

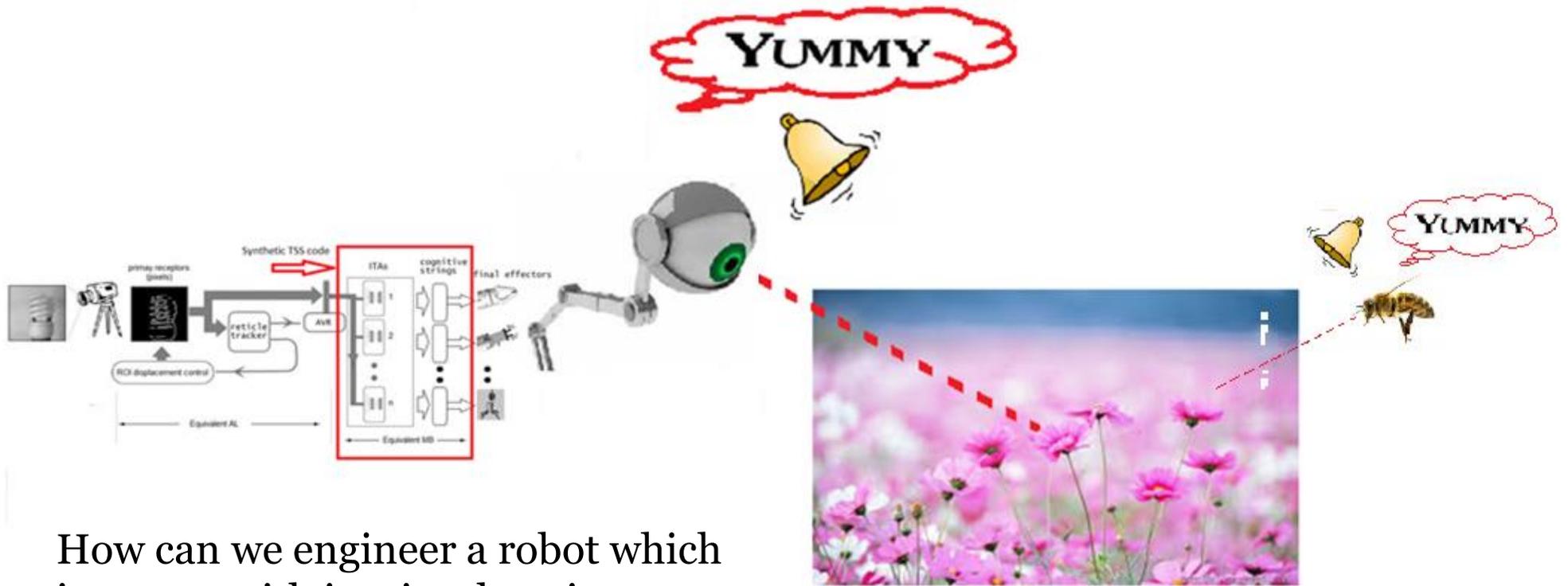
# A Bio-Inspired Robot With Visual Perception of Affordances



