

Classical Conditioning



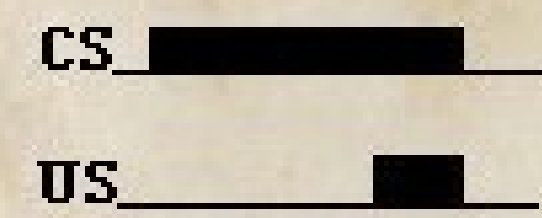
What on earth is going here?

Well, first of all, let's just note what is happening in this picture. What you are seeing is a dog (Lilly) salivating in the presence of toy punch bag. As to why she might be doing that, we'll have to wait until further into the lesson.

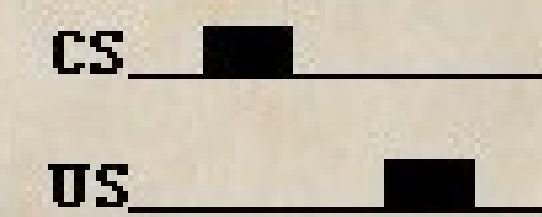
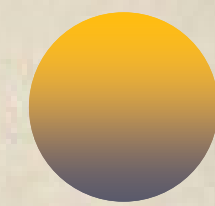
Pairing



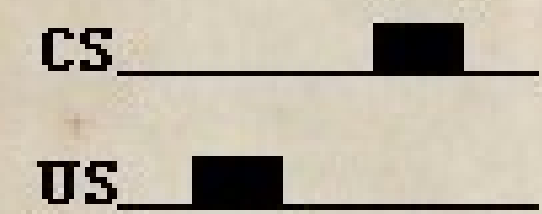
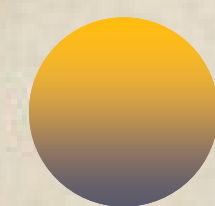
Simultaneous



