



# WHAT CAN WE LEARN FROM ABSENT CUES?

Master's Project Thesis

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**Abstract:** (250 words, placeholder) Far far away, behind the word mountains, far from the countries Vokalia and Consonantia, there live the blind texts. Separated they live in Bookmarksgrove right at the coast of the Semantics, a large language ocean. A small river named Duden flows by their place and supplies it with the necessary regalia. It is a paradisematic country, in which roasted parts of sentences fly into your mouth.

Even the all-powerful Pointing has no control about the blind texts it is an almost unorthographic life One day however a small line of blind text by the name of Lorem Ipsum decided to leave for the far World of Grammar. The Big Oxmox advised her not to do so, because there were thousands of bad Commas, wild Question Marks and devious Semikoli, but the Little Blind Text didn't listen. She packed her seven versalia, put her initial into the belt and made herself on the way. When she reached the first hills of the Italic Mountains, she had a last view back on the skyline of her hometown Bookmarksgrove, the headline of Alphabet Village and the subline of her own road, the Line Lane. Pityful a rethoric question ran over her cheek, then she continued her way. On her way she met a copy. The copy warned the Little Blind Text, that where it came from it would have been rewritten a thousand times and everything that was left from its origin would be the word "and" and the Little Blind Text should

## 1 Introduction

Imagine that you are the first pirate space explorer to set foot on a new planet. Everything here is new and you have no idea what all these different shaped objects are. All you know is that you are going to search for treasure. How will you learn all these new concepts and if they will lead to treasure or not? When we first come into this world all input is new. So then how do we learn these new concepts?

Some literature, as will be discussed below, suggests that people learn through a process called Error Driven Learning (EDL). In this theory the main goal when learning something, is minimising the uncertainty about upcoming states in the world. EDL has been shown to work in multiple domains of learning, such as language acquisition (Hsu et al., 2011; St. Clair et al., 2009, e.g.), second language learning (Ellis, 2006). And in fields such as social psychology, category learning and more as well (see Siegel and Allan (1996) for a general review.), which means that it is not constrained to explaining only one part of learning.

To give a concrete example of this, let's say you have a smoke detector in your house and you see the light blink on it. You are not quite sure what it means, but the next day you hear it beep like it does when the batteries are empty. There is now a connection between the light blinking, the

cue, and the batteries of the detector being empty, the outcome. However on that same day as you saw the lights blink just as you got out of the shower and the hallway was a bit steamy as well. So there is also a connection between the light and the shower steam. There is still uncertainty. The next time the lights blink, you do not come out of the shower and the next day the empty battery beep sounds. Now the connection between the light and the shower steam is weakened, while the connection between the light and the detector's batteries is strengthened. This way uncertainty about the world is reduced.

This is a practical example of what EDL is. However there are different proposals on how the exact mechanisms behind EDL should work. In this research we will disentangle two of those mechanisms, to hopefully gain more insight into happens when learning new concepts.

The first of the two models that attempt to describe the underlying mechanisms of Error Driven Learning, is the Rescorla-Wagner model (1972). The (simplified) formalisation of this model can be seen in Equation 1.1.  $\Delta V_{ij}^t$  is the change in weights between cue  $i$  and outcome  $j$  at a certain time and  $\eta$  is the learning rate (typically set to 0.01). In the original paper  $\eta$  is replaced by  $\alpha$  and  $\beta$ , where the first is the learning rate for the cue

maybe don't use this example to explain reducing uncertainty, but to explain that we learn from cues after that you could raise the question whether we learn in the absence of cues

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## Introduction

① I like the start of intro (1st paragraph),  
but less so the ~~sections~~ afterwards.

paragraphs  
I expected an introduction in your question  
but you immediately jump to EDL (which is quite detailed)  
Maybe you could first ~~describe~~ <sup>introduce</sup> your question from

a higher level : focus on that learning is generally <sup>assumed</sup> ~~caused~~  
triggered by cues. Some accounts even only focus on  
co-occurrence between cues and outcomes (statistical  
learning and associative learning); but ~~the~~ <sup>previous</sup> research  
have shown that ~~the absence of~~ the absence of cues  
also provides useful information (eg. Rescorla 1988)  
Now your question is ~~whether~~ learning takes place in  
the absence of cues.

Optionally : you could add that although there has not been  
a lot of studies investigating this question (but see VH&W),  
implicitly many memory accounts assume that the  
activation of information decays over time (e.g. Anderson 2007),  
which ~~suggests that~~ fit with the idea that learning may  
take place in the absence of cues.