

# Is Learning Theory Enough?

Leonard Cecil  
Ettingen, Switzerland  
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# 1 – Foreword

Why in the world would I write still another paper? The answer: that I was encouraged after my “Literature Review” to do so, isn’t quite enough. The reason, quite frankly is, that that little quote from Wikipedia about the work of Dr Silvan S. Tomkins, besides garnering me scorn from a couple of people who thought that disqualified the whole paper, BECAUSE I actually admitted finding something useful in Wikipedia, set me off in a private search for information about **Affect Theory**. I’m like that. I get a bee under my bonnet and can’t let go, and this concept really interested me.

The more I got into it, the more people I allowed to explain things to me and who put up with my very beginner-level questions, the more I realized, that I had a lot to learn and consider. The biggest question was: “What does this have to do with dog training and behavior modification?” That was a fair question. We as trainers pride ourselves for being specialists in behaviorism. Don’t we have enough to work with using behaviorism? We all read studies of ethology, zoology, are all interested in breed traits, but in the end, we base our training plans –largely– on the principles of behaviorism, with a smidge of this or that in addition. **They do not necessarily replace behaviorism, they add to it.** They expand our training toolbox. They give us additions to our behaviorism knowledge base, for example, of optimal treat delivery position, typical play behaviors, and much more. These other sciences do not have much to do with straight ABC contingencies, nor with respondent conditioning.

In any case, at first I was simply struggling to get a grip on the science of Affects. I’m a systems person, understand concepts of systems, how they are built, how they work, how they connect to other systems. My IT position was mainly support, but I also had to create a client design that more or less allowed all the clients to get their work done, but also integrated them into a server system. I had to create a server system that allowed for the clients to be integrated without getting in their way. I had to see that the server system was integrated into the university computer landscape as well as possible.

But I have a problem. While I understand systems, I cannot remember names. This was my huge weakness as a music teacher. It cost me a lot of time and energy to memorize the names of my students. In our system here, I only saw them once a week, but no one wants to be addressed “Hey you with the long blond hair, glasses and viola”. It’s the same with science, only worse. I stumble along trying to explain my last visit to the doctor to my daughter who herself is a doctor. You would think we were an old married couple how I’d stumble on some long word and she’d kind of pop it into my “mouth” and I’d reply, “yeah, that’s it”.

All to explain, that while I was “getting it” with Affect Systems, it was difficult to talk to knowledgeable people without the proper vocabulary. This article is helping ME obtain that vocabulary as well as perhaps introducing a couple of new ideas to others who might be interested.

So, I started putting some of these thoughts from other scientific sources together, sharing them with some people and decided to risk the wrath of the few, perhaps trade it for the wrath of the many, and put something on paper. As we see from reading studies, this is a risky business. What is published is a snap-shot of your mental processes at this moment. Some people will see “Buzz Cecil” and think, “OMG, wasn’t he the guy who ...” and know all they need to know about me. Others might think “OMG, wasn’t he the guy who...” and be animated, motivated to read perhaps something new. This paper is therefore my present state-of-the-thought-processes as of today. I – hope- that those thought processes will be different, further along their path ... tomorrow.

## 2 – What’s Biology Got to Do With It?

Several years ago, we were on vacation in the Brittany area of France, and had rented a vacation house at the edge of the westerly most tip of the European continent, almost right on the beach. This was a time, when I’d been working with Vela, teaching her more self-control, being that she just had to meet-greet all people and dogs RIGHT NOW. In France, people who have dogs often do not have them on-leash in places away from traffic, like beaches. The dogs are well socialized and in the two weeks there, I don’t remember seeing one single argument between dogs. Vela too was off leash, but my head was on a swivel. I wasn’t enjoying much of the coastline, wildlife, vegetation. I was looking out for people and dogs, so I could set Vela up for success.

During one stretch, I was able to prepare Vela for, using our routines, getting past 3 different dogs, who saw what we were doing and, miracle of miracles, left us alone. Maybe they’d read the handbook. Vela “performed” like a champ, letting the dogs pass us and staying with me as we did our “Look At Me”. These were close encounters of the first kind. 3 dogs in about 4 minutes. But right after we maneuvered past the 3<sup>rd</sup> dogs, we both saw another dog about 40 yards away. I gave the cue to look at me, she looked instead at that dog, some kind of Poodle or Lagotto and ... took off like a shot. In other words, she totally lost it. I didn’t “lose it” so much as I was disappointed, thinking about all the work we’d have to repeat.

When we got back to the vacation house I was reading some PDFs of research papers I’d had on the laptop and ran across one in which the researchers posited, that repeated exposure to situations in which self-control was necessary, depleted the resources necessary to exercise that self-control, to the point that it as no longer possible. (Miller et al., 2010). BINGO.

In the meantime, doing some further research, I found that this was no “new” knowledge. Well, yes, using the listed references as a guide was a help. There were all sorts of research studies with humans and even monkeys (Doudet 1995) showing that depleted supplies of glucose and CSF 5-HIAA led not only to loss of self-control, but also to increased incidents of aggression. While Vela was not aggressive, she sure “lost it” in her own manner. Gailliot (2007), DeWall et al. (2007), Denson et al. (2010) all made connections between depleted resources and aggression in humans, but then also named the resource as glucose being the most important one and one that can, when replenished, hinder further aggressive incidents! Hagger (2013) even went a step further and gave the subjects a mouthwash containing glucose, upon which they too were able to exercise self-control better.

Now this is all well and good, but wouldn’t it be great, if there were some evidence that this works in dogs? Miller et al. (2010), this time using dogs as subjects, confirmed both that depletion of exposure to situations that demanded self-control had an adverse effect to subsequent trials and that giving the subject glucose after trials restored the ability to exercise self-control. They also showed that this was the case in aggression evoking situations (Miller 2012). They also recorded, that when confronted with the choice of either approaching or going away from an unknown dog, after having performed a simple -other- task needing self-control such as a sit stay, they were more apt to not be able to make sound behavioral choices, i.e., staying around dogs who either showed aggressive behavior or to whom they themselves had shown aggressive behavior. Lifting a small bit of text with sums up something to think carefully about:

Avoiding danger enhances an animal’s ability to survive and reproduce. Yet there are often occasions when the need to avoid danger is paired with a natural tendency to approach. To keep out of harm’s way, animals override their natural impulse to approach in order to remain safe and secure. When animals have limited self-control resources, they may make more impulsive decisions that put them in harm’s way. The present experiment examined whether initial exertion of self-control would increase impulsivity in dogs, resulting in risky decisions.

Our results supported this prediction.” (Miller 2012, p. 538)

What does this or could this mean for us as trainers and behavior consultants? In my opinion it shows, that Operant Conditioning and Respondent Conditioning alone cannot supply us with –all– the answers we need. As competent trainers and behavior consultants, we need to reach out beyond Skinner and Pavlov and look into the interdisciplinary realms of biology, biochemistry, neurochemistry, neuroscience and others to expand our toolkit.