Agosto 2014

# Affordance driven Robot Engineering

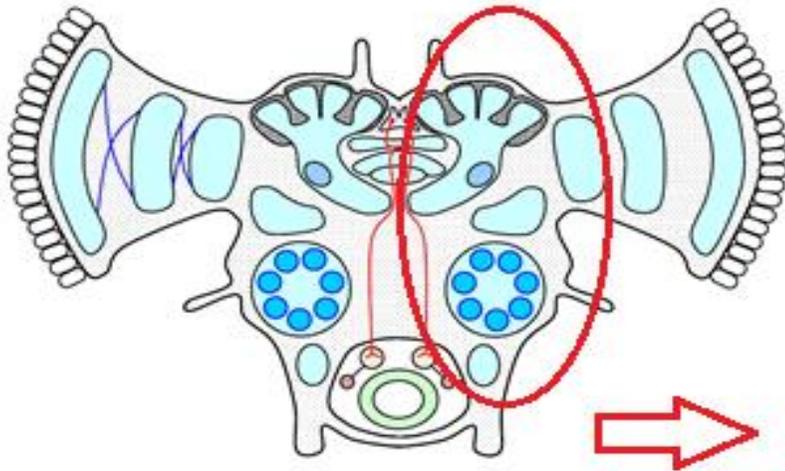
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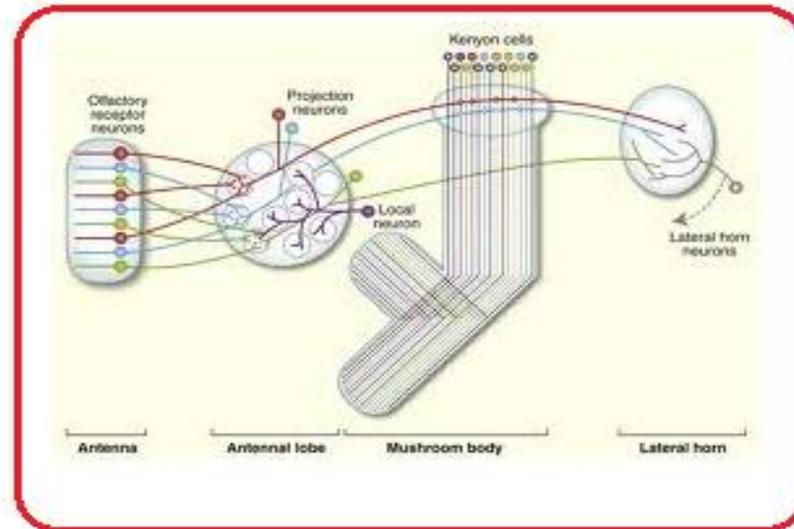
How can we engineer a robot which interacts with its visual environment similar to a real bee?

# The Insect Brain

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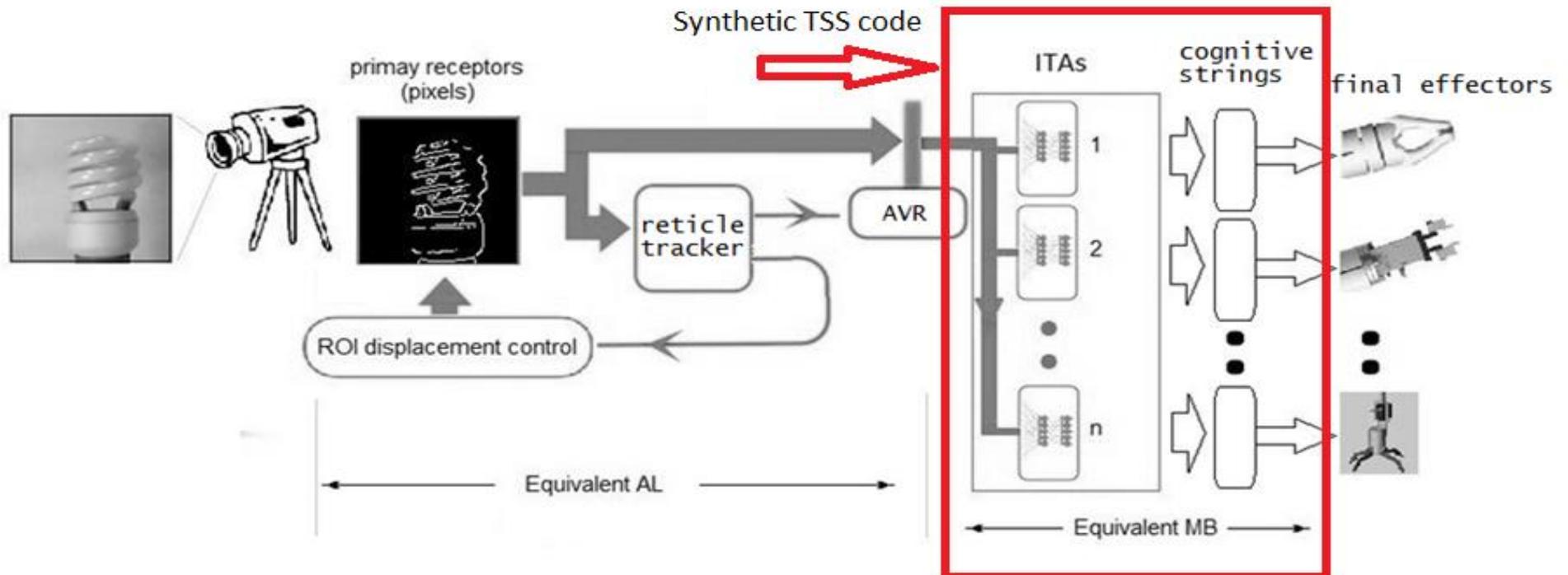
Olfactory system



Insect brains are million times smaller than ours and yet they can learn through symbolic language and develop spatial abilities

