Sex, Brains and Tragedy

Remarks delivered December 11, 2006 at NATO Advanced Research Workshop, Cambridge, England: "Suicide Bombers - the psychological, religious and other imperatives"

Another name for my talk would be “How to Make Someone Hot for Martyrdom.” How many of you have heard of a part of the human brain called “the reward center”? It’s my thesis that none of us should be turned loose on the planet without an instruction manual for this primitive mechanism, which – among other things – impels us to mate. It’s also impelling bombers from Palestine and Egypt.

Consider a recent documentary called Suicide Killers by a Frenchman, who interviewed failed Palestinian suicide bombers. These “would-be explosives” are usually young…and celibate, thanks to fundamentalist Islam. They repeatedly cite “marriage in heaven” as a chief motivation for their annihilation. Upon martyrdom they are promised 72 virgins, or, if female, they will become one of those highly-desirable, sacred beauties. Local newspapers report bomber’s suicides as “marriages.” Even their parents affirm that “better marriage” is one reason they are happy for their dead children – and quite willing to sacrifice their brothers and sisters so they can find the same happiness.

Here’s how our mating neurochemistry contributes to this tragedy. This primitive part of the mammalian brain is known as the “reward center.” It drives us toward the activities that helped our ancestors survive and pass on their genes. It’s treacherous for various reasons.

1. First, we rely on it instinctively to make decisions all day long. It tells us when to eat and drink, and which courses of action are likely to prove rewarding – hence its name. Because these

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1 Also called the “meso-limbic dopamine pathway.” For more, see http://thebrain.mcgill.ca/flash/a/a_03/a_03_cr/a_03_cr_que/a_03_cr_que.html and http://www.nel.edu/25_4/NEL250404R01_Esch_Stefano.htm

urges are subconscious, they often go unexamined by our rational mind. They simply feel right, and we assume they are our will.

2. Second, the top priority of this center is the survival of our genes: not our wellbeing, not the happiness of our marriages, and not our moral or spiritual improvement.

3. Third, modern life is vastly different from the life of our distant ancestors. Therefore, this center’s priorities are often patently wrong—even though they still feel entirely right. For example, on a severely over-crowded planet, reckless procreation equates with wretchedness not survival, yet the reward center gives it “four stars.”

4. Fourth, the reward center does not point the way to satisfaction. In fact, its biological job is to create dissatisfaction, always pushing us from one thing to the next by promising satisfaction. For example, it is programmed to draw us to new mates even though trusted companionship is best for our health and longevity. Why? To increase the genetic variety of our offspring.

5. Finally, when the reward center is intensely stimulated, it subverts our ability to make sound decisions. Then we’re vulnerable to exploitation by others, such as religious authorities, politicians, and advertisers.

How does this center undermine our powers of reason and urge us toward its priorities? With surges of a neurochemical called dopamine. The intensity of the surge is related to the evolutionary importance of the anticipated goal. When a new mate is in the offing, then—as Romeo and Juliet could tell you—these surges can override sound judgment. So think of dopamine as the “I’ve got to have it” neurochemical. How compelling is the drive to mate? A Dutch scientist recently reported that brain activity at the peak of the sexual crescendo looks a lot like the brain activity of someone shooting heroin.4

This brings me to another important point about the reward center. It has no power to analyze what causes a dopamine surge. It just urges us toward whatever is registering high on the dopamine chart. Half a century ago scientists discovered that when you plant an electrode in the reward center of

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3 Mean Genes: From Sex, to Money to Food, Taming our Primal Instincts by Terry Burnham and Jay Phelan, Penguin Books (2000)
4 “Brain Activation during Human Male Ejaculation” http://www.jneurosci.org/cgi/content/abstract/23/27/9185 (brain scan parallels drawn between ejaculation and heroin rush)
a rat so that it can hit a lever to reproduce the effects of dopamine, it keeps hitting the lever until it drops. Not even food will distract it from this “rewarding,” but self-destructive, activity. When our dopamine is high, we, too, become unnaturally goal-oriented, and feel strangely impervious to repercussions.

Anyone who can create in us the anticipation of a reward that sends dopamine soaring, gains a powerful hold over us. We can be manipulated to put these desires before our wellbeing, and the wellbeing of others. For a deeply religious person, that highly-coveted reward might also be union with his Creator.