Very good, let's do that, but in concrete terms, what does or could this mean for us trainers?

- 1) When using exposure treatments to work on fear reduction, there can be very good biological reasons, why it worked well three times and not the fourth. That's discounting faulty technique, discounting other environmental factors. It could be that glucose levels were depleted during the trials.
- 2) When using exposure treatments to work on fear reduction, there can be very good biological reasons, why it worked great yesterday and not so well today. That's discounting faulty technique, discounting other environmental factors. It could be that on the way to the training, the dog had to wait at the door before leaving, then do a sit-stay at the crosswalk and not jump up on the trainer before you ever got started — all things that did not happen yesterday.

Comments:

1. Self control itself can be trained
2. And there is a difference between self control (dog choosing to control itself) vs obedience (dog complying with owner's commands) (Stefanie Riemer, Mag)
3. You still might want to keep those banana chips or ??? handy (L. Cecil)

In discussions with colleagues both here and in Germany, I ran across several who swear by dried fruit bits as rewards for dogs, when working with self-control or fear reduction. It's gotten popular enough here, that in some pet stores you can buy 1lb. tubs of dried fruit. I have no idea what the difference is between this dried fruit and packaged dried fruit you can buy in your local supermarket as human snacks, except the price is much less in the pet shops. Since I'm not a scientist and no one is funding such research for me, I'm not going to experiment to find out the difference. If one of you would like to, let me know your findings. (grin) In any case, I have tried dried fruit with Vela and she's not a fan, preferring the real natural, half rotting type from under the tree. I've not had a client yet whose dog really loved rotten fallen fruit. But I have recommended either giving a bit of dried fruit after each incident requiring self-control or during a break, with more often than not, good results.

Something that is however very interesting to keep in mind when doing fear-reduction, is to either plan for this possible effect and find some way to keep that glucose level higher, at least in the training phases, or if you are using food in your fear reduction program, to “sneak” in a bit of fruit now and again. Some have also recommended dextrose tablets such as diabetics use or grape-sugar tablets. I've not gotten the definitive word yet as to whether grape-sugar tabs are ok for dogs.

In any case, I think everyone can see, that this is a case, where biology and neurochemistry -can- give us some insight into a specific “other” explanation concerning what we are observing during training and that simply applying a typical Learning Theory approach to problem solving may not bring us as far as including this “new” information into a total training plan.

### 3 – Train With Brain, Not Brawn

Now that sounds familiar, doesn't it? Yes, we "scientific" trainers like to say we use our brains, not our brawn. We spend a lot of time reading books, going to seminars, learning "new" techniques. We then do our best to convince our clients, that we are informed, up-to-date, effective and humane. Much more so than those "old-school" trainers.

But haven't we forgotten one brain in this constellation? How about the dog's brain? Well, of COURSE we haven't forgotten the dog's brain. Our dog is the smartest dog we know. The client's dog is ok too. But our dog is the smartest.

Ok, let's leave that thought temporarily. What about emotions? Yes, I know you love your dog. Your client loves her dog. And your dog loves you. And her dog loves her. No questions there. Except for millions of people around the world who can't understand how you can love a dog — "It's just a dog." "Treat it like a dog, not a child." But even Cesar Milan knows a dog has emotions (Garrett 2014).

What does "Cesar" (actually Ms. Leslie Garrett) base this article on? The new science of Neuroscience, Affective Neuroscience to be exact? No, the **not-so-new** science of Affective Neuroscience. Yes, the description is a bit simplistic. I trust you dear reader to be a bit more sophisticated, a bit more open to knowledge, than the average dog-blog inhabitant. So let's dig in.

Neuro- as we know has to do with nerves, with the brain. Science is, well ... science. Affective? What does that mean? Don't worry. A year ago I hadn't heard of it either until I was looking for a real, scientific definition of our favorite term "threshold". You might remember a paper I wrote in December 2013 found here: <http://www.auf-den-hund-gekommen.net/-/fear1.html>, where I quoted:

Exploring The Psychology of Interest" P. J. Silva:

In sum, Tomkins (1962, 1991) answered the first of our questions – What makes something interesting? By asserting that an increase in information increases interest, provided that the rate isn't high enough to induce fear or startle. **He posited a stimulation threshold between interest and fear:** increase in the rate of informational input arouse interest, until the rate exceeds the **interest-fear threshold**<sup>1</sup>. (emphasis mine)

More to Tomkins here: [http://en.wikipedia.org/wiki/Silvan\\_Tomkins](http://en.wikipedia.org/wiki/Silvan_Tomkins)

"Tomkins' Affect theory

Main article: Affect theory

Disagreements among theorists persist today over Tomkins' firm insistence in his Affect theory that there were nine and only nine affects, biologically based. The basic six are: interest-excitement, enjoyment-joy, surprise-startle, distress-anguish, anger-rage, and fear terror. Tomkins always described the first six, and one that "evolved later" (shame-humiliation) in pairs. In these pairs, the first pair part names the mild manifestation and the second the more intense. The final two affects described by Tomkins are "dissmell" and disgust. Tomkins argued that these nine affects are quite discrete (whereas emotions are complex and muddled), that they manifest a shared biological heritage with what is called emotion in animals, and that they differ from Freudian drives in lacking an object.

I asked around so to speak, and found out, that while Dr. Silvan Tomkins was a brilliant theoretician and not a few clinicians practice psychology according to his theory, another researcher had been working for years in roughly a similar direction, but doing hands on research on animals and humans, both in the lab and clinically. Dr. Jaak Panksepp. He is responsible, along with others, for starting a scientific direction called Affective Neuroscience, which takes parts of the so-called primitive brain and locates areas that are activated during stimulation caused by **Affect Systems**, which are basically collections of similar emotions, very simply put.