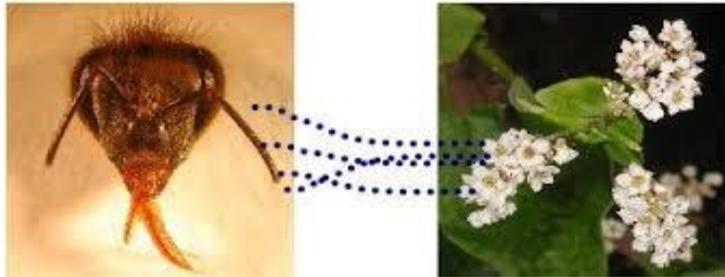
# The proposed neural controller

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# Isolated Learning

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To learn and recognize a  
pattern (odor)  
no counter examples are needed



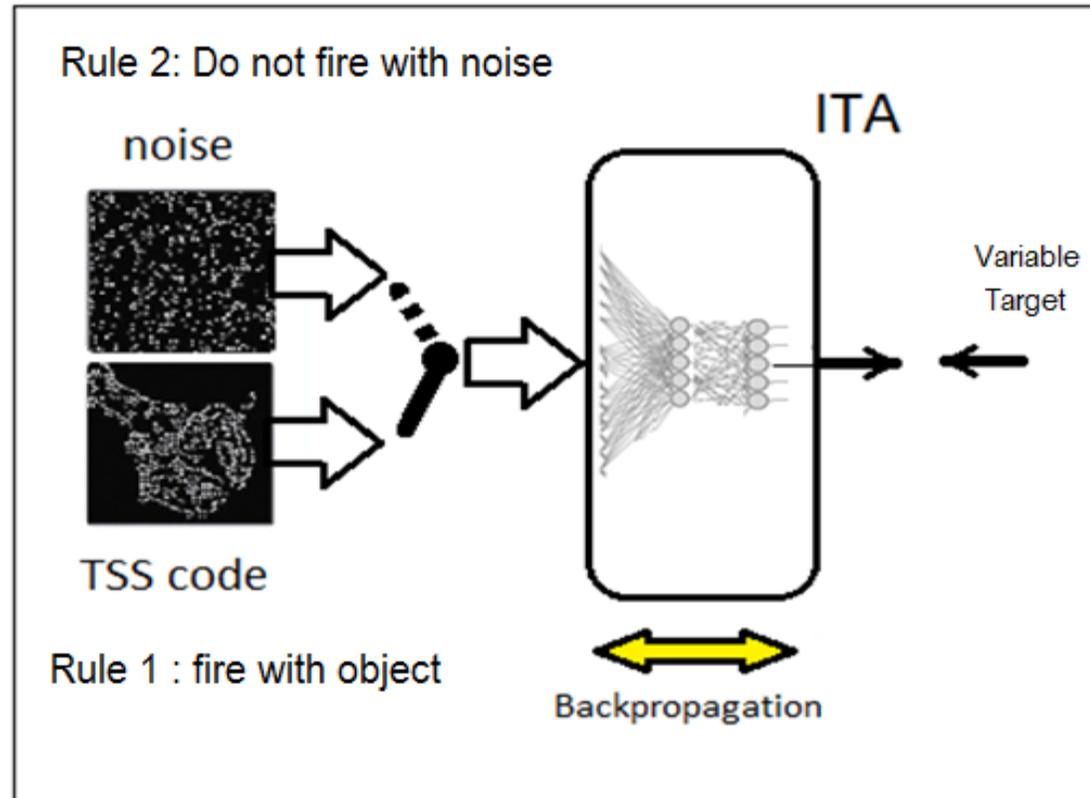
☙ Limonene ☙ Octanol ☙ Hexanol ISI=2s US=4s CS=4s

	TRIAL	Acquisition			Extinction		
		1	2	3	4	5	6
BEE	1 CS* Group	☙*	☙*	☙*	☙	☙	☙
	2 US Group		☙*		☙	☙	☙
	3 *CS Group	☙*	☙*	☙*	☙	☙	☙
	4 US Group		☙*		☙	☙	☙
	5 *CS Group	☙*	☙*	☙*	☙	☙	☙
	6 CS* Group	☙*	☙*	☙*	☙	☙	☙
	7 *CS Group	☙*	☙*	☙*	☙	☙	☙
	8 CS* Group	☙*	☙*	☙*	☙	☙	☙
	9 US Group		☙*		☙	☙	☙