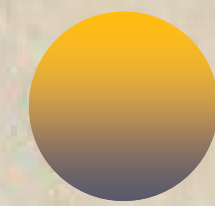
Delay



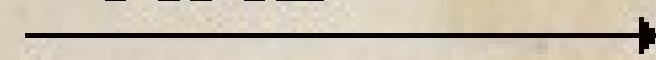
Trace



Backward

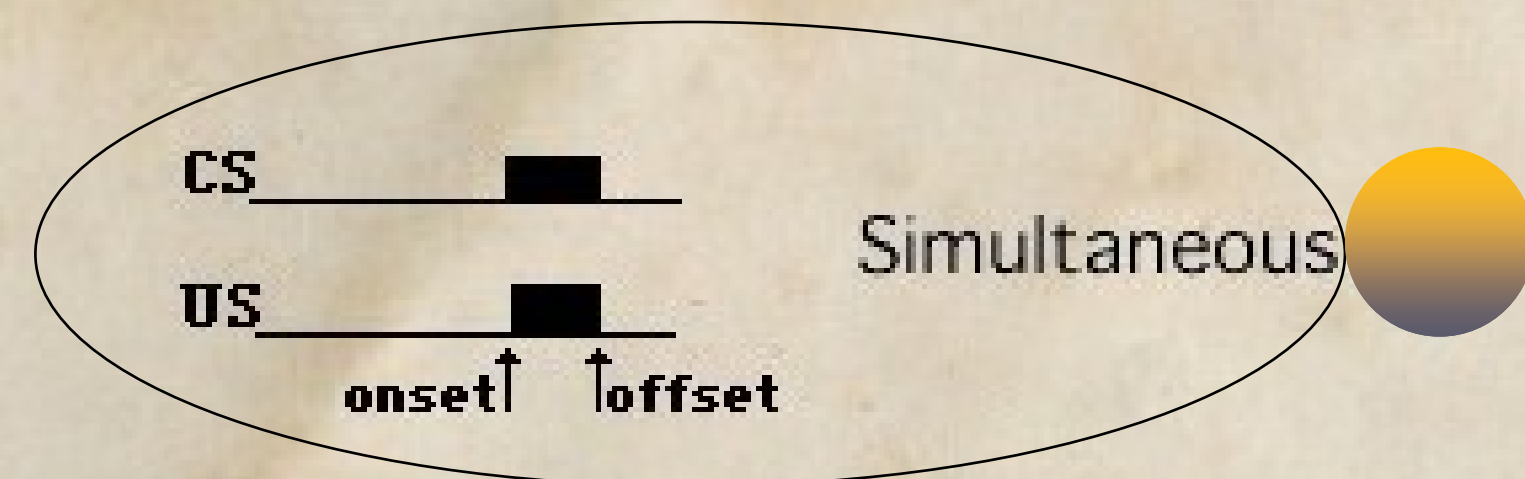


TIME



RETURN

Pairing



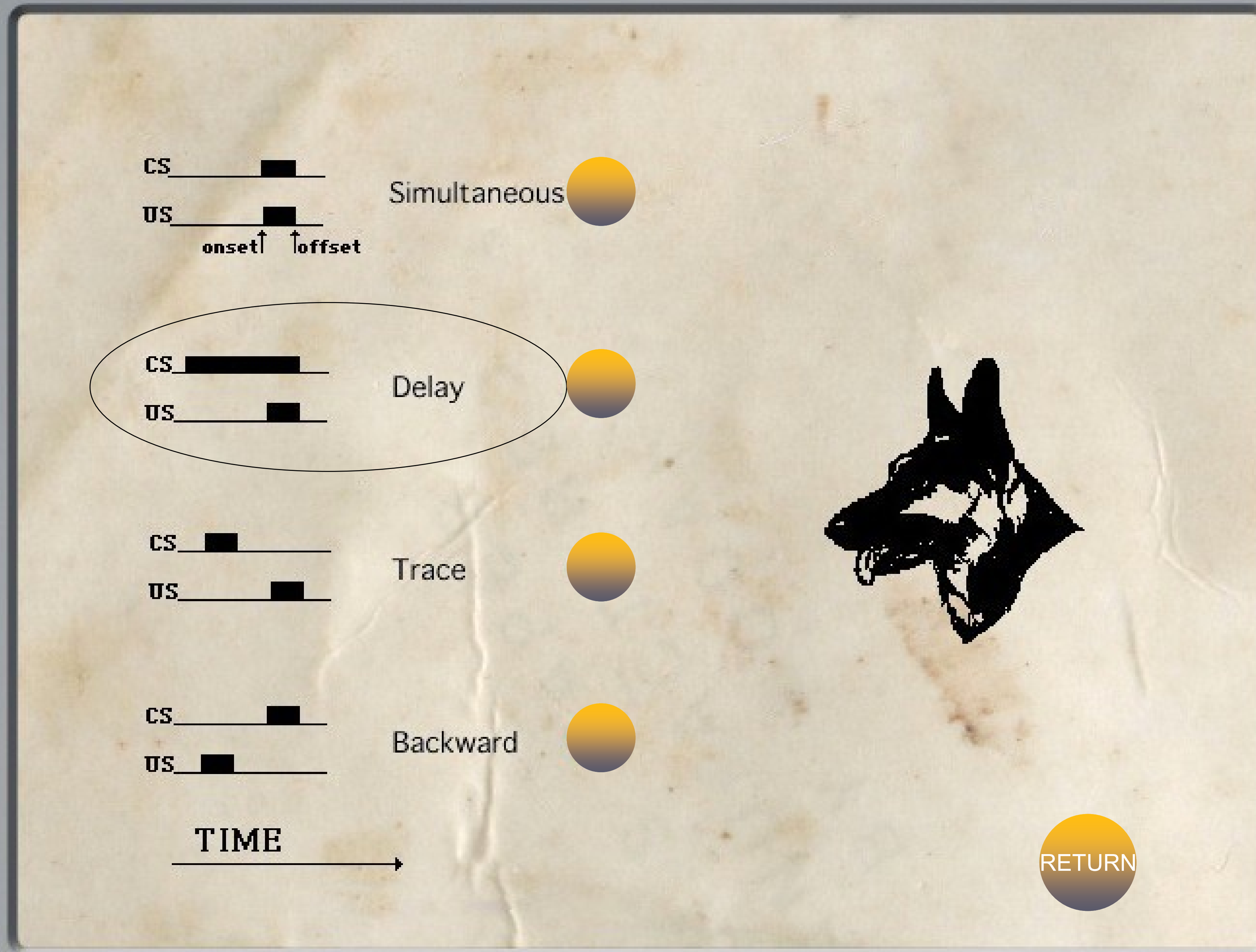
TIME →



RETURN

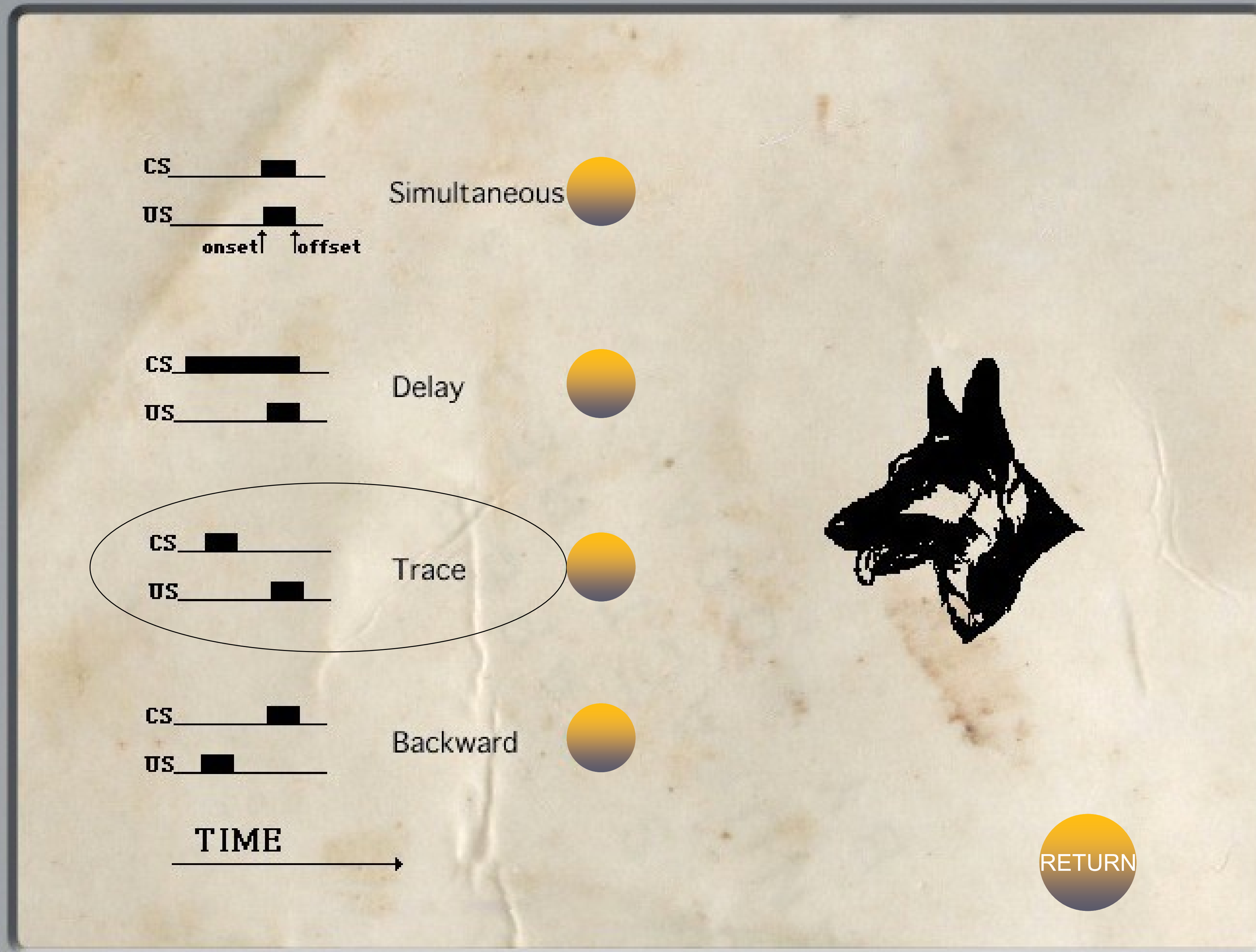
With this procedure, the CS begins at the same time as the US and it ends at the same time as the US.

Pairing



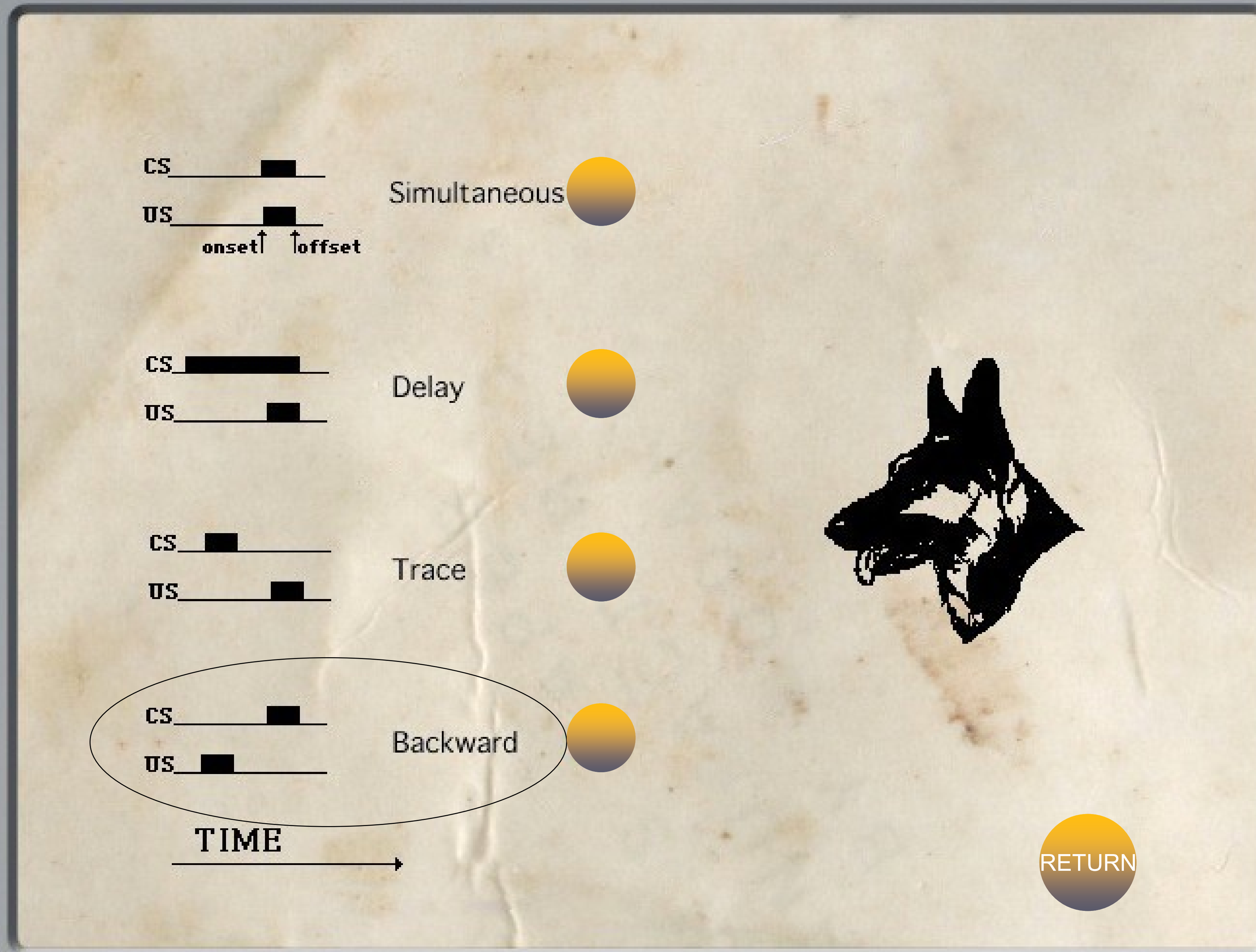
With this procedure, the CS begins well before the start of the US and it continues up to the US, ending at the same time as it.

Pairing



With this procedure, the CS begins and ends before the start of the US.

Pairing



With this procedure, the sequence of presentations is reversed. The CS is now presented after the US ends.