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<sup>1</sup> Actually, Tomkins described an interest-excitement and fear-terror relationship. Silva seems to have changed this to **interest-fear** [http://en.wikipedia.org/wiki/Affect\\_theory](http://en.wikipedia.org/wiki/Affect_theory)

**Affects** are nothing new at all. Used in this manner, we run into them as early as the 17<sup>th</sup> century as the “Doctrine of Affections” written by René Descartes (1596-1650) in his treatise “Passions of the Soul” (Latin: “De passionibus animae”) (Lenneberg 1958). In it he posited, the composer could create music, which, using different elements of time and key as well as articulation, would be able to produce a particular emotional response with the audience. It reached its highpoint during the so-called High Baroque with such composers as J. S. Bach. It is interesting to note, that while he believed that these emotions were based upon biology of the human body and could be observed, they did not have relevance in everyday life<sup>4</sup> — perhaps a notion that is now a little strange to us. So this is more of historical interest to us. The idea that inward emotions can be “triggered” by outside stimuli, in this case music, even needing to be correctly composed for that purpose and interpreted by the performer, is not new. It’s centuries old. The specifics can be found in the excerpt from **Der Vollkommene Kappelmeister** (1739) by Johann Mattheson (1681-1764) who further expanded them, even recommending, that everyone read Descartes. (Wessel 1955, Kin Hoi Wong 2008)

Now we can fast-forward to our friend Charles Darwin who wrote extensively about the emotions and their present and yes, past functions and their evolutionary importance in his “The Expression of Emotions in Man and Animals”. While there are differences in exactly how his writing on emotions have been interpreted (Barrett 2011), let’s just say, that he was convinced, that animals have an emotional life and that it plays an important role in an animal’s individual survival and more.

Our next stop is one of the founders of operant conditioning and ... no, not B.F. Skinner, but rather Edward Lee Thorndike who wrote in his **Law of Effect**: “A principle associated with learning and behavior which states that behaviors that lead to satisfying outcomes are more likely to be repeated than behaviors that lead to unwanted outcomes.” (JRank). Now this has been “changed” in many sources to “reinforcing” or “rewarding” and “punishing”, which has a completely different meaning. So much so, that our next protagonist has written and said, that it should actually be called the “**Law of Affect**” (Siviy, p. 259).

Let’s move forward from Thorndike, ignoring the various trends that fluctuate between animals having feelings (emotions/affects) to having none, from having souls to having none and even experiencing no pain to being pain aware. Let’s simply cover the rest of the historical overview in the form of a link to an external graphic time-line, which shows, I believe, that what we are about to discuss in slightly more detail, is nothing new, not a simple fad, but does have plenty of empirical data and is definitively serious science [click here](#) And let’s skip down along this linked time-line to year 1992 where it reads “Panksepp coins the term affective neuroscience”. (Dalgleish 2004).

Who?

[Dr. Jaak Panksepp](#), meet the collected dog trainers and behavior consultants of ... whatever.

Dr. Panksepp is

- 1) Baily Endowed Chair of Animal Well-Being Science and Professor, Integrative Physiology and Neuroscience (IPN), Washington State University,
- 2) Distinguished Research Professor Emeritus of Psychology, Bowling Green State University
- 3) Head, Affective Neuroscience Research, Falk Center for Molecular Therapeutics, Northwestern University

In addition to 300+ scientific articles (see CV, linked above), he has co-edited the multivolume “Handbook of the Hypothalamus and of Emotions and Psychopathology”, a series in “Advances in Biological Psychiatry” and a “Textbook of Biological Psychiatry” (Wiley, 2004). His one textbook, “Affective Neuroscience: The Foundations of Human and Animal Emotions” (Oxford, 1998), has company, in his newest book “The Archaeology of Mind – Neuroevolutionary Origins of Human

Emotions” (Norton 2012).

Here a quote from his Washington State University College of Veterinary Medicine Biography page:

Our working assumption is that all of consciousness was built on affective value systems during the long course of brain evolution. In my new book, *The Archaeology of Mind: Neuroevolutionary Origins of Human Emotions* (in press), I present these topics to a wider, more general audience and include discussion of current research in affective neuroscience. Our research orientation is that a detailed understanding of basic emotional systems at the neural level will highlight the basic sources of human values and the nature and genesis of emotional disorders in humans. In the 1980s we helped develop the still controversial opioid-antagonist therapy for autistic children based on pre-clinical investigations into brain circuits that control social behaviors (<http://www.autism-help.org/points-brain-chemistry-autism.htm>) as well as the use of melatonin in regulating common sleep-waking problems in pervasive developmental disorder (<http://legacy.autism.com/treatable/supplement/melatonin.htm>). We are pursuing new therapies for the treatment of Attention Deficit/Hyperactivity Disorders (ADHD), and depression. Many of the findings from animal models are ready to be evaluated in human psychological research. Accordingly, we are seeking to facilitate the development of new depth-psychological perspectives to understanding the human mind.

**Our Center for the Study of Animal Well Being (<http://www.vetmed.wsu.edu/depts-CSAW/>) and People-Pet Partnership Program (<http://www.vetmed.wsu.edu/depts-pppp/>), are devoted to the study and improvement of animal emotional well-being. (bold, emphasis LC**

The **Affects**, or **Affect Systems** as described by Dr. Panksepp are basically the following ([Panksepp 2005](#), [Panksepp 2011](#), [Panksepp 2011](#)):

**Pleasant** (as in Thorndike – see above):

- ◆ **SEEKING**: anticipation of good<sup>2</sup>, approach and/or engagement, this system is critical also for most other basic emotional responses, such as the seeking of safety when threatened<sup>19</sup>  
Key brain area(s): Nucleus Accumbens – VTA  
Mesolimbic and mesocortical outputs  
Lateral hypothalamus – PAG
- ◆ **CARE**: nurturing, a mother’s touch  
Key brain area(s): Anterior Cingulate, BNST  
Preoptic Area, VTA, PAG
- ◆ **PLAY**: while it can border on aggression, it is of a light engaging nature.  
Key brain area(s): Dorso-medial diencephalon  
Parafascicular Area, PAG
- ◆ **LUST**: sexual in nature  
Key brain area(s): Cortico-medial amygdala,  
Bed nucleus of stria terminalis (BNST)  
Preoptic hypothalamus, VMH, PAG

**Unpleasant** (as in Thorndike – see above):

- ◆ **FEAR**: avoidance of danger, through either freezing and/or rapid retreat “...a dynamic flight pattern with chaotic-projectile movements to get out of harm’s way (which may reflect recruitment of dopamine energized SEEKING urges...)” ([Panksepp 2005](#))  
Key brain area(s): Central & lateral amygdala to medial hypothalamus and dorsal PAG
- ◆ **RAGE**: anger which is expressed in attacks, aggression, both positive and negative valences can be involved.

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<sup>2</sup> As examples of the so-called **hedonic motivational principle**, i.e. to move **towards pleasurable stimuli** and **away from unpleasant ones**. ([Panksepp 2005](#))

Key brain area(s): Medial amygdala to Bed nucleus of Stria Terminalis (BNST). Medial and pericormical to PAG

- ◆ PANIC/GRIEF – are grouped together, as in the distress of separation from a sibling or parent, vocalizations and attempts to get back together.  
Key brain area(s): Anterior Cingulate, BNST & Preoptic Area  
Dorsomedial Thalamus, PAG

Now these Affect Systems use vocabulary that is not defined as we may have in behaviorism and not from any other source. These are Dr. Panksepp's terms and therefore his definitions. Positing things and assigning vocabulary is nothing new in science. Skinner did this too, as we know. But this does make it difficult to find comparative work from other colleagues, or even repudiations. And like behaviorism, not everyone is in total agreement. What, you thought all scientists agree with all of behaviorism? Not even all Behaviorists do.

