

you seem to see. In Barlow's terms, it is the unexpected, it is 'news', and that is why we see it.

Birds have an additional problem which humans ordinarily are spared. A bird perched on a tree branch is constantly being blown up and down, to and fro, and its retinal images seesaw accordingly. It is like living through a permanent earthquake. Birds keep their heads, and hence their view of the world, steady by diligent use of the neck muscles. If you film a bird on a windblown branch, you can almost imagine that the head is nailed to the background, while the neck muscles use the head as a fulcrum to move the rest of the body. When a bird walks, it employs the same trick to keep its perceived world steady. That is why walking chickens jerk their heads back and forth in what can seem to us quite a comical fashion. It is actually rather clever. As the body moves forward, the neck draws the head backwards in a controlled way so that the retinal images remain steady. Then the head shoots forward to allow the cycle to repeat. I can't help wondering whether, as an untoward consequence of the bird way of doing things, a bird might be unable to see a real earthquake because its neck muscles would automatically compensate. More seriously, we might say that the bird is using its neck muscles in a Barlow-style exercise: holding the non-newsworthy part of the world constant so that genuine movement stands out.

Insects and many other animals seem to have a similar habit of working to keep their visual world constant. Experimenters have demonstrated this in a so-called 'optomotor apparatus', where the insect is placed on a table and surrounded by a hollow cylinder painted on the inside with vertical stripes. If you now rotate the cylinder, the insect will use its legs to turn, keeping up with the cylinder. It is working to keep its visual world constant.

Normally, an insect has to tell its simulating software to expect movement when it walks, otherwise it would start compensating for its own movements, and then where would it be? This thought prompted two ingenious Germans, Erich von Holst and Horst