# Isolated Learning: An autocritical Agent

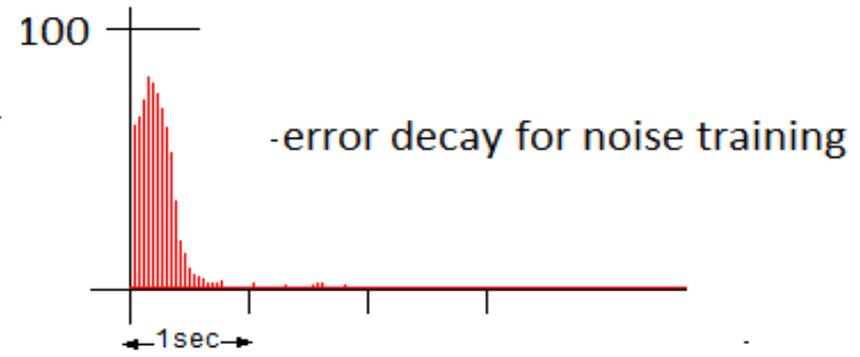
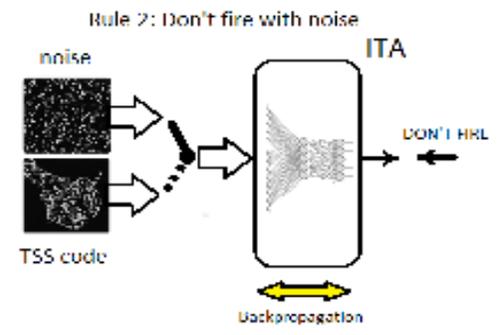
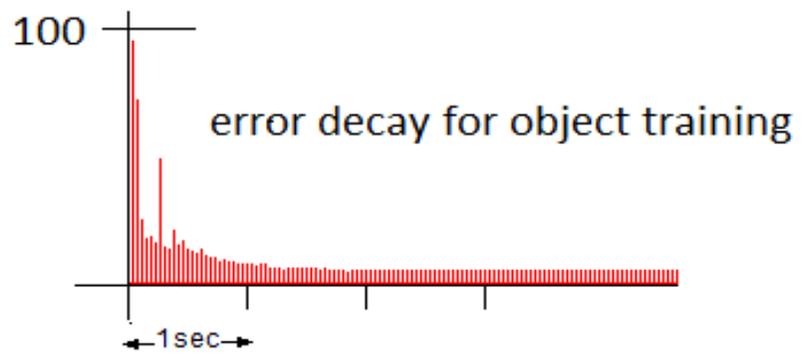
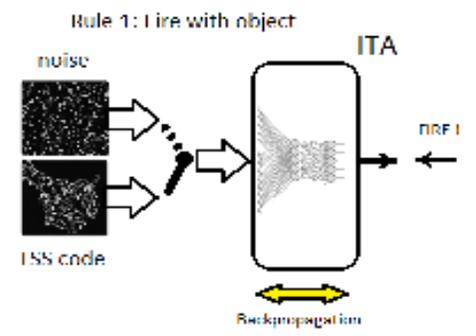
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# Isolated Learning. The effects of a Reward