The Process

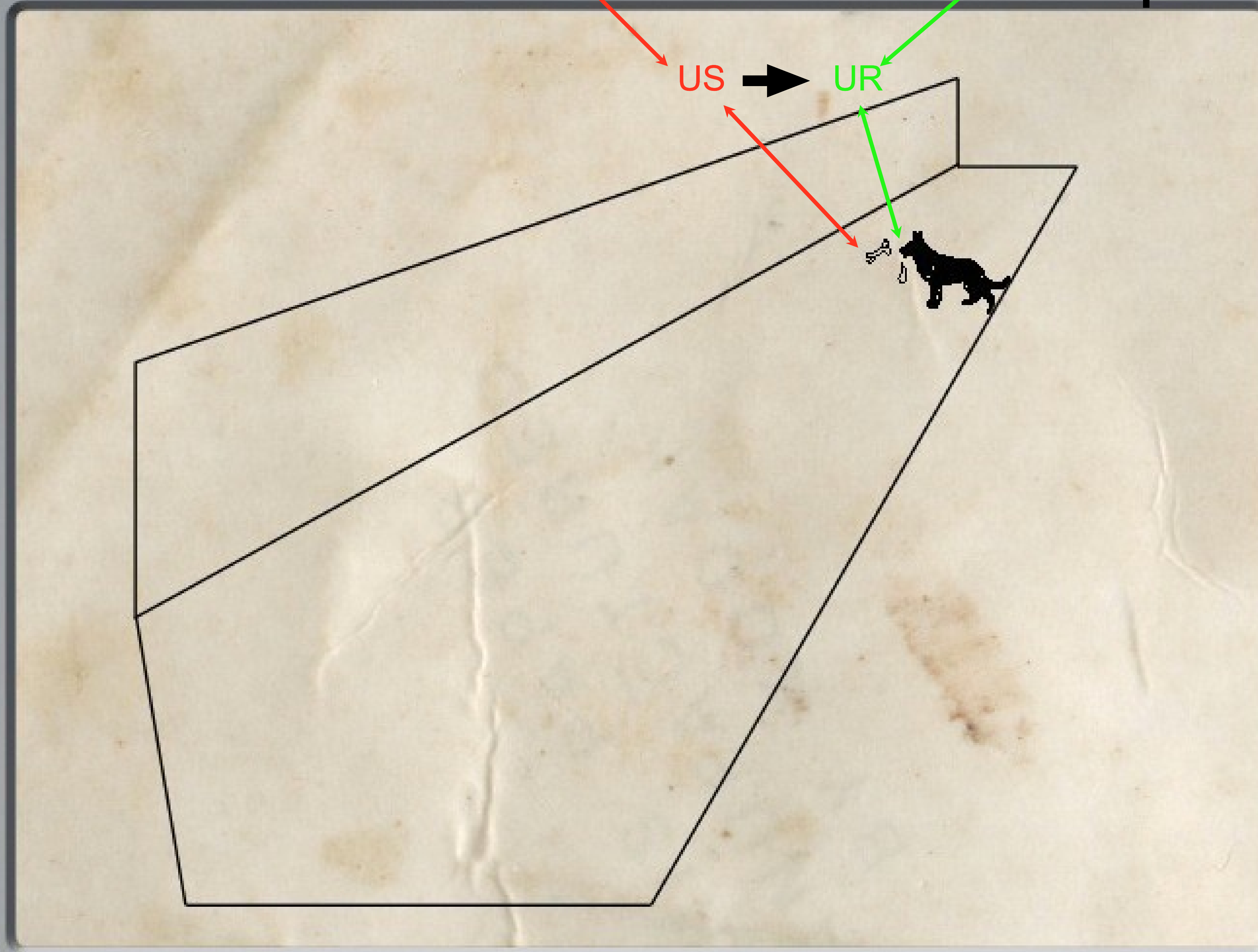


In this tutorial you will be taken through some fundamental issues in the study of *Classical Conditioning*. This is a field of study first investigated by a Russian physiologist called Ivan Pavlov (1849-1936). When he was studying digestion in dogs, he discovered that his dogs followed a routine before they ate their food. He investigated the conditions and simple form of *learning*.

Pavlov's early attempts to investigate this phenomenon represent a milestone in the experimental analysis of behaviour. He showed the value of systematic experimentation as a method of uncovering laws of nature.

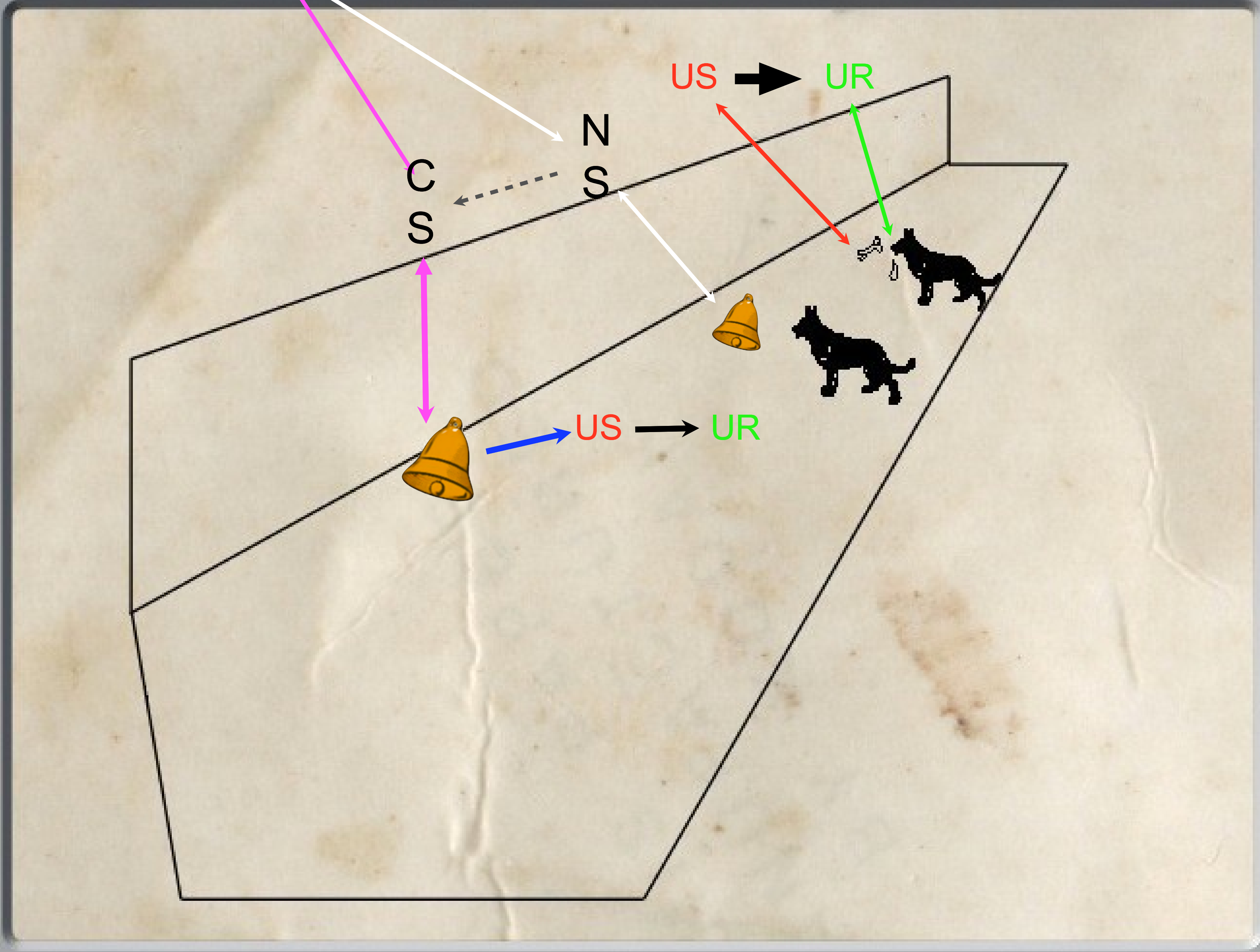
Unconditioned
Stimulus

Unconditioned
Response



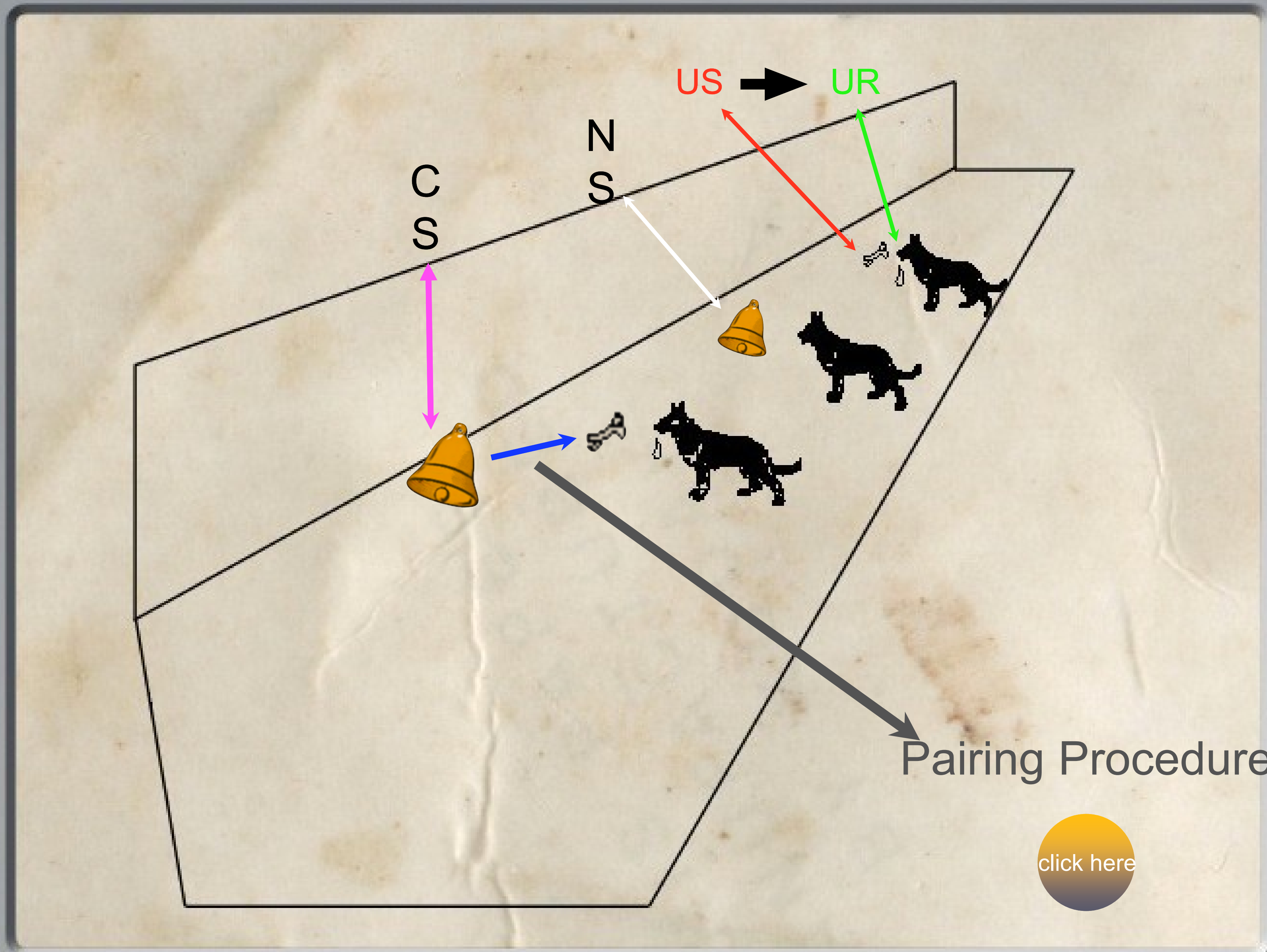
Here we see a dog salivating when presented with a bone. Given that we are studying a science of behaviour it shouldn't surprise you to see that some technical terms have been developed to label our observations. Your first two terms to learn are, the US and the UR. The US *elicits* the UR because that is how the organism has been genetically programmed to respond.

