Dogs in the Zone

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Training stimulates the pleasure center of a dog's brain and can become chemically addictive

Is it possible that oxytocin levels in the brain induce a chemical response that makes training "addictive"? *Barb Levenson* investigates

Have you ever seen that look in your dog's eyes? He looks at you and it feels like he truly loves you. Well, you are probably right. Scientists are discovering that we may actually be correct. Our dogs are indeed expressing their love for us.

Several weeks ago I was working with my eight-month-old Border collie puppy, Classy. I wanted to shape the behavior of him putting his head down while he was in his bed. In this situation I used a clicker as my marker so I could pinpoint the exact time Classy made a correct response. I also picked a very specific criterion – click when his nose moved down toward the bed. Classy was getting the behavior but something interesting was happening at the same time. He seemed to go into a "zone."

I usually keep my training sessions short in order to keep Classy wanting to play more with me. In this instance, however, he seemed to be enjoying the game so much so that distractions in the room had no effect on his attention to me. Our session lasted almost 12 minutes. Never once did he want to leave the bed and only one time did he glance away from me. This was amazing. I had not seen this in him before. Adolescent puppies are not known for long attention spans but Classy was showing me he might be an exception, in this context at least.

It was fascinating for me to watch my puppy become thoroughly engaged in the game. I was reinforcing him with his break-

fast so I was simply using kibble and not special treats. Becoming an observer, not just a participant, I watched Classy become calmer and calmer. He only took his eyes off me once and those eyes had something going on behind them.

What was also interesting was that he did not want to stop the game. I literally had to pull him away from the bed. If I had had more food he would have continued indefinitely. At the time I thought Classy was having the same experience as the so-called "runner's high" where endorphins flood the brain while you are running. You feel as though your feet are not even touching the ground and you can run forever. So this set me to thinking about what was going on in Classy's brain.

Pieces started coming together. I remember seeing a Facebook page that I had shared on my website and posted at my training facility. The title of the page was *Effects of Training on Your Dog's Brain*. Your dog becomes physically addicted to listening to you. The first bullets in this post were as follows:

- Training stimulates pleasure center of the dog's brain
- Boosts release of pleasure chemical, oxytocin
- Reduces levels of stress chemical, cortisol
- Makes your dog want to REPEAT positive behaviors

I started a search for oxytocin. Where to first? Wikipedia, of course. Exactly what is oxytocin?

The Chemical Connection

Oxytocin was first discovered in 1906 as a hormone that increases during and after child birth, and secures a bond between the mother and her newborn.

More recent studies have investigated the role of oxytocin in behaviors such as social recognition, anxiety and pair-bonding. The same connection that is formed between mother and child is formed between many owners and their dogs, chemically speaking that is. This is why I hear people describe their love for their dog as though he were their baby.

Oxytocin is a hormone produced by the hypothalamus and stored and secreted by the posterior pituitary gland. It acts primarily as a neuromodulator in the brain. Neuromodulators facilitate focused delivery of modifying agents – e.g. electrical, optical or chemical signals - to targeted areas of the nervous system in order to improve neural function. Recent studies have begun to investigate oxytocin's role in various behaviors, including the above mentioned pair-bonding, and, for this reason, it is sometimes referred to as the "bonding hormone". In addition oxytocin is released during various positive sensory stimulations such as touch, light pressure, warmth and stroking, and is one of the reasons why our dogs love their belly rubs.

Oxytocin Studies and Dogs

I began looking into research that went beyond human pair bonding and looked at the effects on our dogs. Several well-known and respected names came up. The first that attracted my attention was the well-known behaviorist, Patricia McConnell. McConnell speculates about oxytocin in her book, *For the Love of a Dog (*McConnell, P., 2007 *For the Love of a Dog* Ballantine Books). She became interested in it because of an article in the journal, *Hormones and Behavior*. McConnell states the authors, M. Nagasawa et. al., found a correlation between the level of an owner's oxytocin and how much their dog tended to gaze directly at them. This is exactly what Classy was doing. I did not realize it was building up in my brain too.

McConnell calls oxytocin a "feel good" hormone associated with social bonding and it correlates with friendly social behavior in many species, including humans. As I watched and worked with Classy in this training session, I realized he was becoming more and more committed to me and the "game" and I was too. It was reinforcing to look into the eyes of my Border collie. I felt we were making a real connection.