We can be reminded through Panksepp & Bernatzky (2002) that there could be a useful tie between music, Affects and psychological treatment – and maybe a tie all the way back to Descartes/Mattheson? But for the time being, let's look still deeper without getting too technical. If you do well with statistics and with chemistry, do read the studies.

The main question “we” need to ask is, “How does he know, that these Affects exist and have anything to do with real life behavior?” Good question. Well, for one, he has over 40 years of in-lab AND clinical research behind him. See the recommended reading list, page 16.

The main message Panksepp has given us is, that these 7 groups (Affect Systems) of primary emotions are common to all mammals based upon the researched mammals to date. They have been located at their origins in the various parts of the brains according to the emotional responses exhibited. But they have also been located as stimulated areas of the brain as a result of external stimuli experienced. In other words, he and his crew have stimulated a specific part of the brain and the subject showed that particular reaction such as fear. But then, they subjected the subject to a fearsome stimulus and that same area of the brain showed activity.

This shows us that mammals, some reptiles and birds have and experience emotions and we can thusly tell which emotions. He and his colleagues, as well as other researchers approaching the same questions from different angles, are however a long way from being able to look at higher emotions like jealousy, greed, etc., which doesn't mean animals cannot experience these. We just cannot prove that for the time being.

Panksepp also posits,

- 1) the Affect Systems all work to a greater or lesser degree together
- 2) SEEKING is probably the one that ties them all together ([Panksepp 2011](#))

This is because SEEKING has to do with learning, with exploring, with curiosity, enthusiasm, interest. If you or the animal has a diminished SEEKING system, you or the animal may very well be depressed, whereas if it's overstimulated, one may suffer from mania. And it's dopamine driven, which means we all are dopamine junkies, so to speak. This is for most of us no new concept. Most of us have by now seen the marvelous Dr. Robert Sapolsky in his talk at Stanford University where he first thanked the university for allowing him to fulfill a childhood dream of being applauded in a basketball stadium and then went on to describe how flexible schedules of reinforcement work so well due to dopamine — better than fixed ones ([Sapolsky 2009](#)). If you haven't seen this video, it's tremendous. The dopamine part is at 25' 05”.

Panksepp's hands-on research has shown us also, that more than one Affect System can be in operation at a time. SEEKING may be on the lookout for that other dog that scared me yesterday.

*Even though I'm SEEKING, there is that twinge of FEAR because I might see him again. But I might also find a dead fish to eat. And if dad shows up, finally after having been gone all day, I'll get a big dose of CARE from him. Of course if that other dog does jump out to scare me, I can run back to mom and get a dose of CARE from her.*

These are all natural reactions.

What is perhaps a new concept, is that these Affect Systems themselves learn. Or rather they help us learn, either way. They are natural reactions to natural things in our environments. We can learn to use these to our advantage in training. We can learn to use our own brains and most prominently our SEEKING system itself to think about these systems, how they work — you may want to consult some of the linked works or look at the recommended reading list and rethink some of the things we've heard in terms of training techniques. Why should we reward a dog in this manner instead of that manner? Food or play or petting? Position of reward delivery? Maybe we want to activate an increase in the SEEKING system alone? Or maybe we want to teach the dog to use her SEEKING system to good advantage to SEEKing the CARE-giver, i.e. "mom". Whoops, maybe we need to cement that CARE feeling between the two of them first. After all, safety (CARE) is one of the most reinforcing things we can offer (Thanks Dr. Susan Friedman).

Yes, yes, I know, you're DOING that already. Many of us do it for reasons that are laudable in and of themselves, but are perhaps less than defensible to those who say "it's just a dog". Well, we now have the evidence, that that dog is not just a dog, but a being with most of the emotional basics we do. In terms of "plumbing" (thank you Dr. Robert Sapolsky for the specific scientific nomenclature) as well as the functionality of that "plumbing".

## 4 – Many Different Ways to Rome

So what would be some concrete examples?

- 1) When you are walking your dog and you have been working on fear reduction you leave the house and run into another dog. Your dog has been trained to notice the other dog and look to you. Now he doesn't. Why not?
  1. As usual, Spot had to sit at the door, wait for you to get the leash and hook it up, wait some more for you to open the door, walk until you tell him to sit so you can close the door, then walk at a calm "heel" to the garden gate. Perhaps depletion of glucose for the brain.
  2. The other dog is too close so the trained CER doesn't work.
  3. Spot is fearful of Brutus as shown by the escape/avoidance behavior of going away. He still needs more work.
  4. Spot's SEEKING has simply taken priority and he wants or needs to know more about that other dog, if the other dog is as friendly as his best buddy. We can't know the reasons for wanting to know this. Maybe he's also juggling FEAR and needs to know how to react to possibly protect himself.

At this point, we simply do not know what the dog is thinking or feeling. One answer is as good as the next, they are 4 different lenses through which we can observe the situation. But in real life we have no idea which one or ones are "correct".
- 2) Further down the street, you run into another dog. This time Spot is looking at this dog for a couple of seconds, then takes a few steps closer, stops and then returns to you, standing behind you. What just happened?
  1. Since I DID actually give him a banana chip after the above incidence, he was able to make a good choice, although delayed (we're not in the lab), and come back — still existing glucose resources in the brain to allow this. Great dog! Have a bit of dried apricot and 2 banana chips.
  2. Even if slightly delayed (we're not in the lab), the CER worked and he came back to get his treat — which is also the DRI of an incompatible behavior to the unwanted one.
  3. Spot is fearful of the other dog as shown by the escape/avoidance behavior of going away. He still needs more work.
  4. SEEKING is still competing with FEAR. This was a reason for stopping and taking another step. But mom (CARE) back there has food, safety, chin rubs. I'll take a break with her and see if Brutus up there is still interested in me afterwards.
- 3) After this encounter, you continue down the street and see still another dog. This time Spot takes one look at the other dog, turns around and trots back to you.
  1. That dried apricot and 2 banana chips did their work. He could make a sound decision to come back to me.
  2. The trained CER / DRI work perfectly. Great job Spot!
  3. The trained CER / DRI work perfectly. Great job Spot OR  
Spot is fearful of the other dog as shown by the escape/avoidance behavior of going away. He still needs more work.
  4. For whatever reason CARE took precedence to SEEKING and mom (CARE) was preferable to seeing what kind of dog the other is. Or Spot remembered that mom (CARE) has treats and went for a couple (SEEKING).