Conditioned Stimulus



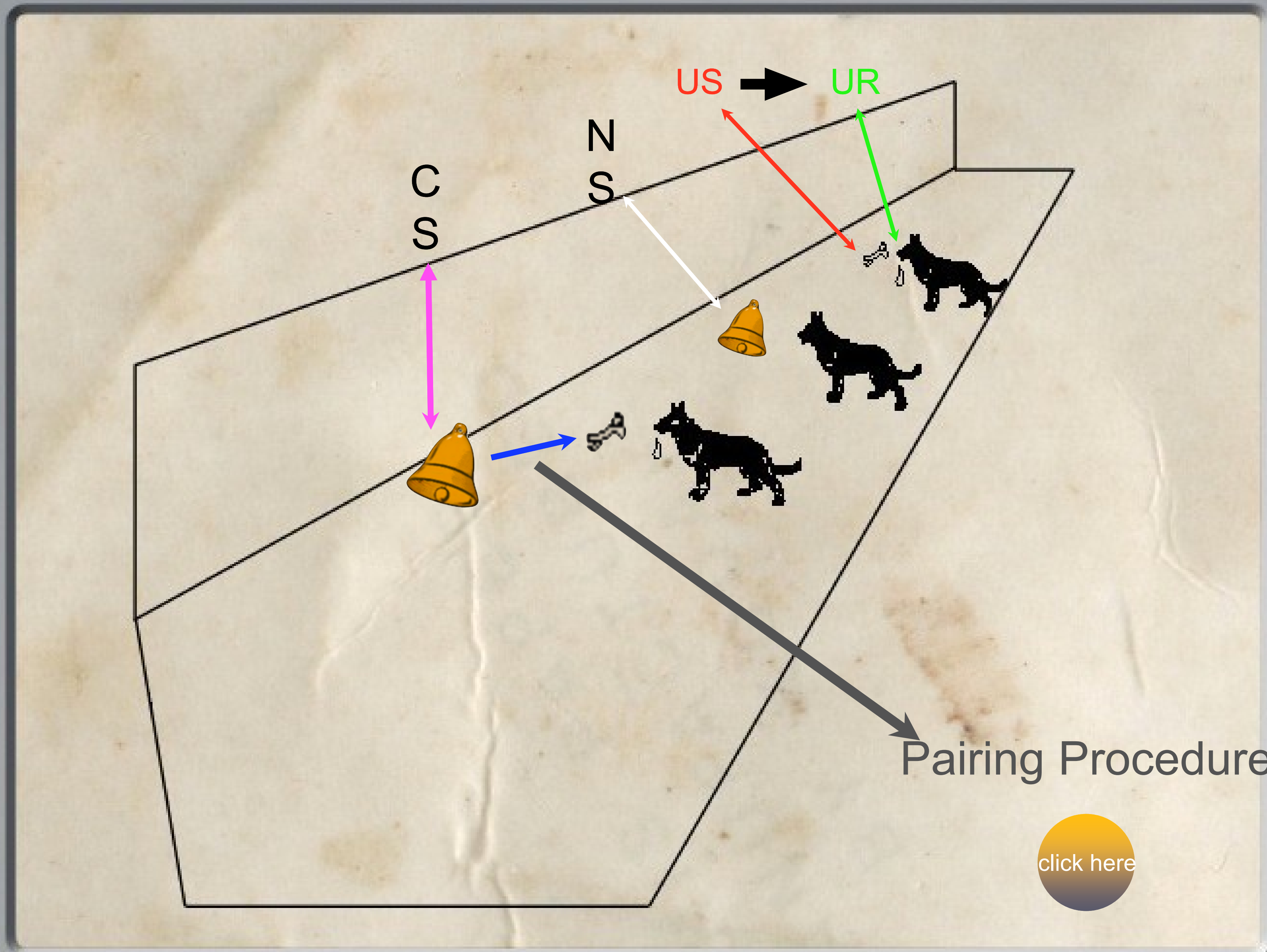
The stimuli that Pavlov worked with were at first considered 'Neutral Stimuli' (NS) i.e. they were 'behaviourally neutral' because they had no obvious effect on the dog's behaviour. But he soon discovered that if he carefully arranged a relation between a neutral stimulus and the US. Because this stimulus now produced a specific change in behaviour, he called it a Conditioned Stimulus (CS).

Conditioned Stimulus



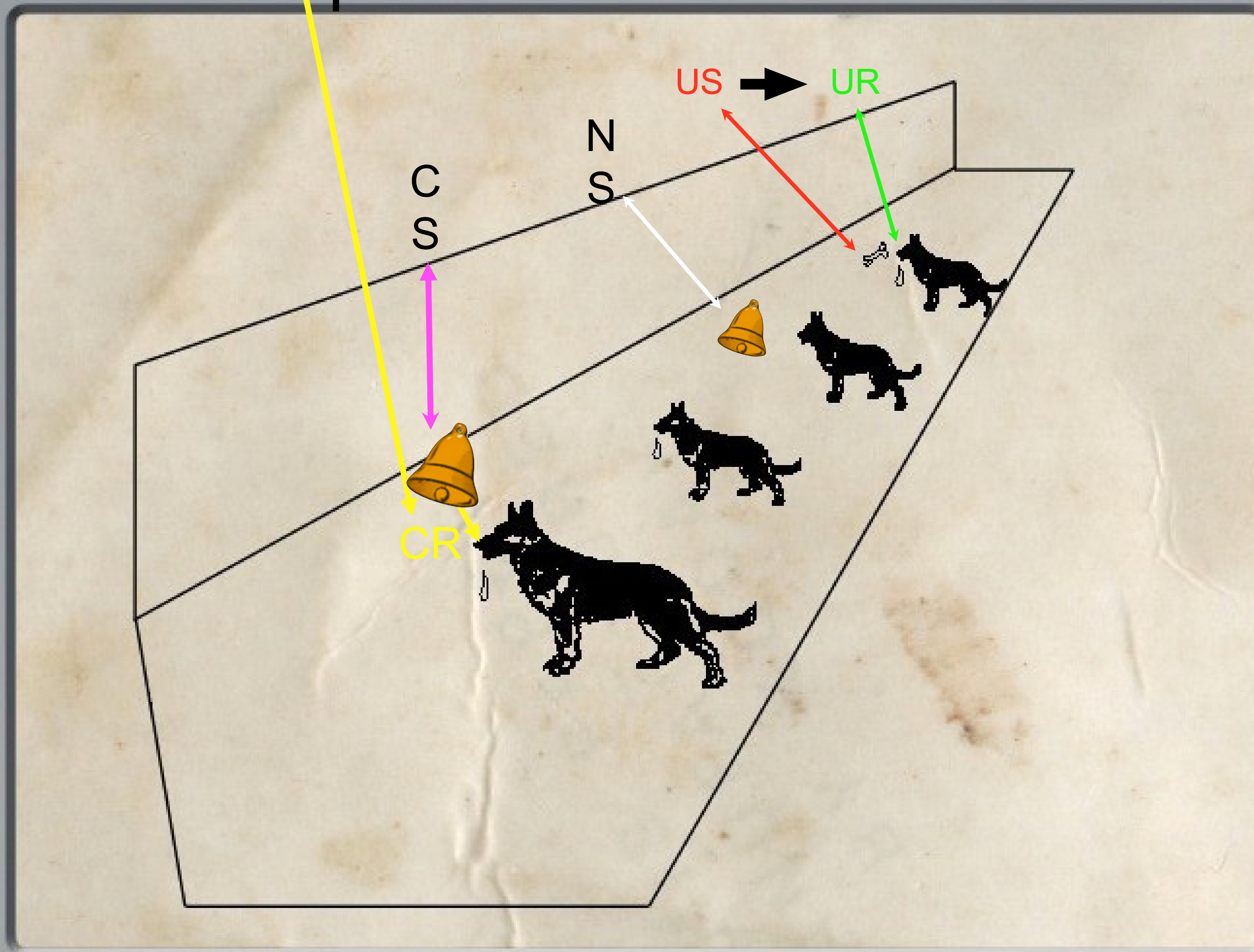
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Conditioned Stimulus



