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From the Los Angeles Times

## The 411 to avoid boredom

As 'infovores,' information is the fuel that keeps our brains all fired up.

By Irving Biederman

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Crackberry. Only a metaphor for our addiction-like urge to check e-mail? Or does the term shed light on a deep biological truth about our hunger for information?

Human-motivation studies traditionally stress well-established needs: food, water, sex, avoidance of pain. In a culture like ours, most of these needs can be satisfied easily. Just open the refrigerator door, or blow on that spoonful of hot soup. (Satisfying the need for sex may require a bit more doing.)

What's been missing from this scientific research is humans' nonstop need for more information.

We are "infovores." The human eye makes three fixations a second on the world around it, and not at random. Our gaze is drawn to items we suspect have something new to tell us -- posters, signs, windows, vistas, busy streets. Confined to a featureless physician's examination room, we desperately seek a magazine, lest we be reduced to counting the holes in the ceiling tiles. Cornered at a party in a banal conversation, we seek to freshen our drink.

Without new information to assimilate, we experience a highly unpleasant state. Boredom. Conversely, at one time or another, each of us has felt the joy of information-absorption -- the conversation that lasts late into the night, the awe at a magnificent vista.

Cognitive neuroscience -- the science that seeks to explain how mind emerges from brain -- is beginning to unravel how this all works. At USC, my students and I use brain scanning to specifically investigate the neuroscience behind the infovore phenomenon.

The explanation involves opioids, one of many neurotransmitters -- which are molecules that the neurons in our brain release to activate or inhibit other neighboring neurons. The effect of opioids is pleasurable. In fact, the same neural receptors are involved in the high we get from opiate drugs, such as heroin or morphine.

In the past, these opioids were believed to exist primarily in the spinal cord and lower brain centers, where they reduced the sensation of pain. But more recently, a gradient of opioid receptors was discovered in a region of the cerebral cortex, humans' enormous outer brain layer that is largely responsible for perception and cognition.

In the areas of the cortex that initially receive visual or auditory information, opioids are sparse. But in "association areas," where the sensory information triggers memory and taps into previous knowledge, there is a high density of opioid receptors. So the more a new piece of information tickles that part of your brain where you interpret the scene or conversation, the bigger the opioid hit.

Staring at a blank wall will produce few, if any, mental associations, and thus standing in a corner is punishment. Looking at a random mass of objects will produce strong activation only in the initial stages, where there is little opioid activity to be had.

Gaze at something that leads to a novel interpretation, however, and that will spur higher levels of associative activity in opioid-dense areas. We are thus thrilled when new insights tap into what we have previously learned. We seek ways to feed our opioid desires; we are willing to endure the line at the movie theater in anticipation of the pleasure within. We pay more for a room with a view or a cup of coffee at a Parisian sidewalk cafe.

But if we get more opioids from making connections to our memories and knowledge, why do we then

prefer the new? The first time our brains take in a new perception -- a scene, a movie, a literary passage - there's a high level of activity in which a few neurons are strongly activated but the vast majority are only moderately or weakly activated. The strongly activated neurons inhibit the weak -- so there's a net reduction of activity and less opioid pleasure when our brain is exposed to the same information again. (Don't feel sorry for the inhibited neurons, the losers in this instance of neural Darwinism. They are now freed up to code other experiences.)

No wonder we can't resist carrying a BlackBerry 24/7. Who knows what goodies it will deliver? A breaking news item. A piece of gossip. An e-mail from a long-ago girlfriend. Another wirelessly and instantaneously delivered opioid hit.

I hope you got a few opioid hits, too, in learning about your inner infovore.

As for me, I'm starting to feel separation anxiety. Where's my BlackBerry?

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