Ian Dunbar, another internationally known veterinarian and behaviorist, quotes a study conducted by Tokyo University (found in the journal, *Proceedings of the National Academy of Sciences of the United States of America*). The article offers evidence that a dose of oxytocin given to our dogs will increase the demonstration of social behaviors toward both other dogs as well as their humans.

According to Dunbar, the Tokyo researchers worked with 16 pet dogs who were given either a saline spray or a spray of oxytocin into their nostrils. They monitored the dogs both behaviorally and physiologically (blood and urine samples were taken) after the oxytocin was administered and while they were released to interact with their owners and each other. The owners were not informed as to which spray the dogs had received but had been instructed not to interact with the dogs.

Scientists are discovering that dogs really do love their human guardians

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The Chemistry of Feeling Good

At present, brain oxytocin, opioids, and prolactin systems appear to be key participants in the subtle feelings that we humans call acceptance, nurturance, and love - the feelings of social solidarity and warmth. Although many human interactions and cognitive experiences also contribute to maternal states, without the underlying mood- and behavior-altering neuropeptides, those experiences would probably remain shallow and without emotional intensity.

At the present time, AVP, oxytocin and opioid systems appear to be prime movers in the construction and maintenance of social bonds in mammals... Animals also prefer to spend more time with other animals in whose presence they have experienced high brain oxytocin and opioid activities. Thus, it seems as if friendships are cemented by the same chemical systems that mediate maternal and sexual urges.

Additional research on oxytocin provides yet anther intriguing piece to the neurosocial puzzle. The chemistries that promote pleasure and family values are also able to dramatically reduce irritability and aggressiveness.

It has long been known that human societies that encourage physical closeness, touching and the free flow of intimacy tend to be the least aggressive in the world... This of course makes a great deal of evolutionary sense: If one is socially well satisfied, there is little reason to fight.

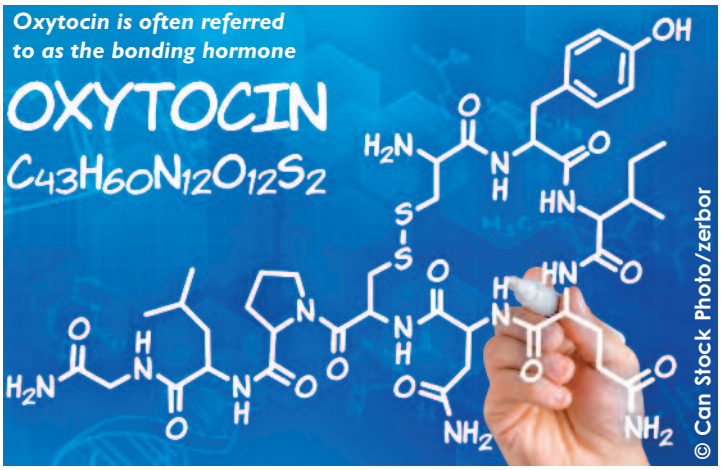
Oxytocin administration reduces all forms of aggression that have been studied.

Source: **Panksepp, J.** (1998)
Affective Neuroscience: The Foundations of Human and Animal Emotions

The results were fascinating. The dogs who had received the oxytocin treatments displayed more playful, affiliative and social behaviors towards both the humans and other dogs. Behaviors such as pawing (for attention), sniffing, licking (go ahead, call it doggy kisses) and prolonged directed gazes were measured. Additionally, all that social bonding behavior produced even more oxytocin in the dogs. I believe the little "capturing game" I performed with Classy was definitely doing this because he wanted to continue to play the game. Was he on an oxytocin high? I am beginning to think perhaps he was.

Another study supporting the effects of oxytocin in our dogs is quoted by Victoria Stilwell in her book, *Train Your Dog Positively* (Stilwell, V., 2013 *Train Your Dog Positively* Ten Speed Press). The research was performed by another Japanese researcher, Miho Nagasawah, of the Department of Animal Science and Biotechnology at Azabu University in Japan.

This study demonstrated that even eye contact between a dog and a human causes an increase in oxytocin. This interaction between our two species has a powerful physiological effect on both of us, promoting feelings of love and attachment while lowering blood pressure and heart rate, soothing pain and lessening stress. This is one of the reasons dogs are being used in therapy with the elderly. And, this is exactly what was happening with Classy and I in our session. I was starting to find some answers.

