

Neuroaesthetics. Lecture 4.

Ramachandran's eight laws of aesthetics

Our subject today will be Professor Vilayanur Ramachandran's so called EIGHT LAWS OF AESTHETICS. Ramachandran is professor in neurobiology at the Center for Brain and Cognition, University of California, San Diego.

LAW ONE: THE PEAK SHIFT PRINCIPLE

(next) According to Ramachandran and Hirstein, art will always tend to be a sort of exaggeration of the reality. As arguments in favor of their thesis, they draw on artifacts, such as the exaggerated female form of the mystical, so called **(next)** Venus of Willendorf, **(next)** Indian female temple sculptures from the 9th c., but they also points to caricatures, such as **(next)** this one of Nixon, which, as pointed out by Ramachandran, is more Nixon-like than the photo of the ex-President.

Ramachandran labels this exaggeration of form in art as **(next)** *the peak shift effect*. He finds the same mechanism in work in the animal world. In 1954, the etologist Tinbergen made an interesting experiment on seagulls feeding their chicks. The beak of the seagull, which is yellow, has a red stripe on it, on which the chickens peck when they beg for food.

(next) **(next)** If you put a yellow stick with a red stripe on it into the nest, the chicks will peck also at this stimulus. Now, if you put another stick with, say, three red stripes into the nest, the chicken will pick even more vigorously. The stick with tree red stripes appears to be a 'Picasso in the world of chicks 'says Ramachandran: **(next)** being trained to respond to one particular stimulus will lead to a preference for an exaggerated or *peak shift*-version of the same stimulus.

Another example from the animal world is (**next**) that if a rat is trained to prefer a rectangle more than a quadrat, it will be even more excited when seeing a skinnier rectangle. Hence, the rat is not learning the prototype: rectangle, but a rule: rectangularity. Rectangularity becomes, what Ramachandran calls a superstimulus.

This is also what happens when a face is rendered into a caricature. The artist will find out what is different with this particular face as compared to an average face, and then amplifying this difference. (**next**) That is the reason why the Nixon caricature is more (**next**) Nixon like than (**next**) Nixon himself.

But what is the neurobiological explanation for why the caricature is more Nixon like?

What happens is that from the primary visual processing mechanisms in the visual cortex and in the ventral temporal areas, there are sent impulses to the (**next**) limbic system, resulting in an addition of emotional content to what is seen. A face will be recognized in the fuciform face area within the temporal cortex. A caricature, i.e. a superstimulus, will add to the face even more emotional content, and Nixon will be more Nixon like than on a photograph.

The same mechanism can be said to (**next**) help the artist producing the caricature. `Nixon stimulus` sent to the limbic system, from which feedback loops will leed back to the early visual centres to reinforce the `Nixon module`, which turns the `Nixon stimulus` into a `Nixon super stimulus`.

Ramachandran is from India, and draws most of his examples from Indian art. Indian artists use the word RASA for the artistic capturing of the essence. He illustrates the meaning of RASA by

drawing our attention to Indian female temple sculptures (**next**) from the 9th century of our era, sculptures that are extremely erotic in their appearance and pose. On conveying a particular RASA or essence in an artwork becomes a way to evoke a particular mood in the observer. As you can see in this sculpture, the female form is exaggerated in extrema: The broad hips versus the extremely small width of waist is an anatomical impossibility; still it is erotic provocative.

The artist has here created what Ramachandran will designate a «super stimulus» or RASA of female beauty and sexuality. This super stimulus captures the *rasa* of feminine pose and grace which will tap into the limbic system of the beholder resulting in an emotional response.

You find the same principle at work in (**next**) this celestial nymph, a perfect representation of RASA of feminine perfection; it was executed about A.D. 800. And look at this (**next**) sculpture, with its exaggerated breasts. According to Ramachandran, it is a possibility that our brain has particular form centres in the lower part of temporal lobe that is able to immediately recognize the round female forms as opposed to male form characteristics, and that the amplification of the difference appears in interaction with the limbic system.

In short, (**next**) to subtract a typical male body characteristics and pose from those of a female, and then amplify the difference is the way to create this RASA of femininity, says Professor Ramachandran.

And in this **(next)** drawing of an amorous couple, Ramachandran maintains that, I quote: even though these particular highly stylised anatomical poses are impossible, it is very evocative of the SRINGARA RASA or KAMA RASA , which means sexual and amorous ecstasy, because the artist is providing a caricature that exaggerates the amorous pose. It is as though the artist was able to intuitively access and powerfully stimulate neural mechanisms in the brain that represent amorousness – end of quotation.

Ramachandran finds that the exaggeration of female form that we find in the **(next)** Venus figures in Paleolithic art and other examples **(next)** of early art are other examples of what he calls peak shift effect, or superstimulus. And he maintains that it is an universal principle that is profoundly expressed also in modern art, such as in this act by **(next)** Henry Matisse, and in this **(next)**, also by Matisse, which, in fact, is exaggerated both in posture and in colour space. The same can be said about this painting, **(next)** a Caryatide, by Amadeo Modigliani, 1913-14.