By the way, dopamine is operative in all addictions. When people use cocaine or alcohol, or become entranced with titillating two-dimensional computer images, they hijack the reward center artificially. What makes some activities especially addictive? When dopamine has been extremely high, it doesn’t just drop back to normal levels. It falls even lower— as if the body needs to recover after over-stimulation. Until it returns to normal, we suffer an uncomfortable withdrawal phase. At this point in the cycle, we are especially susceptible to any suggestion that will bring our dopamine back up so we feel good again. It is the actually the lows, combined with the promise of relief, which keep us locked in addictive behavior.

Recent findings confirm that there are two perfectly natural activities that have the potential to send dopamine surging high enough to throw us into this addictive cycle. These are binging on high-calorie foods, and, especially, sex.5 Incidentally, it is the addictive cycle of passion that drives men and women apart. We see “Mr. or Ms. Right” when our dopamine is

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5 “A Real Sugar High”
“Sex and Addiction” http://www.reuniting.info/science/sex_and_addiction
Rob Weiss, founder of the Sexual Recovery Institute says, “Porn addicts become hooked on their brains' chemical responses to the stimulating material. "I think of sex addicts as being drug addicts—only their drug is their own neurochemistry, Rob says….Contrary to popular belief, sex addiction is not about sex, Rob says. "It's like a gambling addiction."
“Reward Mechanism Involved in Addiction Likely Regulates Pair Bonds Between Monogamous Animals”
http://www.yerkes.emory.edu/index/yerkes-app/story.50/
high. The low dopamine phase, however, can linger for days. During this time we may feel a sense of lack (low dopamine) that shows up as feelings of scarcity, cravings, or irritability – which we project onto the world around us…finding things to blame for our distress. Unfortunately we also tend to project our uneasiness onto our mate – who is not registering as “rewarding” in the primitive part of our brain…while new opportunities do. This is how our reward center drives us on to additional mates - and away from the trusted companionship that benefits us (rather than our genes).

Now that you have a bit of background about this weak point in our design, let’s return to the matter of suicide bombers. This chart shows medical conditions associated with excess and deficient dopamine. Notice that excess dopamine can easily make someone susceptible to delusional thinking. Suicide bombers fall somewhere toward this red column. They are predominantly puritanical Sunnis, who are forbidden sexual release outside of marriage and are often too poor to marry. Sexual frustration equates with a lot of that “I want my reward” dopamine. But so does an intense, impatient yearning to be with

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\begin{array}{|c|c|c|}
\hline
\text{EXCESS} & \text{HEALTHY} & \text{DEFICIENT} \\
\hline
\text{~Aggression} & \text{~Healthy bonding} & \text{~Inability to love} \\
\text{~Risky behavior} & \text{~Healthy libido} & \text{~Low libido} \\
\text{~Delusions} & \text{~Well-being} & \text{~Erectile dysfunction} \\
\text{~Schizo-phrenia} & \text{~Sound choices} & \text{~Addictions} \\
\text{~Sexual fetishes} & \text{~Good feelings toward others} & \text{~Depression} \\
\text{~Addiction} & \text{~Realistic expectations} & \text{~No ambition} \\
\text{~Detachment} & \text{~Optimism} & \text{~Withdrawal} \\
\text{~Compulsions} & & \text{~ADHD} \\
\text{~Obsession} & & \text{~No remorse} \\
\hline
\end{array}
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\[6\] This “hangover” involves other, inter-related neurochemical components as well. “Pharmacological and physiological aspects of sexual exhaustion in male rats” [Drastic reduction in androgen receptor density in specific regions of the brain following sexual activity. May take up to 7 days to recover from sexual activity, perhaps due to androgen receptor decrease after orgasm, which decreases effects of testosterone.)

“Sexual behavior reduces hypothalamic androgen receptor immunoreactivity”

“Effects of acute prolactin manipulation on sexual drive and function in males”

“Prolactinergic and dopaminergic mechanisms underlying sexual arousal and orgasm in humans.”

“Hot for Martyrdom” by Michael Coren (November 03, 2006)
Allah. Both sex and the desire to be reunited with one’s Creator may reflect the same deep desire for oneness or fulfillment.

In any case, to keep people in this “excess dopamine” state, a radical leader has only to inflame his celibate followers by dwelling on heaven’s pleasures. To motivate them to act, he emphasizes the possibility of eternal glory, joy - and the only sex that is pure enough to be praiseworthy for fundamentalists: *sex in heaven.*

Potential martyrs, driven to seek relief from their inflated desires, now focus on the reward they *anticipate* – not on what they forfeit. In their state of mind, sound choices and realistic expectations are temporarily not an option.

