sound waves is parallel to radiations. If balls are also fitted with blinking LED lights, the light pules will be compressed at precise proportion of sound pitch. The laws of physics would have to concise with the delivery of the information depicted in this study. Particularly, the light-speed action of the atomic universe. Where the events of invisible objects are taking places in vast volume and velocity hardly matched by the sensitivity and response of our detectors.

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