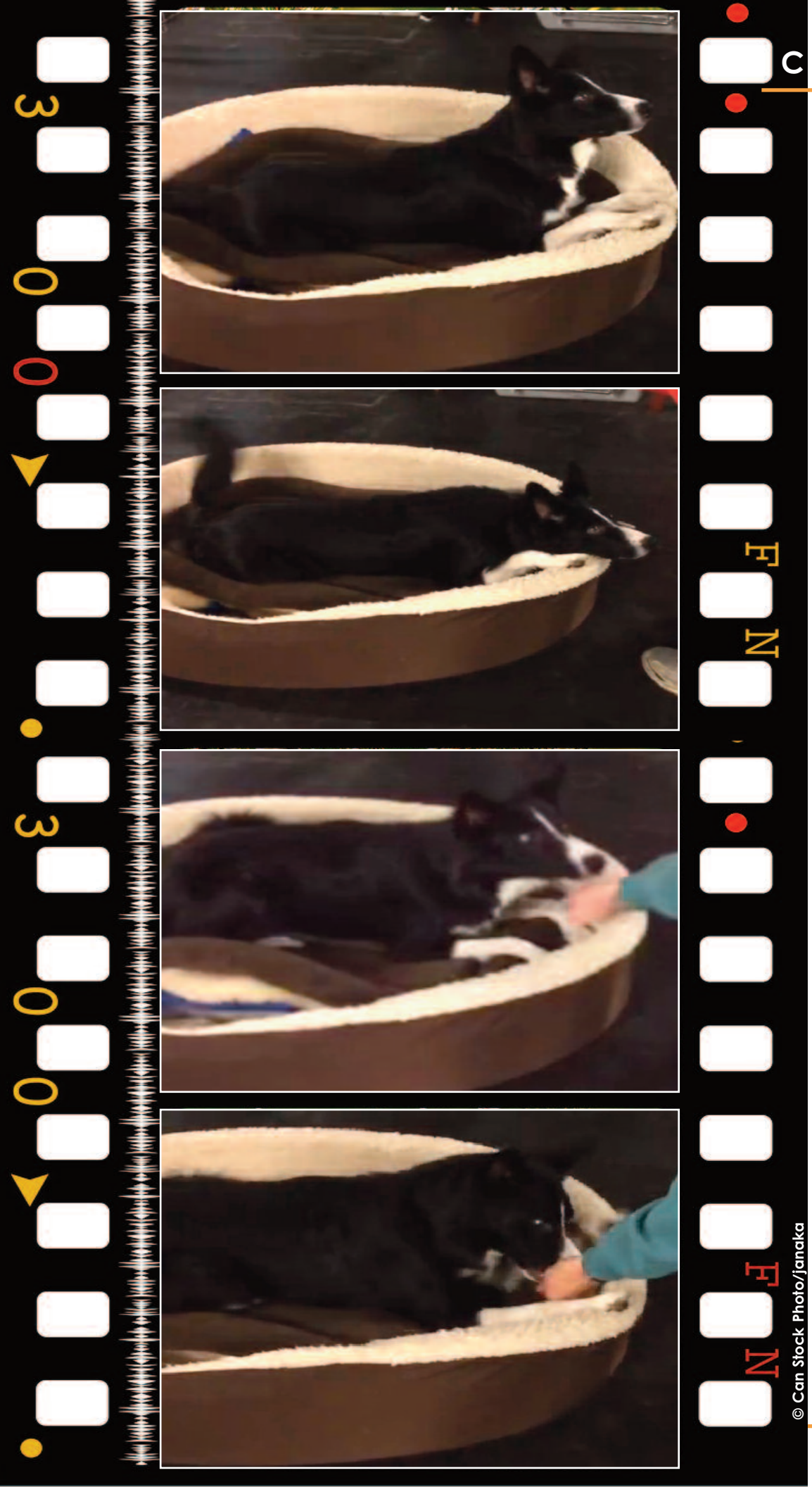


Oxytocin and Stress

There was one last interesting bullet in the aforementioned post on the Kurgo DogBlog. Oxytocin reduces levels of the stress chemical, cortisol. I knew about cortisol and stress but was unfamiliar with its implications for my dog. In humans, cortisol amps up our response to fight or flight stimuli. It is one of the body's hormones that helps to speed up our heart rate and create the hyper alert energy state which empowers us to immediately get out of danger. In human beings, even non-physical related stress like relationship problems, job-related problems and family problems increase cortisol levels. Could this relate to our dogs? The research says it does.