These are just 3 possible scenes with 4 possible explanations each. It all depends upon what glasses you are wearing as to which you wish to "believe". The interesting thing is, there is empirical data to support all. Since we are not equipped to unequivocally know what is going on in terms of the

dog and his/her emotions, and therefore which explanation is “right”, the main question is, what now?

- 1) We know that the dog was thinking.
- 2) We know that there was an emotion or array of emotions or Affects going on.
- 3) But we do not and cannot “know” exactly what.
- 4) Do we continue with what we’ve always done, or do we look at “other” possible explanations and how would these “other” possible explanations effect what we do next?

The purpose of this “paper” is to stir the pot. Stirring the pot hopefully will help some people think about alternative explanations for what they are doing and ask if the answers they now have are complete or if there could be more. If your answers are already working well enough for you, great. If they are not, or are looking to expand your toolkit, maybe this paper will help you ask similar or more questions and hopefully steer you to new answers.

Do these small excursions into biology or affective neuroscience replace behaviorism? Of COURSE not. Neither behaviorism, biology nor affective neuroscience are wrong. It depends upon how you were looking at the training or trial situation, what you were looking **for** in an analytical manner and what you then were **seeing** in the same manner. Turn the glass around, the analysis was different, but the basic results you were seeing were the same. We non-scientists can expand our toolkit, as we already have, with bits and pieces of ethology, zoology, genetics, biology, biochemistry, neurochemistry, neuroscience and others. These are not exclusive, but in our practice in the field, where appropriate, inclusive. They have many similarities, some differences and can be used in conjunction with each other, even to compliment each other. **It’s not an either/or proposition!**

A final note: I’m including a Bibliography, which includes not only the studies I referenced in the paper, and also others that support these, and am also including a “Recommended Reading / Viewing” list. You may know of others or even studies which repudiate these. Please let me know about these. As much as we would like to believe it, many things in science are not black/white. Right/wrong. Even with empirical data, divergent ideas can produce their own truisms, sometimes depending upon the perspective. Sometimes scientists even make mistakes and correct themselves – watch this space. In any case, I hope I did grab your interest. I would be very thankful for constructive criticism and suggestions for furthering my knowledge. Of course, the danger would exist, that I might write again. But then again, I might write again anyway.

## Thanks

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## 5 – Bibliography

- Barrett, Lisa Feldman,** (2011) Was Darwin Wrong About Emotional Expressions? *Current Directions in Psychological Science*, 20(6) 400–406, 2011, <http://cdp.sagepub.com/content/20/6/400.abstract>
- Baumeister, Roy F., et al,** (2007) The Strength Model of Self-Control, *Current Directions in Psychological Science*, Vol. 16, No. 6 (Dec., 2007), pp. 351-355 <http://www.jstor.org/stable/20183234>
- Berridge, Kent C.; Kringelbach, Morten L.** (2013) Neuroscience of affect: brain mechanisms of pleasure and displeasure, *Current Opinion in Neurobiology Volume 23, Issue 3, June 2013, Pages 294–303* <http://www.sciencedirect.com/science/article/pii/S0959438813000330>
- Burghardt, Gordon M.,** (2014) A Brief Glimpse at the Long Evolutionary History of Play. *Animal Behavior and Cognition*, (2014) 1(2), 90-98. doi: 10.12966/abc.05.01.2014 [http://abc.sciknow.org/archive\\_files/201402/20140201\\_Burghardt.pdf](http://abc.sciknow.org/archive_files/201402/20140201_Burghardt.pdf)
- Burman, Oliver et al.,** (2011) Using judgement bias to measure positive affective state in dogs, *Applied Animal Behaviour Science* 132 (2011) 160–168, <http://www.sciencedirect.com/science/article/pii/S0168159111001183>
- Dalgleish, Tim,** (2004) The Emotional Brain, *Nature Reviews Neuroscience* 5, 583-589 (July 2004), <http://www.nature.com/nrn/journal/v5/n7/full/nrn1432.html>
- Denson, Thomas F. et al.,** (2010) Glucose consumption decreases impulsive aggression in response to provocation in aggressive individuals, *Journal of Experimental Social Psychology* 46 (2010) 1023–1028, <http://www.sciencedirect.com/science/article/pii/S0022103110001423>
- Denson, Thomas F. et al.,** (2011) Understanding Impulsive Aggression: Angry Rumination and Reduced Self-Control Capacity Are Mechanisms Underlying the Provocation–Aggression Relationship, *Personality and Social Psychology Bulletin* 37(6) 850–862 (2011) <http://psp.sagepub.com/content/37/6/850>
- DeWall, C. Nathan, et al,** (2007) Violence restrained: Effects of self-regulation and its depletion on aggression, *Journal of Experimental Social Psychology* 43 (2007) 62–76, <http://www.sciencedirect.com/science/article/pii/S0022103105001551> <http://www.sciencedirect.com/science/article/pii/S0022103105001551>
- Doudet, Doris, et al.,** (1995) Cerebral Glucose Metabolism, CSF 5-HIAA Levels, and Aggressive Behavior in Rhesus Monkeys, *Am J Psychiatry* 152:12, 1782-1787 <http://journals.psychiatryonline.org/data/Journals/AJP/3653/1782.pdf>
- Gailliot, Matthew T., et al,** (2007) Self-Control Relies on Glucose as a Limited Energy Source: Willpower Is More Than a Metaphor, *Journal of Personality and Social Psychology Copyright 2007 by the American Psychological Association*, Vol. 92, No. 2, 325–336, <http://www.uky.edu/~njdewa2/gailliotetal07JPSP.pdf>
- Garrett, Leslie, (2014,) New Scientific Studies Ask: Can Dogs Feel Empathy?, *Cesar’s Way, Dog Behavior*; <http://www.cesarsway.com/dogbehavior/basics/Can-Dogs-Feel-Empathy2>
- Hagger, Martin and Chatzisarantis, Nikos.** (2013) The sweet taste of success: The presence of glucose in the oral cavity moderates the depletion of self-control resources. *Personality and Social Psychology Bulletin*. 39 (1): pp. 28-42. [http://espace.library.curtin.edu.au/R?func=dbin-jump-full&local\\_base=gen01-era02&object\\_id=188806](http://espace.library.curtin.edu.au/R?func=dbin-jump-full&local_base=gen01-era02&object_id=188806)