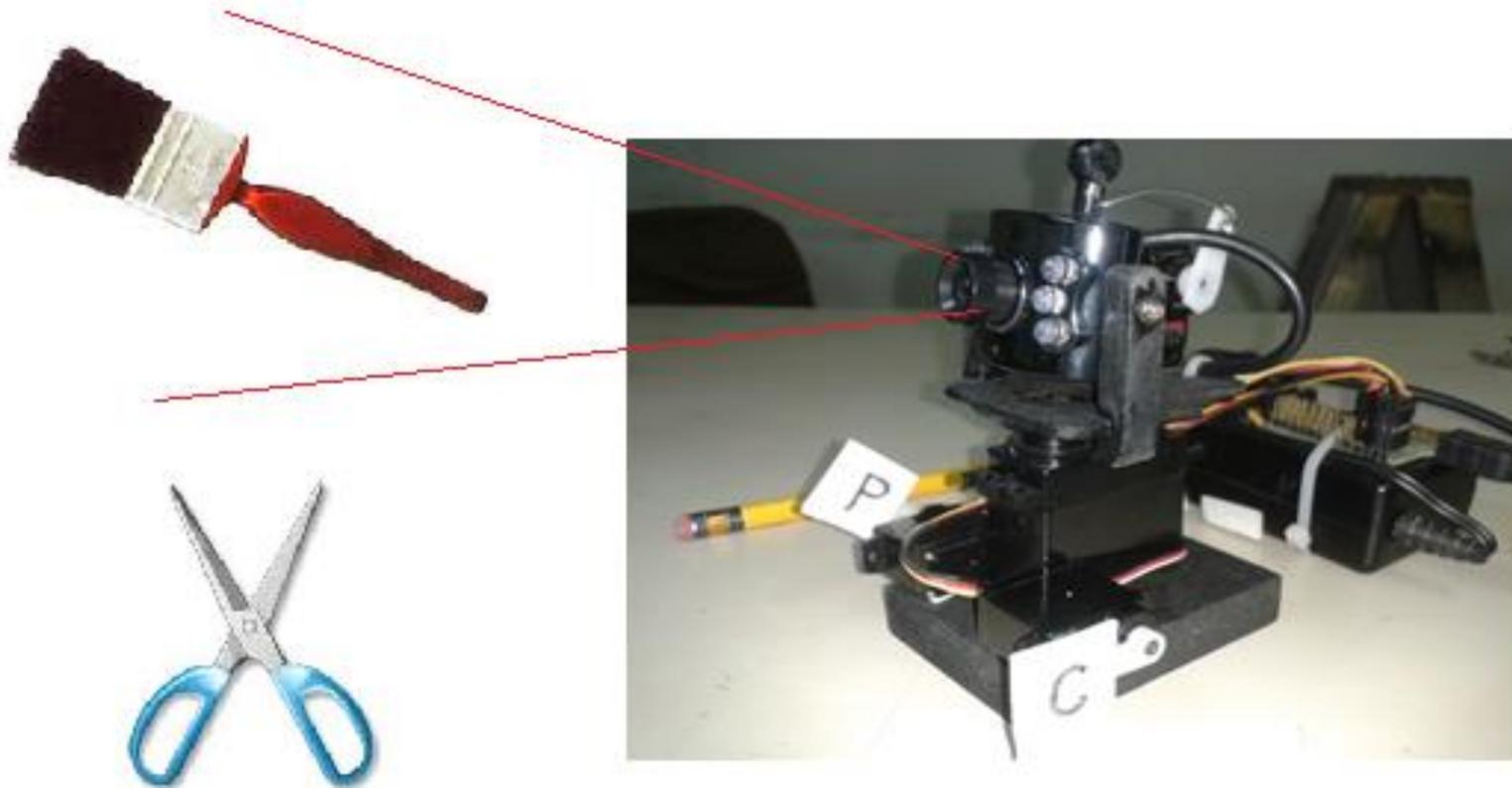
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The space-time  
diagram of one  
reward



# The proposed Affordance driven Robot

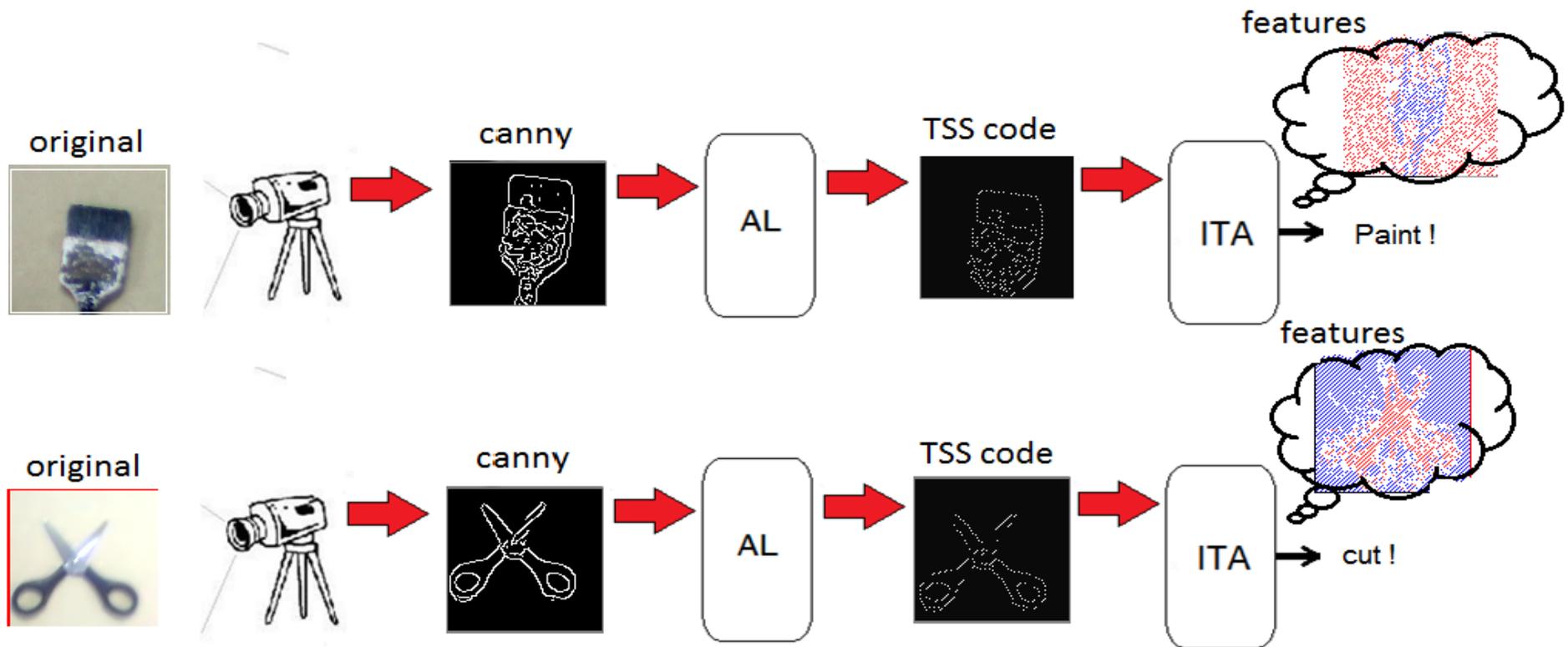
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# Experiment 1:

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## The emergence of affordance perception





# Experiment 2: Exploring Caltech Database

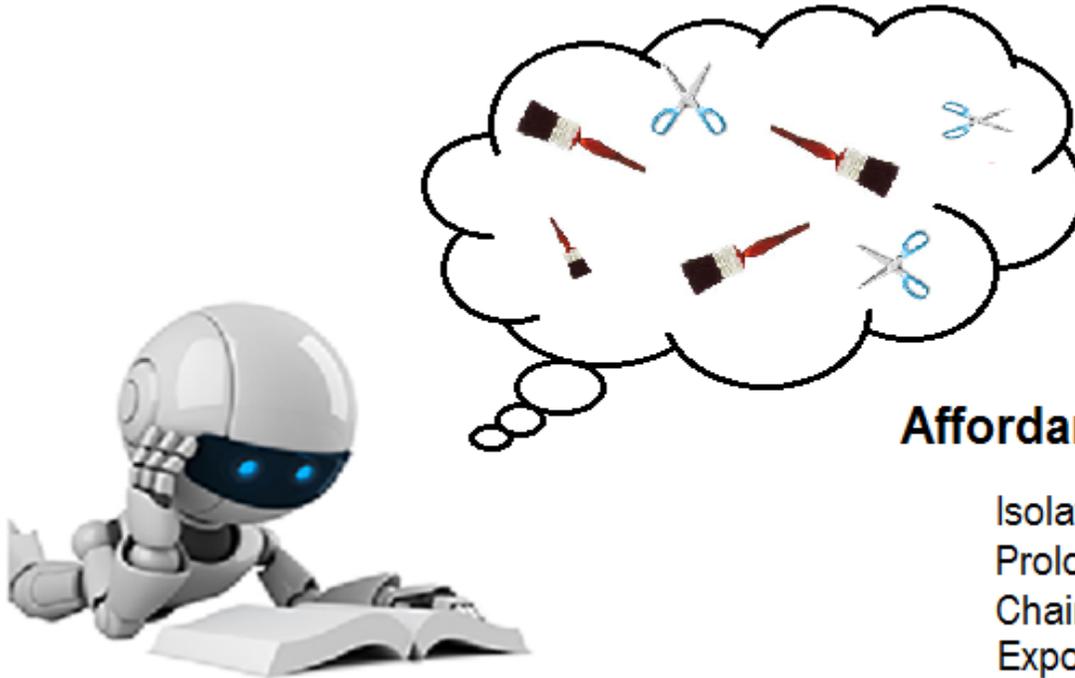
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## A non easily distractible eye



# Results: An affordance Driven Robot

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## Affordance Perception

Isolated learning  
Prolonged learning time  
Chain-released learning resources  
Exposition to abundant learning examples