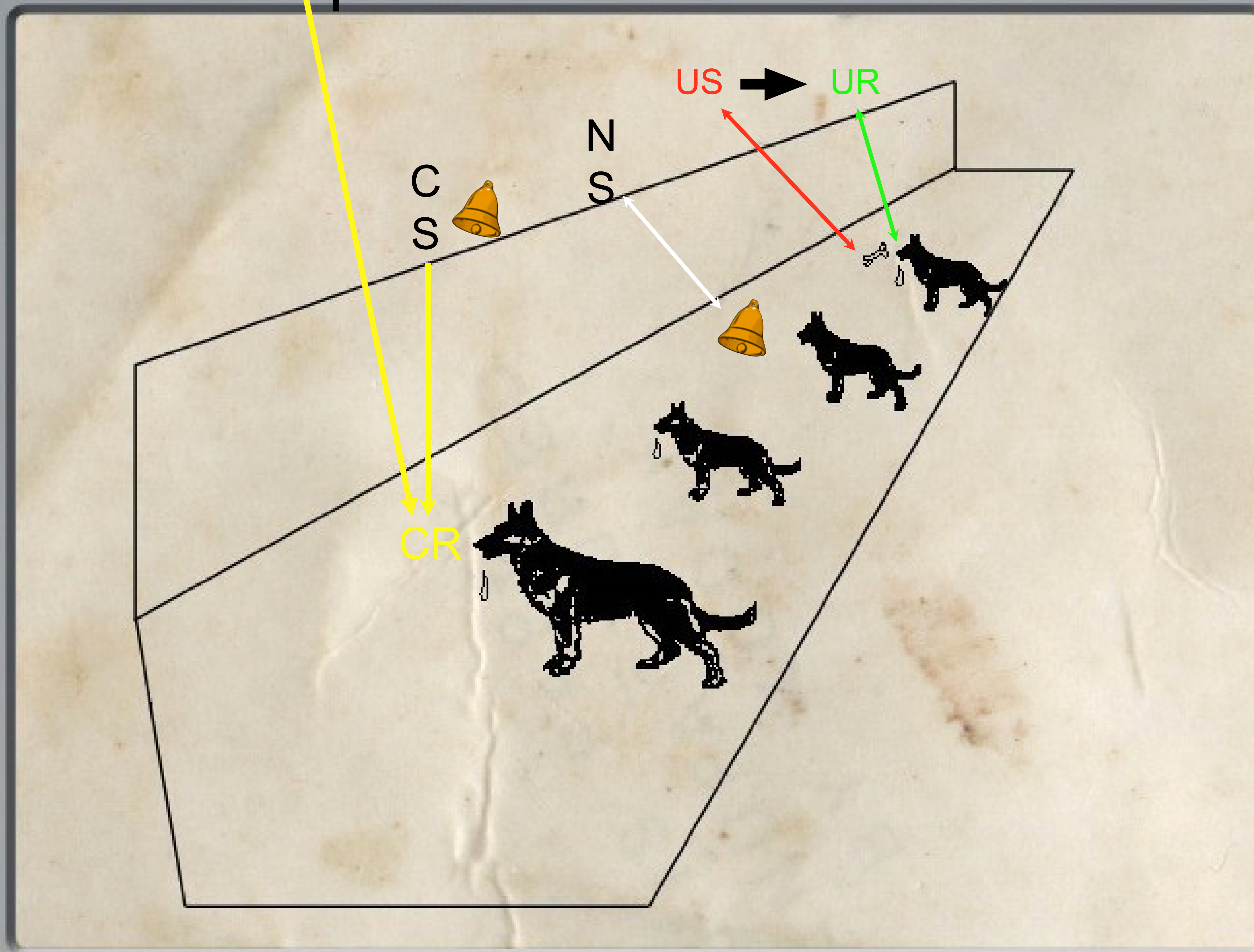
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Conditioned Response



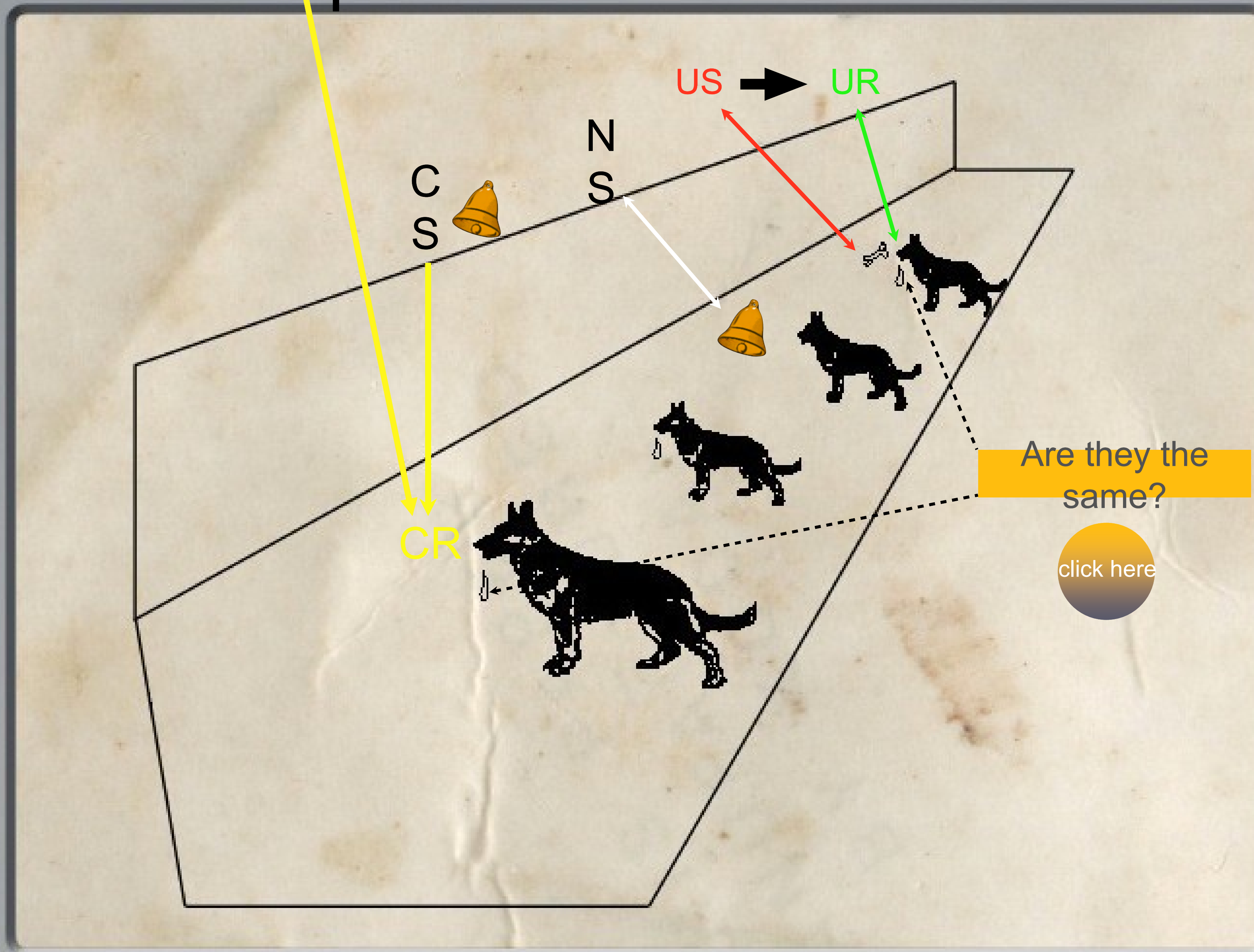
Salivation now occurred in the presence of the CS! Because this salivation response was under the control of the CS, it was called the Conditioned Response (CR).