The *Kurgo DogBlog* stated that training reduces cortisol levels in the dog's brain. Right now, Classy is in the midst of his adolescent fear period during which he becomes stressed at and frightened of both novel and familiar situations. For example, we have struggled with the teeter – we get it, we lose it, we get it back and lose it again as his fears ebb and flow. He becomes confident and then a couple of weeks later he is terribly afraid. When he is afraid of the teeter I simply revert to an earlier step and build again.

Now I am beginning to think about the effect of oxytocin on this retraining. Perhaps it is not simply the "retraining" that gets his confidence back but my force-free training that allows him to offer behaviors (on the teeter and elsewhere) that are reinforcing for him. And I now know that this interaction, this offering of behaviors for reinforcement increases his levels of oxytocin. I originally thought it was the food plus the training that helped him overcome his fears. But instead, is this oxytocin at work countering the effects of fear, stress and his cortisol levels as I



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train and bond with him?

A lot of the training of my own dogs is designed to help them learn how to think and offer behaviors. When they are reinforced for a behavior they offer I have found that behavior to be stronger and more durable then behaviors I teach primarily as a verbal cue. As a result of this line of thinking I have come to an important conclusion.

My force-free training stimulates and engages the pleasure centers of the brain, stimulates the production of oxytocin and thus creates an opposing effect to cortisol. Could more of this kind of training help Classy through his fear period? By engaging in more training of the kind that reduces cortisol and increases oxytocin could I help him be calmer and also bond more with me?

My little Border collie is the most challenging of my career. Many of the behaviors I have taken for granted in my many other dogs result in very stressful reactions from Classy. For example, the simple act of a pat on the side and "good boy" caused him to react excessively and snarl at me. He came to me with some body sensitivities. "Don't touch me like that," was what he seemed to say.

The well-known veterinary behaviorist, Dr. Karen Overall, would tell me that Classy has difficulty with control and she would be right. In her manual *Clinical Behavioral Medicine for Small Animals* (Overall, K., 2013 Mosby, Inc. *Pages 214-215*), Overall describes Classy's reactions as an "impulse control" behavior which is analogous to some generalized anxiety disorders. I see this also as an adolescent anxiety disorder and per-

Screenshots (left) of Classy during one of his training sessions. Note his tail position, his focus and calm demeanor. It is clear that he is "in the zone." Watch the video here.

The Bonding Hormone

Oxytocin is a posterior pituitary hormone that is released by way of touch... Oxytocin not only mediates maternal behavior but also appears to facilitate attraction of the young toward their mother. Panksepp notes that oxytocin exercises some significant agonist effects over opioid systems, sensitizing them to opiate substances and making them less responsive to the effects of opioid tolerance. Consequently, oxytocin may render a mother particularly responsive to attachment signals and help to sustain long-term nurturing bonds with her young. Like opiates, oxytocin and prolactin (a pituitary hormone that stimulates milk production) exert powerful inhibitory effects over separation distress. Finally, oxytocin (and arginine vasopressin) appears to facilitate the formation of lasting social memories, thereby complementing underlying neurophysiological attachment processes mediated by the neuropeptide.

Source: **Lindsay, S. R.** (2001)
Handbook of Applied Dog Behavior and Training
Volume Two: Etiology and Assessment of Behavior Problems
Iowa State University Press/© John Wiley & Sons

fect for using training/oxytocin as a mediator to overcome the stress. I can also see how the old, outdated collar corrections could cause a rise in the cortisol levels of a dog frequently leading to more stress, avoidance or a complete shutdown on the part of the dog.

Dr. Overall believes the studies being done with oxytocin are leading researchers to understand that cortisol-induced increases in oxytocin could mediate some of the effects of stress and cortisol. She also believes that nasal oxytocin may even hold promise for distressed and panicked dogs, dogs with true fear or generalized anxiety disorder.

For me this has turned into an amazing journey. I have learned so much about my dog and my dog training. I have become even more committed to positive training if that is possible. It also appears that, as a result of increases of oxytocin during training, Classy could even become addicted to listening to me. What a great addiction. Bring on the oxytocin! ■

Barb Levenson BS has been competing in dog sports since 1981 and teaching obedience and agility privately since 1985. She has titles in Obedience, Agility and Herding and heads the Barb Levenson Dog Training Centers in Pittsburgh, PA. Barb's first book *Flatwork for Agility* was released in early 2007.

Eye contact between a dog and a human causes an increase in oxytocin