- Hood, Heather K, et al.**, (2010) Effects of safety behaviors on fear reduction during exposure, *Behaviour Research and Therapy* 48 1161e1169, <http://www.sciencedirect.com/science/article/pii/S0005796710001804>
- JRank**, Psychology Encyclopedia, <http://psychology.jrank.org/pages/372/Law-Effect.html>
- Kin Hoi Wong, Helen**, (2008) Sources of influence on Johann Mattheson's ideas on Musical Expression, <http://helenmusicology.files.wordpress.com/2013/01/essay-2008-sources-of-influence-on-johann-matthesons-ideas-on-musical-expression.pdf>
- Lenneberg, Hans**, (1958) "Johann Mattheson on Affect and Rhetoric in Music", *Journal of Music Theory*, Vol. 2, No. 1, pp. 47-84, <http://www.jstor.org/stable/842930>
- Miller, Holly C., et al**, (2010) Self-Control Without a "Self"?: Common Self-Control Processes in Humans and Dogs, *Psychological Science Online*, First, published on March 11, 2010 as *doi:10.1177/0956797610364968*, <http://pss.sagepub.com/content/21/4/534>
- Miller, Holly C., et al**, (2012) Too dog tired to avoid danger: Self-control depletion in canines increases behavioral approach toward an aggressive threat, *Psychon Bull Rev* 19:535–540 DOI 10.3758/s13423-012-0231-0 <http://www.shamanandscientist.com/images/Dogs/DogTired.pdf>
- Odendaal, J. S. J. And Meintjes, R. A.** ( 2003) Neurophysiological Correlates of Affiliative Behaviour between Humans and Dogs, *Volume 165, Issue 3, May 2003, Pages 296–301*, <http://www.sciencedirect.com/science/article/pii/S109002330200237X>
- Olds, M. E. & Olds, J.** (1963) Approach-avoidance Analysis of Rat Diensephalon, *J Comp Neurol*. 1963 Apr;120:259-95. [http://deepblue.lib.umich.edu/bitstream/handle/2027.42/49985/901200206\\_ftp.pdf?sequence=1](http://deepblue.lib.umich.edu/bitstream/handle/2027.42/49985/901200206_ftp.pdf?sequence=1)
- Panksepp, J.** (2005) “Affective consciousness: Core emotional feelings in animals and humans”, *Consciousness and Cognition* 14 30–80 <http://www.sciencedirect.com/science/article/pii/S1053810004001187>
- Panksepp, J.** (2010) Affective neuroscience of the emotional BrainMind: evolutionary perspectives and implications for understanding depression, *Dialogues Clin Neurosci*. Dec 2010; 12(4): 533–545. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181986/>
- Panksepp, J.** (2012) An Evolutionary Framework to Understand Foraging, Wanting, and Desire: *The Neuropsychology of the SEEKING System Neuropsychanalysis* 01/2012; 14(1):5-39. DOI: 10.1080/15294145.2012.10773683, [http://www.researchgate.net/publication/235009370\\_An\\_evolutionary\\_framework\\_to\\_understand\\_foraging\\_wanting\\_and\\_desire\\_The\\_neuropsychology\\_of\\_the\\_SEEKING\\_system](http://www.researchgate.net/publication/235009370_An_evolutionary_framework_to_understand_foraging_wanting_and_desire_The_neuropsychology_of_the_SEEKING_system)
- Panksepp, J.** (2011) Cross-Species Affective Neuroscience Decoding of the Primal Affective Experiences of Humans and Related Animals. *PLoS ONE* 6(9): e21236. *doi:10.1371/journal.pone.0021236* <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0021236>
- Panksepp, J.; Bernatzky, Günther**, (2002) Emotional sounds and the brain: the neuro-affective foundations of musical appreciation, *Behavioural Processes* 60 (2002) 133!/155, <http://www.sciencedirect.com/science/article/pii/S0376635702000803>
- Panksepp, J.** (2005) On the Embodied Neural Nature of Core Emotional Affects, *Journal of Consciousness Studies*, Volume 12, Numbers 8-10, 2005, pp. 158-184(27) <http://www.ingentaconnect.com/content/imp/jcs/2005/00000012/F0030008/art00009>

**Panksepp, J.** (2011) “The basic emotional circuits of mammalian brains: Do animals have affective lives?” *Neuroscience and Biobehavioral Reviews* 35 (2011) 1791–1804, [http://ac.els-cdn.com/S0149763411001497/1-s2.0-S0149763411001497-main.pdf?\\_tid=7ff68816-2963-11e4-80cb-00000aab0f26&acdnat=1408646985\\_be2165ec6d98723057740c85c2037ad6](http://ac.els-cdn.com/S0149763411001497/1-s2.0-S0149763411001497-main.pdf?_tid=7ff68816-2963-11e4-80cb-00000aab0f26&acdnat=1408646985_be2165ec6d98723057740c85c2037ad6)

**Panksepp, J. and Zellner, Margaret R.** (2004) Towards A Neurobiologically Based Unified Theory of Aggression *Presses Universitaires de Grenoble, RIPS / IRSP*, 17 (2), 37-61  
<http://www.mzellner.com/page1/files/2004%20Panksepp%20Zellner.pdf>

**Sapolsky, Robert,** (2009) The Uniqueness of Humans | *Dr. Robert Sapolsky Class Day Lecture 2009*, <https://www.youtube.com/watch?v=GY1x8k79bZE>

**Schiller, Daniela, et al.,** (2008) From Fear to Safety and Back: Reversal of Fear in the Human Brain, *The Journal of Neuroscience*, November 5, 2008 • 28(45):11517–11525 • 11517,  
<http://www.jneurosci.org/content/28/45/11517.full.pdf>

**Siviy, Stephen M.** Science of the Brain as a Gateway to Understanding Play, An Interview with Jaak Panksepp, *Journal of Play*, Vol. 2, Nr. 3 245-277  
<http://www.journalofplay.org/sites/www.journalofplay.org/files/pdf-articles/2-3-interview-science-of-brain-jaak-panksepp.pdf>

**Toronchuk, Judith A.; Ellis, George F. R.** (2005) Affective Neuronal Darwinism: The Nature of the Primary Emotional Systems, <http://www.mth.uct.ac.za/~ellis/ToronchuK%20&%20Ellis,%202010.pdf>

**Wessel, Frederick,** (1955) The Affektenlehre in the 18th Century, *unpublished Ph.D dissertation, University of Indiana*, 1955, <http://www.musictheoryhelp.com/downloads/files/doctrine%20of%20affections.pdf>

## 6 – Recommended Reading / Viewing

**Panksepp, J.** (2010), “Affective neuroscience of the emotional BrainMind: evolutionary perspectives and implications for understanding depression”, *Dialogues Clin Neurosci. Dec 2010; 12(4): 533–545*. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181986/>

This article gives a very concise and understandable description of the 7 Affect Systems as well as how they connect to higher-level systems.

**Panksepp, J.** (2012) An Evolutionary Framework to Understand Foraging, Wanting, and Desire: The Neuropsychology of the SEEKING System *Neuropsychanalysis 01/2012; 14(1):5-39. DOI: 10.1080/15294145.2012.10773683*, [http://www.researchgate.net/publication/235009370\\_An\\_evolutionary\\_framework\\_to\\_understand\\_foraging\\_wanting\\_and\\_desire\\_The\\_neuropsychology\\_of\\_the\\_SEEKING\\_system](http://www.researchgate.net/publication/235009370_An_evolutionary_framework_to_understand_foraging_wanting_and_desire_The_neuropsychology_of_the_SEEKING_system)

Since the SEEKING System is probably the most important system and ties the others together, this is the paper, albeit long, to better understand how it works and what it does.