Conditioned Response



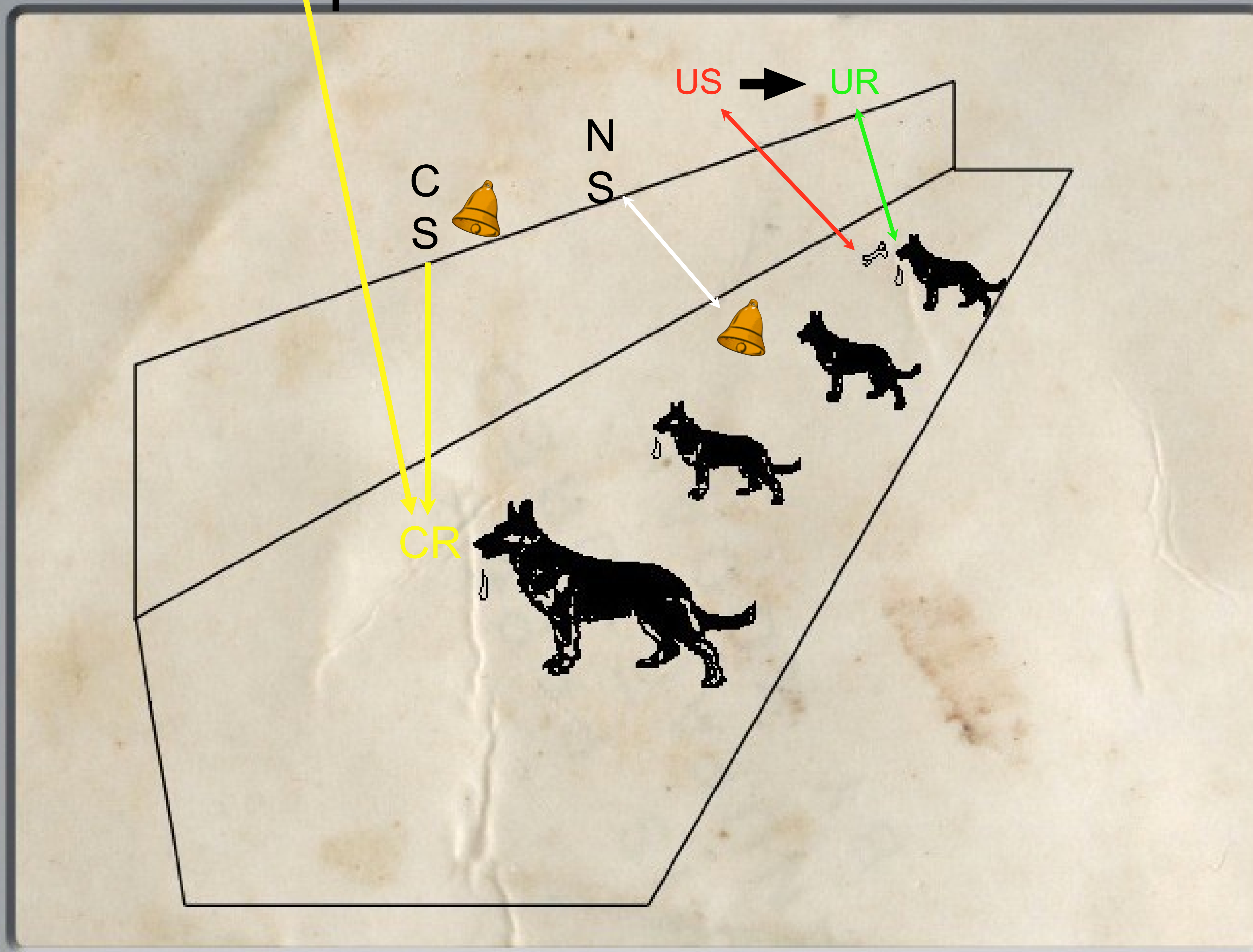
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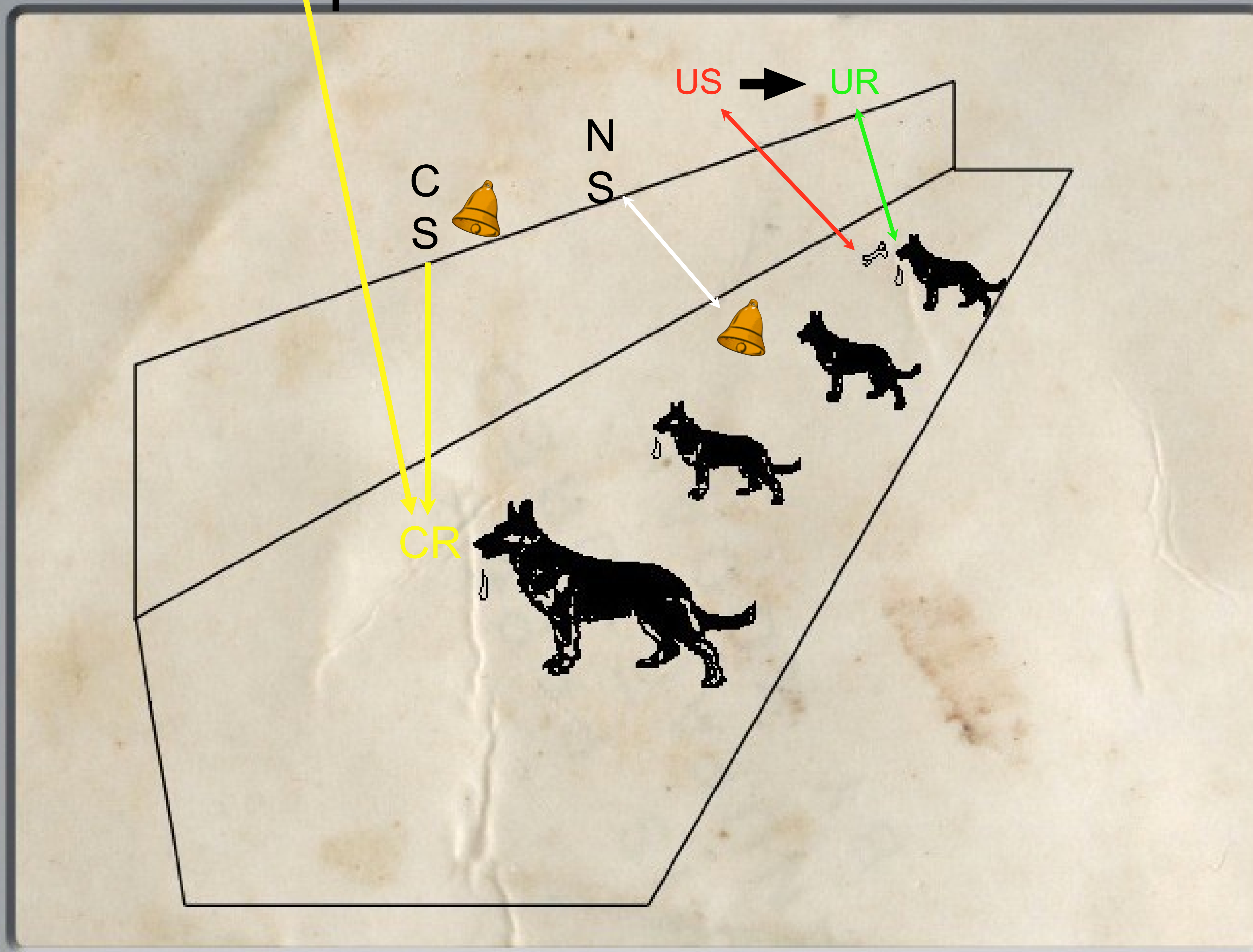
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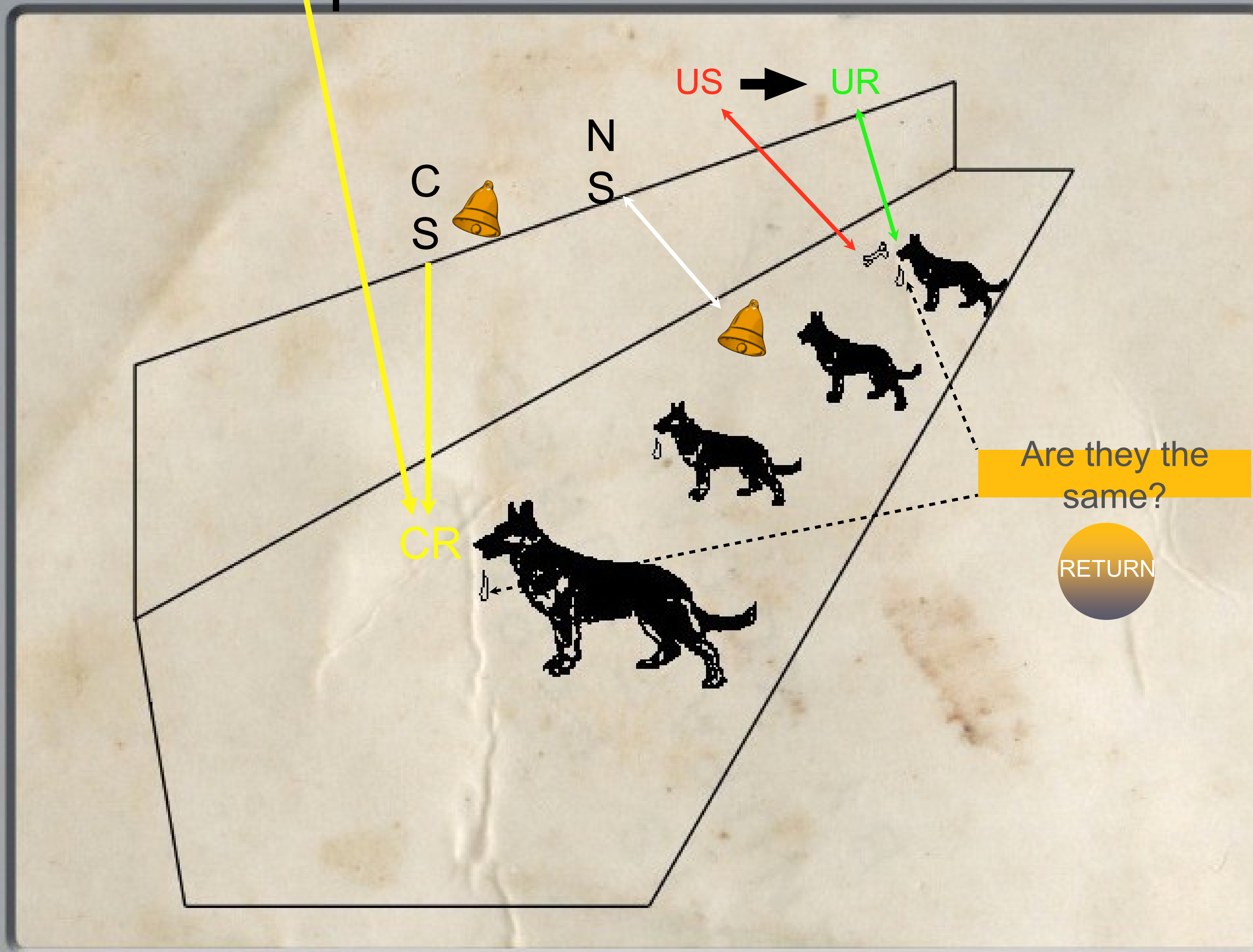
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Conditioned Response