As to exaggeration in colour space, we can stick to the Matisse paintings and his principle of contrasting three colours with some small additions with a fourth. Here it is the green, blue, and red that are clinging together with addition of yellow. **(next)** What you see is actually Madame Matisse, and she had absolutely not this skin colour. In the words of Ramachandran, this exemplifies that it is not just form space and position space that are exaggerated in art. This certainly also holds true for colour space.

What about a **(next)** RASA for graciousness, as in this gothic Madonna of Notre Dame, Paris – or in the **(next)** Madonna with the long Neck by Parmigianino?

When it comes to the posture space, it has not just to do with erotic poses. It is very significant that we recognize poses and, as stressed by Ramachandran, there is an obvious need to connect

these posture representations to the limbic system: it is quite imperative that I recognize an attack posture, a posture or body position which beckons me, or one which indicates sadness or depression etc.

Moreover, **(next)** the face and the eyes can be a superstimulus. A face is one of the most potent stimuli, activating the so-called fusiform face area within the temporal lobe. Gaze on you will also activate the temporal lobe, within the superior temporal sulcus.

In this **(next)** painting Picasso so to speak super-activates both our fusiform cortical areas, and the superior temporal sulcus. The fusiform face area has cells responsive to different angles of face, connecting to some super-cells that will be sensitive to the sum of facial angles. These cells, in turn, will feed their information to limbic areas, such as in the amygdala, where there is a particular face area, telling whether a face is frightening or friendly.

Artists often make **(next)** homage to earlier artists, or to particular forms. The latter artist makes a caricature of his beloved predecessor. New art forms find and amplify the essence of previous ones, as is the case with Picasso, and African masks.

I am trying to interpret Ramachandran from the point of view of my own background and artistic experience, and then the Norwegian painter Edvard Munch comes to my mind. Can you find any better RASA **(next)** of love than in this woodcut called The Kiss, known from oil paintings, and countless graphic blades. I find that this woodcut is particularly expressive.

LAW 2: GROUPING AND BINDING

Ramachandran's second law has to do with our brains searching for perceptual grouping and binding to get a deeper meaning of what we see.

One of the main functions of early vision is to discover and delineate objects in the visual field. Of obvious reasons, this is of utmost importance from an evolutionary point of view: How can I recognize a predator, or how can I recognize my prey? Can I feel safe in this landscape filled with wild animals?

(next) What do you see here?

And you can never know: we may have entered into a very spooky situation. Someone has told me that we are not alone? What do you think? It is dark, autumn, wind is blowing, I hear someone, for sure

(next) How can I recognize a face, it may be a murder.

What is all this about? It has to do with the fact that our brain will try to put together the puzzle of visual information to create a clear picture of what we see. This goes through successive stages through our visual pathway in the temporal cortex. The successive analysis will also tap into the emotional system, the limbic system, leading to a substantial emotional feedback to the visual areas, until we recognize the dog or the man, and are filled with relief, and say aha, I can see you. The limbic activation is so strong that when you have got the aha, you will never forget the Dalmatian or the face.

The principle of grouping and binding will also be evident by an analysis of what we conceive in **(next)** this figure. Do you see multiple hourglasses, or multiple closed forms.

In art, grouping and binding are, for instance, used by our visual brain in visual reading of broken surfaces like mosaic. **(next)** In this detail of a female saint's face, deriving from an early ninth century mosaic in Rome, the face is very roughly made by relatively large cubes. Still, we have no problem to see that it is a face. Grouping and binding within our visual processing areas in the temporal cortex, particularly within the fusiform face area, added to limbic activation, clearly tells us that this is a face.

This can also be clearly visualized experimentally. **(next)** Can you see how we bind the figure, even where it is not delineated at all?

I have tried to give a schematic representation of the interaction between primary visual areas and the limbic/emotional structures**(next)**.....

THIRD LAW: ISOLATING A SINGLE MODULE LEADS TO ALLOCATING ATTENTION

We will now go back to our **(next)** Nixon example, and what we will now call the Nixon module. What do I mean with Nixon module? Is it his face as seen in a photograph? We have already seen in LAW ONE that the real Nixon is less Nixon like than the caricature. Hence, the Nixon module is the line drawing of his face, particularly the exaggerating one. The reason why a colour photo of Nixon, or anyone else, is less interesting for our nervous system than the line drawing is, simply, that our brain prefers contrasts. The colour of the skin tone is far less interesting. This has, thus, to do with basic principles by which our nervous system is composed.

Ramachandran illustrates what he means by a module also by referring to the splendid drawings by the autistic girl **(next)** Nadia. Her drawings of horses are so brilliant that they can hardly be considered inferior to those of Leonardo da Vinci. How can this be so?

Ramachandran underlines that the autists seem to have the ability to isolate some modules in their brain, for instance the form module. Since their brains are less occupied with noisy inputs from other sources, complex social settings, etc. they may be able to amplify the genius competence within each module, resulting in such splendid expressions as those we can see in the drawings by Nadia.