The following papers will go back to the original Thorndike **Law of Effect**, which does not make a distinction as Skinner did of “+” or “-” in terms of reinforcement/punishment, but rather what he called “satisfying outcome” or punishment, which he called “unwanted outcome” This ties into the **Affect Systems** very well, being that there are groups of “pleasant” and “unpleasant” Affect systems.

**Baron, Alan and Galizio, Mark,** (2005), “Positive and Negative Reinforcement: Should the Distinction Be Preserved?”, *Behav Anal. 2005; 28(2): 85–98*. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2755378/pdf/behavan00002-0003.pdf>

**Baron, Alan and Galizio, Mark,** (2006), “The Distinction Between Positive and Negative Reinforcement: Use With Care”, *Behav Anal. 2006 Spring; 29(1): 141–151*. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2223166/pdf/bhan-29-01-141.pdf>

**Hackjin, Kim H, Shimojo S, O'Doherty JP.,** (2006), Is Avoiding an Aversive Outcome Rewarding? *Neural Substrates of Avoidance Learning in the Human Brain. PLoS Biol 4(8): e233*. doi:10.1371/journal.pbio.0040233, <http://www.plosbiology.org/article/info%3Adoi%2F10.1371%2Fjournal.pbio.0040233>

**Hood, Heather K, et al.,** (2010), “Effects of safety behaviors on fear reduction during exposure”, *Behaviour Research and Therapy 48 1161e1169*, <http://www.sciencedirect.com/science/article/pii/S0005796710001804>

**Jakovcevic, Adriana, et al.,** (2013), “Frustration Behaviors in Domestic Dogs”, *JOURNAL OF APPLIED ANIMAL WELFARE SCIENCE, 16:19–34, 2013*, [http://www.tandfonline.com/doi/abs/10.1080/10888705.2013.740974?url\\_ver=Z39.88-2003&rft\\_id=ori:rid:crossref.org&rft\\_dat=cr\\_pub%3dpubmed#.U\\_pRukv5lg0](http://www.tandfonline.com/doi/abs/10.1080/10888705.2013.740974?url_ver=Z39.88-2003&rft_id=ori:rid:crossref.org&rft_dat=cr_pub%3dpubmed#.U_pRukv5lg0)

**Marr, A. J,** (2001), “WHY BEHAVIORISM, TO SURVIVE AND TRIUMPH, MUST ABANDON ITS VERY NAME: AN OPEN LETTER”, *Behavior & Social Issues Volume 11, No. 1 (Fall 2001)*, <http://dx.doi.org/10.5210/bsi.v11i1.105>

**McGreevy, P.D., et al.,** (2014), “The importance of safety signals in animal handling and training”, *Journal of Veterinary Behavior xxx (2014) 1-6*, [http://www.journalvetbehavior.com/article/S1558-7878\(14\)00089-6/abstract](http://www.journalvetbehavior.com/article/S1558-7878(14)00089-6/abstract)

**Michael, Jack**, (1975), “Positive and Negative Reinforcement, a Distinction That Is No Longer Necessary; Or a Better Way to Talk about Bad Things”, *Behaviorism*, Vol. 3, No. 1 (Spring, 1975), pp. 33-44, [http://www.tandfonline.com/doi/abs/10.1300/J075v24n01\\_15](http://www.tandfonline.com/doi/abs/10.1300/J075v24n01_15)

**Milosevic, Irena and Radomsky, Adam S.**, (2008), “Safety behaviour does not necessarily interfere with exposure therapy”, *Behaviour Research and Therapy* 46 1111–1118, <http://www.sciencedirect.com/science/article/pii/S0005796708001368>

**Mixon, Don**, (1975), “Away with Positive and Negative Reinforcement”, *Behaviorism – Vol. 3, No 1 1975*, 45-47, <http://www.jstor.org/stable/27758830>

**Olds, M. E. & Olds, J.** (1963) “Approach-avoidance Analysis of Rat Diensephalon”, *J Comp Neurol*. 1963 Apr;120:259-95. [http://deepblue.lib.umich.edu/bitstream/handle/2027.42/49985/901200206\\_ftp.pdf?sequence=1](http://deepblue.lib.umich.edu/bitstream/handle/2027.42/49985/901200206_ftp.pdf?sequence=1)

**Rachman, S. Et al.**, (2008), “Safety behaviour: A reconsideration”, *Behaviour Research and Therapy* 46 163–173, <http://www.sciencedirect.com/science/article/pii/S000579670700232X>

**Schiller, Daniela, et al.**, (2008), “From Fear to Safety and Back: Reversal of Fear in the Human Brain”, *The Journal of Neuroscience*, November 5, 2008 • 28(45):11517–11525 • 11517, <http://www.jneurosci.org/content/28/45/11517.full.pdf>

Some videos...

**LeDoux, Joseph**, “Joseph LeDoux, Our emotional brains (2011 Copernicus Center Lecture)”, <https://www.youtube.com/watch?v=tjhCPhhzBqQ>

**Panksepp, Jaak**, “Jaak Panksepp - 'Affective Continuity From SEEKING to PLAY -- Science, Therapeutics and Beyond' p.1”, <https://www.youtube.com/watch?v=qf4ZFwyVJ2A>

The first of a two part video of a lecture given by Dr. Panksepp. Very thorough, a bit technical, but very interesting.

**Panksepp, Jaak**, “Jaak Panksepp - 'Affective Continuity From SEEKING to PLAY -- Science, Therapeutics and Beyond' p.2”, <https://www.youtube.com/watch?v=JX0FIILSKYE>

**Panksepp, Jaak**, “The science of emotions: Jaak Panksepp at TEDxRainier”, [https://www.youtube.com/watch?v=65e2qScV\\_K8](https://www.youtube.com/watch?v=65e2qScV_K8)

**Panksepp, Jaap**, “Why do rats laugh? Interview with Jaak Panksepp - präsentiert von Braincast”, <https://www.youtube.com/watch?v=u4ICY6-7hJo>

Don't worry, only the bit in the title and a tiny bit at the very beginning is in German, the rest is in English.

**Sapolsky, Robert**, “Stanford's Sapolsky On Depression in U.S. (Full Lecture)”, <https://www.youtube.com/watch?v=NOAgplgTxfc>

Not only does Sapolsky talk about depression and what goes on in the brain, he gives a very easy to understand description of the mechanics of the brain. Great place to start if you're interested in this and then neuroscience.