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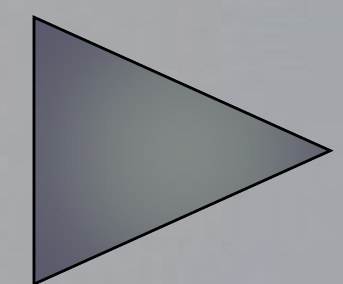
Conditioned Response



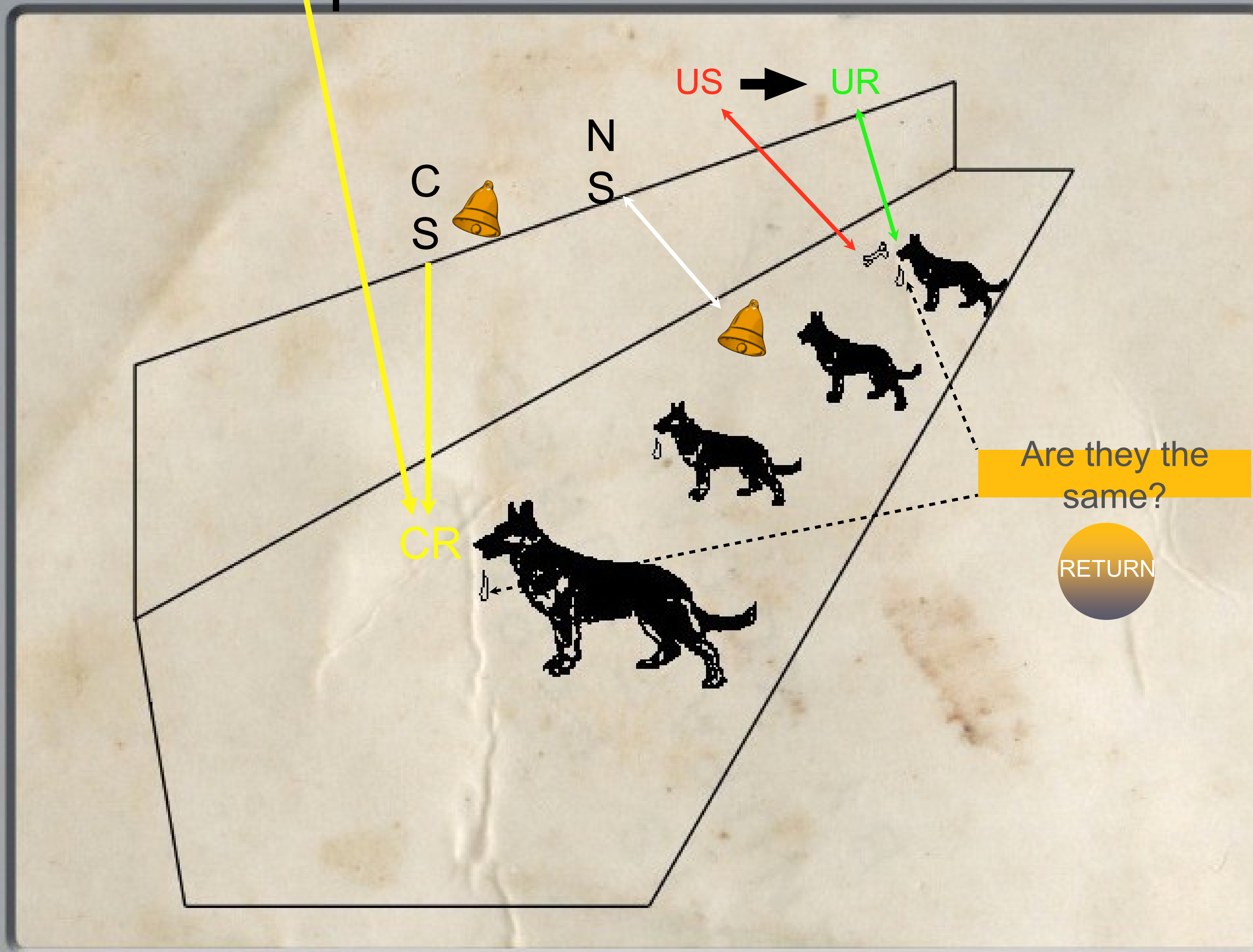
This turns out to be a surprisingly difficult question to answer. This is because there are a number of things that influence the CR.

Imagine you were in Pavlov's shoes and you were conducting the original experiments. Initially you discover by accident that a dog salivates before it receives food. You then decide to explore this phenomenon.

How do you do this? Well, this is where Pavlov taught us the value of systematic experimentation. You focus on a particular CS and a particular US. You make the necessary arrangements to measure both the UR and the CR. This allows you to judge the extent to which the CR and UR are similar.



Conditioned Response



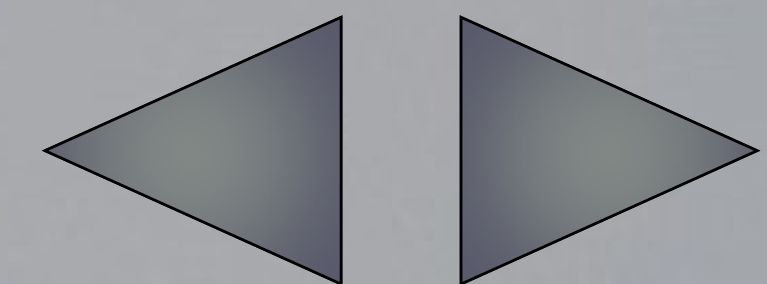
Measurement

1. Quality

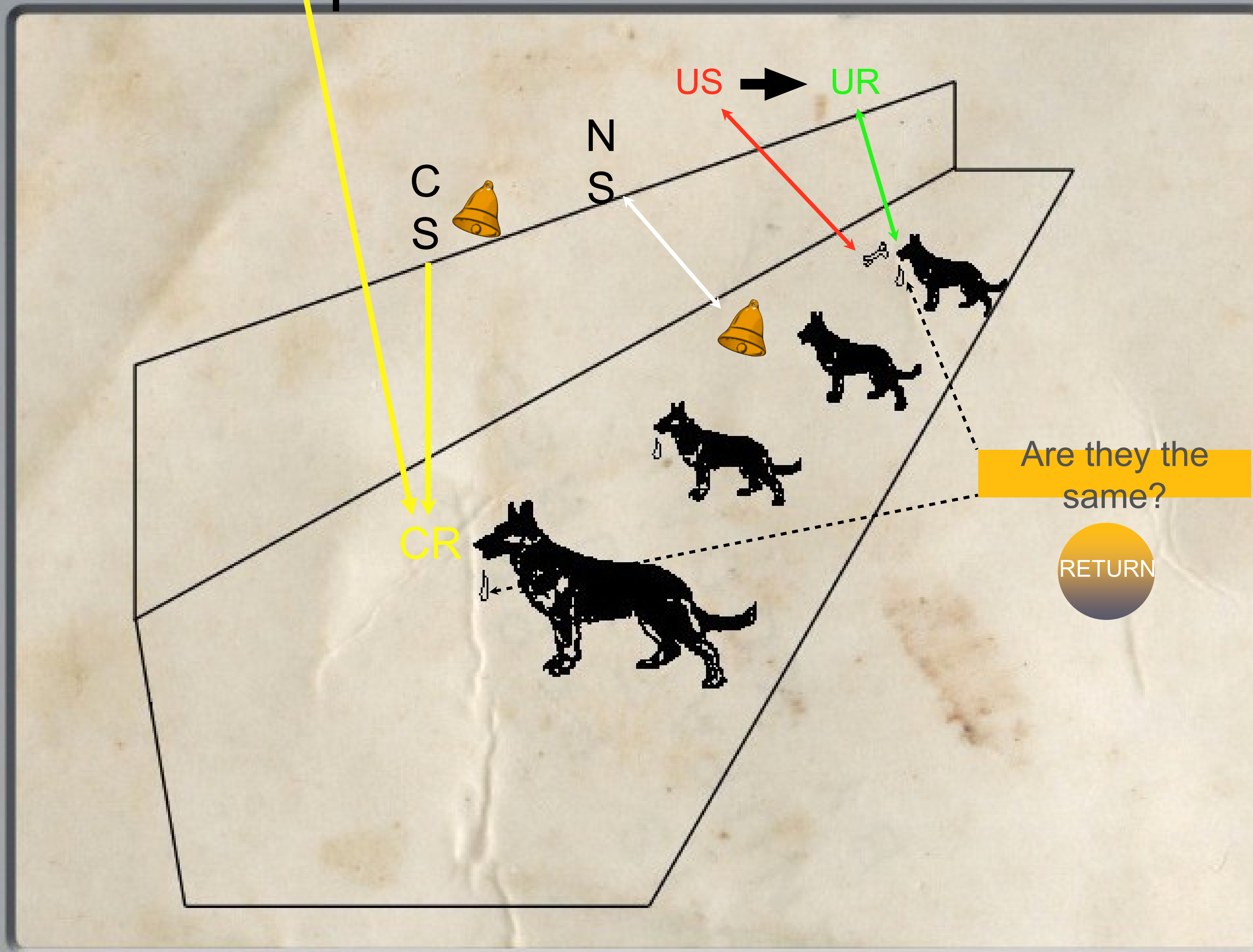
In the case of salivation, quality is determined by looking at the chemical constitution of the saliva. Initially it was thought the saliva produced by a CS differed from that produced by a US only in terms of quantity. However, it has been found that quality is determined by the exact nature of the stimuli used.....