The leaders’ job is easier than it looks, because the reward center is instinctual. It has no power to weigh options on their merits, but only on how much dopamine is produced when we think about them. This is how we can come to pursue intense thrills even above our survival. This recklessness serves evolution. Throughout history people have pursued sex partners despite threats of death or hell. We are programmed to risk our lives (if necessary) to *pass on our genes* – and our reward center doesn’t distinguish between a real future sex partner and a fictional one. *It measures only our level of feverish anticipation.*

Research on rats confirms that survival is not our reward center’s top priority. A rat will starve to death rather than cross an electrified grid to get food. Yet, place a lever at the other end of the cage, and train him to stimulate his reward center as dopamine would, and he will risk electrocution to get his “reward.”

8. For a suicide bomber, the promise of unearthly delights is at the other end of the cage. All that he or she is being asked to risk is instant death in the service of Allah. To an overheated reward center, rash action in pursuit of a great prize feels right.

Now you see how very bad ideas like “suicide-for-sex” can become highly desirable to people with (temporarily) imbalanced brain chemistry. Until they are thinking clearly, these are

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8. "Self-administration in a shuttle box avoidance task summary"
   http://abdellab.sunderland.ac.uk/Lectures/Reward/tasks.html
definitely not people you want anywhere near weapons. Unfortunately, our current presidential administration has been exploiting the same fundamentalist fervor on our side of the ocean. We, too, have our “Sunnis” - belligerent religious fanatics. They exhibit the same belief that they hold a monopoly on The Truth, the same conviction that God wants them to persecute others, and the same intense paranoia. Fortunately, no one has yet thought of promising them heavenly sex. However, this woman said she was so inspired by the religious fervor of the jihadists that she opened a camp to transform children into radical Christian warriors.9

Ironically, the agenda of our religious fanatics is similar to their Sunni “enemies.” They, too, anticipate intense gratification in the next world…like the witch-burning puritans who settled in the United States. Meanwhile, they also demand sexual abstinence before marriage and control over women’s reproductive rights. They also condemn homosexuality.

The Bush administration allied itself with the prejudices of these fundamentalists, not to bolster our feeble morals, but to implement a pro-military-industrial agenda, which also thrives on paranoia. Given the ghastly destructiveness of this “unholy alliance” between militarism and fundamentalism, the majority of us were elated when the Republicans lost the recent election. They lost in part due to outrage over the war, but also due to sexual scandals that underscored their hypocrisy. For example, there were shocking revelations about promiscuous Republican homosexuals – one a fanatical fundamentalist who had White House ties and was a popular speaker at the radical children’s camp just mentioned. The woman, by the way, had the good grace to close her camp.

All this drama proved one thing: God has a sense of humor.

Even so, the link between puritanical zeal and militarism is ominous. The more powerful the country, the more havoc this combination generates - as we see in Iraq.10 Our press reports only what its pro-military industrialist owners want Americans to hear and fear. Frightened people can easily be

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9 “Jesus Camp” http://www.jesuscampthemovie.com/
10 The authors of the US Constitution tried to prevent this very problem by forbidding close ties between religion and government. This administration has violated this protection at every turn, and subverted our media. Needless to say, it is vitally important that we protect the Internet from Republican efforts to censor it “for our safety.” “Gingrich wants to restrict freedom of speech?” http://www.msnbc.msn.com/id/15951435/ and demand paper ballots so we can hold a fair election in 2008.1 “Congress to Look at Voting Problems” http://www.truthout.org/docs_2006/113006S.shtml
convinced of unsound ideas. This brings me to another unfortunate parallel between the United States and puritanical Islam. American reward centers are also under assault, and as a result we are also highly vulnerable to manipulation. I am not talking about our fundamentalists now, but rather our entire society.

We are dramatic proof that the reward center’s urges are not suited to modern life. My country has had the wealth to indulge these impulses freely in recent decades. *Indulgence has not led to happiness*, but to weakened willpower and anxiety. Here is some of the proof:

<table>
<thead>
<tr>
<th>Reward Center</th>
<th>Result</th>
<th>How Many Americans?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Choose sweet, fatty foods”</td>
<td>Obesity</td>
<td>1/3 obese 1/3 overweight</td>
</tr>
<tr>
<td>“If it feels good, do it!”</td>
<td>Alcohol, drug problems</td>
<td>10-20%</td>
</tr>
<tr>
<td></td>
<td>Nicotine addiction</td>
<td>22</td>
</tr>
<tr>
<td>“Sex feels good!”</td>
<td>Use porn</td>
<td>10% of adults</td>
</tr>
<tr>
<td>“Sex is more rewarding with a new partner”</td>
<td>Divorce rates climbing</td>
<td>1/2 will end in divorce</td>
</tr>
<tr>
<td></td>
<td>Child sexual abuse</td>
<td>1/5 of girls 1/10 of boys</td>
</tr>
</tbody>
</table>

Weak willpower has grave repercussions. It was Clinton’s inability to control his sexual impulses that made it possible for the Republicans to usurp the presidency.