**Sapolsky, Robert**, “The Uniqueness of Humans” | *Dr. Robert Sapolsky Class Day Lecture 2009*, <https://www.youtube.com/watch?v=GY1x8k79bZE>

This is the one, where he talks about dopamine's role in flexible schedules of reinforcement. And dopamine is a vital part of the SEEKING affect system.

**Woodling, Nathan and Chung-Ming Ng, Anthony**, Sopalsky Stanford Lecture Series “10. Introduction to Neuroscience I”, [https://www.youtube.com/watch?v=5031rWXgdYo&list=PLuxM6j2BVHhSluSDKE99X\\_9tx7caffbRL&index=2](https://www.youtube.com/watch?v=5031rWXgdYo&list=PLuxM6j2BVHhSluSDKE99X_9tx7caffbRL&index=2)

Books:

**Panksepp Jaak**, “Affective Neuroscience: The Foundations of Human and Animal Emotions”, *Oxford University Press 1998*, [http://www.amazon.com/Affective-Neuroscience-Foundations-Emotions-Science/dp/019517805X/ref=sr\\_1\\_2?ie=UTF8&qid=1408966649&sr=8-2&keywords=Panksepp](http://www.amazon.com/Affective-Neuroscience-Foundations-Emotions-Science/dp/019517805X/ref=sr_1_2?ie=UTF8&qid=1408966649&sr=8-2&keywords=Panksepp)

**Panksep Jaak and Biven, Lucy**, “The Archaeology of Mind – Neuroevolutionary Origins of Human Emotions” (*Norton 2012*). ISBN-13: 978-0393705317 ISBN-10: 0393705315 Edition: 1<sup>st</sup>, [http://www.amazon.com/The-Archaeology-Mind-Neuroevolutionary-Interpersonal/dp/0393705315/ref=sr\\_1\\_1?ie=UTF8&qid=1408966364&sr=8-1&keywords=Panksepp](http://www.amazon.com/The-Archaeology-Mind-Neuroevolutionary-Interpersonal/dp/0393705315/ref=sr_1_1?ie=UTF8&qid=1408966364&sr=8-1&keywords=Panksepp)

(check out the editorial reviews, even from Damasio)

## 7 – Hold the presses!

This is how science works. Someone does a study, or a couple of studies, that appear to confirm previous work and push further on in the same direction. But ... there could be some problems with either the method or the results or the explanations of the results or all together.

Already, just before I'd put out this "paper", I'd been contacted by Dr. Stefanie Riemer, that there could be some "problems" with the two Miller Studies<sup>3</sup> concerning glucose and it's effect in propping up self-discipline in impulse control situations and/or fear problems with dogs.

Dr. Riemer has now brought up the not small methodological problem that I'll quote from her communication with me:

The study by Holly Miller has a serious flaw: those dogs exerting self-control were in a down stay while a robotic hamster was whizzing around.

There was NO ROBOTIC hamster in the crated group. Why not? BECAUSE PRELIMINARY STUDIES SHOWED THAT THIS CAUSED FRUSTRATION behavior in the dogs! (presumably barrier frustration).

But Miller and colleagues were thus varying 2 variables at the same time (self control yes/ no and hamster present yes/ no). Their findings could just as well be explained by higher arousal in the self-control dogs (having seen the hamster), or by frustration (i.e. RAGE after Panksepp) due to not being able to chase the hamster.

So to me, not a good proof of the diminishment of self control necessarily. Also, there is no information of the behavior the dogs showed towards the aggressive dog in the crate – whether they were exploring or whether they wanted to engage in an aggressive encounter.

Now this doesn't mean we need to throw out the whole study or it's conclusions. After all, they were simply transferring results of other studies already done on humans that showed the same results. There is just now some question as to whether the glucose played the same role in dogs as it did in humans.

Dr. Riemer further attended a conference *Behavior 2013 Joint Meeting of the 33<sup>rd</sup> International Ethological Conference & the Association for the Study of Animal Behavior*, (Newcastle, UK) at which Holly Miller, K.U. Leuven, Kristina Pattison, Camille Bourassa, Justine Blamplain & Jen Laude presented: „Too dog-tired to behave: Self-control in humans and dogs is sensitive to fatigue“. During this presentation, Dr. Miller reported about this newer study<sup>4</sup>, that when given fructose (dried fruit chips for example) that the dog's ability to successfully do nose work was better than when they fasted. It was also noted, that fructose doesn't affect blood glucose, so there must be something else involved. This "something else" is that the fructose DOES affect the vagus nerve, which effects digestion and controls regulation of emotions. Actually, it was found that dogs who had a good low carb breakfast did better with self-discipline than these who fasted. Also mentioned, that dogs are very efficient in turning protein into ... wait for it ... **glucose**.

So...what does that mean on a practical basis? You might want to NOT use fructose alone to help restore impulse control, maybe just mix it with some chicken or hot dog. But not chocolate!

Another thing to consider, and something we fleetingly mentioned is, that self-control can be learned. It's like a muscle as Baumeister et. al. (2007)<sup>5</sup> posits. This would mean, that the ability to exercise self-control, like a muscle, increases in potency when exercised. Avoidance of stimuli that

3 Miller, Holly C., et al, "Self-Control Without a "Self"?: Common Self-Control Processes in Humans and Dogs", Psychological Science Online, First, published on March 11, 2010 as doi:10.1177/0956797610364968, <http://pss.sagepub.com/content/21/4/534>

Miller, Holly C., et al, "Too dog tired to avoid danger: Self-control depletion in canines increases behavioral approach toward an aggressive threat", Psychon Bull Rev (2012) 19:535–540 DOI 10.3758/s13423-012-0231-0 <http://www.shamanandscientist.com/images/Dogs/DogTired.pdf>

4 Miller, Holly C. & Bender, Charlotte "The breakfast effect: Dogs (*Canis familiaris*) search more accurately when they are less hungry", Behavioural Processes 91 (2012) 313–317, <http://www.sciencedirect.com/science/article/pii/S0376635712002008>

5 Roy F. Baumeister, Kathleen D. Vohs and Dianne M. Tice The Strength Model of Self-Control, Current Directions in Psychological Science 2007 16: 351 DOI: 10.1111/j.1467-8721.2007.00534.x <http://cdp.sagepub.com/content/16/6/351>

“need” exhibited self control will not increase the ability to exercise it. However (under threshold or controlled) exposure to such stimuli would increase the ability to show self control. Of course that would be a create time to reinforce all successful attempts, thus also teaching the dog what she should do – that old litany again.

Thanks once again go to Dr. Stefanie Riemer for her thoughts on the original studies and her report from the conference, outlining it’s implications for this particular part of my paper.

Leonard “Buzz” Cecil,  
Ettingen, Switzerland  
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