2. Strength

It has been reliably shown with many reflexes that increasing the number of CS-US pairings results in an increase in the strength of the CR. Also, the maximum strength of the CR depends on both the reflex studied and on the intensities of the CS and US. Strength is measured by a combination of factors.



Conditioned Response



Measurement

1. Quality

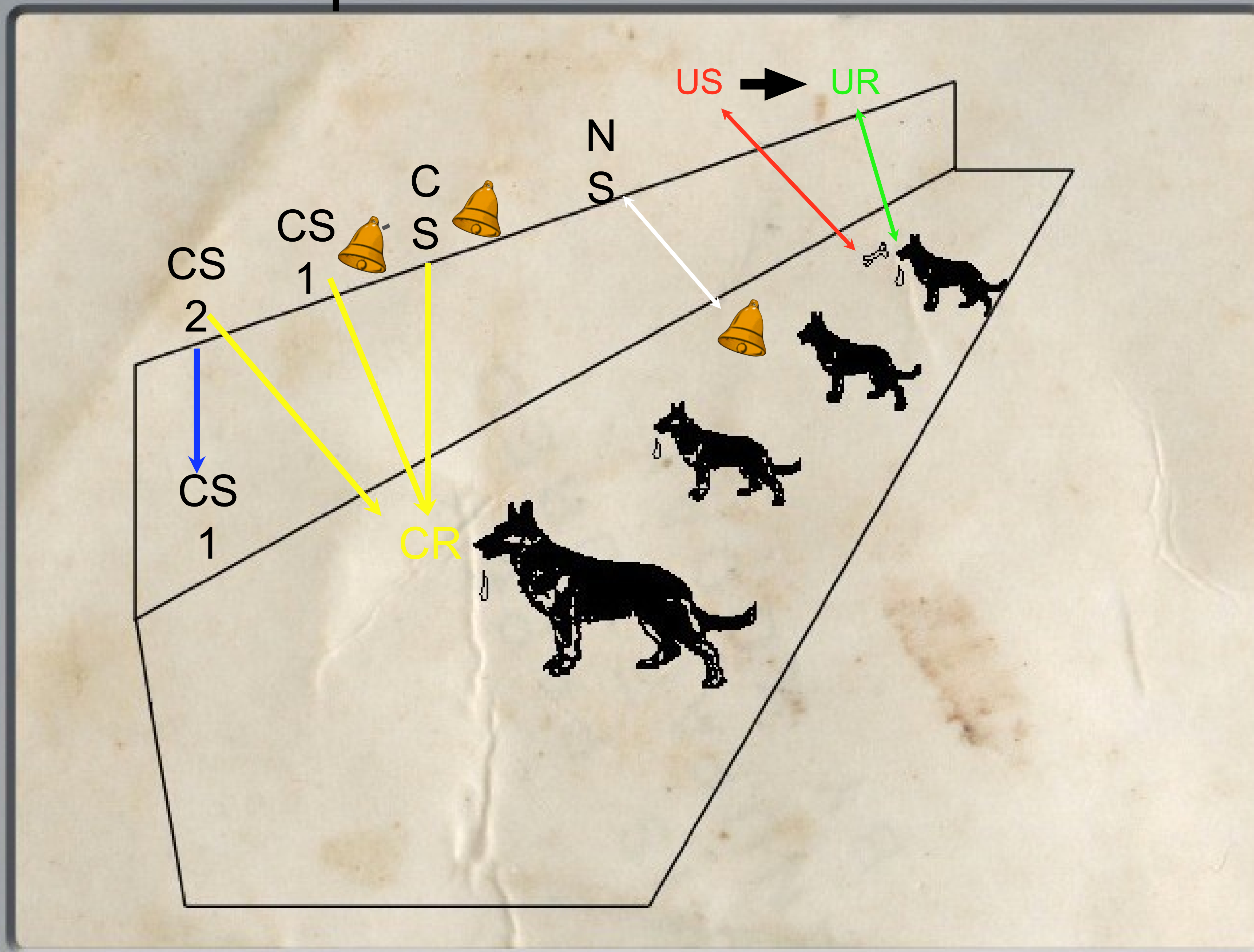
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2. Strength

Probability - You measure this by counting the number of times the CR occurs after all of the CS presentations.

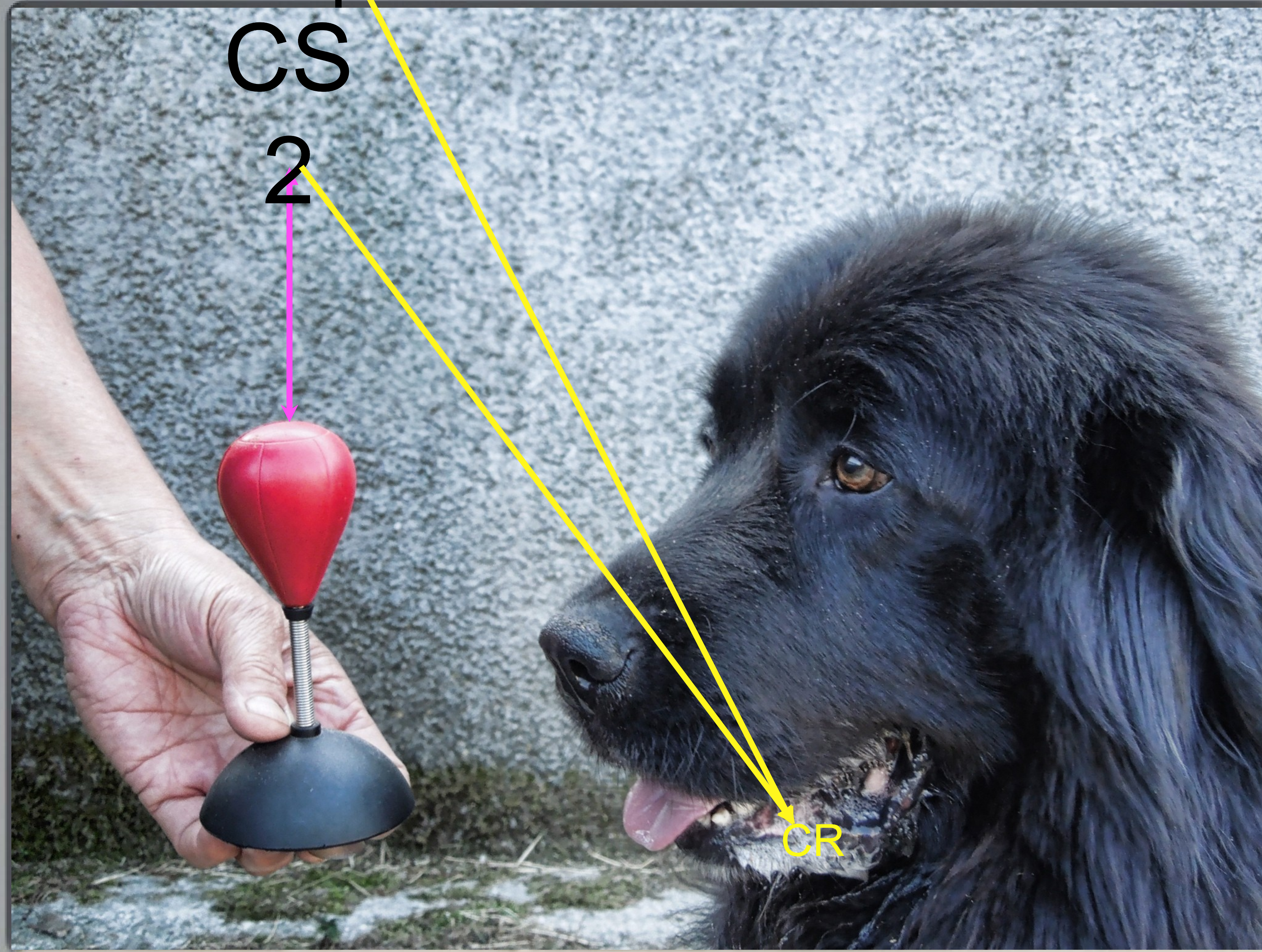
Latency - You measure this by recording the time taken for response to occur after the CS has occurred. Short durations indicate a strong response.

Conditioned Response



Pavlov also discovered that the CS could now be paired with other stimuli so that they too could control salivation. In the example here, the label for the CS is changed to CS1 prior to pairing it with the new stimulus, CS2.

Conditioned Response



Now we see why Lilly responds to the punch bag by salivating!! She was first trained using a clicker that was paired with food. Once she responded reliably to the clicker, the punch bag was presented *before* the clicker was pressed.