If the reward center is allowed free rein it reduces intimacy to the status of addictive fix – expendable as soon as the thrill is gone. This center urges us to have our children with different mates, because that improves our genes' chances of survival. This is why almost no mammals are monogamous. Also keep in mind that our brains evolved when we lived in tribes. Children were raised by the entire group, and stable unions were not so critical for their wellbeing as they have been for the last few thousand years.
Fundamentalism *attempts* to solve this thorny problem, but it fails. When we resist this mating program with rigid rules - yet continue to emphasize the value of fertilization-driven sex - our restlessness often shows up in our marriages anyway…as deception, bitterness, misogyny and domestic violence. If we remain celibate, we’re vulnerable to having our mating impulse redirected by others – as our young bombers demonstrate.

Incidentally, authorities also manipulate Western reward centers with little concern for our wellbeing. Think of the phony research the tobacco companies financed to keep people smoking. Think of the fast food deliberately made more addictive with sugar. Now pharmaceutical companies are poised to sell us sexual desire, too.¹¹ And then new drugs to counter the very addictions they encourage.¹² When your trusted authority - whether a radical leader or a pharmaceutical company – promises you sexual pleasure, your reward center will clamor for it, ignoring any downside. We are vulnerable – and we don’t see it, because, like the bombers, we are focused only on what we think we want.

What can humanity do to protect itself from these faulty signals? We can balance ourselves from within, by changing our behavior. Two things help:

1. Consciously shifting our attention away from our obsessions toward other behaviors that are “rewarding,” but not so rewarding as to throw us into the addictive cycle. For example, a sense of accomplishment, or regular, healthy meals are also rewarding, but not addictive.
2. Encouraging the production of a neurochemical called oxytocin.

Unlike dopamine, oxytocin *is* about warm satisfaction. It increases trust,¹³ counters stress,¹⁴ and acts an anti-depressant.¹⁵ It also calms. In fact, when

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¹¹ “The New Viagra for Women” [http://www.spiegel.de/international/spiegel/0,1518,416776,00.html](http://www.spiegel.de/international/spiegel/0,1518,416776,00.html)
injected into a single rat, oxytocin will have a calming effect on an entire cage full of anxious rats. One of oxytocin’s most intriguing properties is its beneficial effect on the reward center. For example, it soothes addiction and withdrawal symptoms. It helps free our willpower and restore clear perception.

It is also the “bonding hormone,” connecting us with our children and friends, and making it possible to fall in love. It is even associated with monogamy in one rodent, so it may hold the key to strengthening our unions. Thanks to its benefits, oxytocin is probably the reason why close, trusted companionship is associated with longer lives, faster healing, better ability to cope with stress, and less illness.

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14 “[Oxytocin, a mediator of anti-stress, well-being, social interaction, growth and healing]”

15 “Oxytocin as a possible mediator of SSRI-induced antidepressant effects”

16 “Energy conservation in stressed rats exposed to an oxytocin-injected cage mate”

17 “Oxytocin and addiction: a review”

18 “Prognostic importance of marital quality for survival of congestive heart failure”

“Stable partnership and progression to AIDS or death in HIV infected patients receiving highly active antiretroviral therapy: Swiss HIV cohort study”
http://www.bmj.com/cgi/content/abstract/328/7430/15?maxtoshow=&HITS=10&hits=10&RESULTFORM AT=&fulltext=stable%252Bpartner%252BAIDS&andorexactfulltext=and&searchid=1087362145486_172&stored_search=&FIRSTINDEX=0&sortspec=relevance&resourcetype (stable partnership is associated with a slower rate of AIDS or death in HIV infected patients)

19 “Hostile Marital Interactions, Proinflammatory Cytokine Production, and Wound Healing”
http://pni.psychiatry.ohio-state.edu/jkg/JKG%20Article%20PDFs/171.pdf#search=%22Hostile%20marital%20interaction%22 (marital conflict slows wound healing)

“Social facilitation of wound healing”

20 “Warm Partner Contact Is Related to Lower Cardiovascular Reactivity”
http://www.reuniting.info/download/pdf/WarmContactPaper.pdf (affectionate relationships with a supportive partner may contribute to lower reactivity to stressful life events and may partially mediate the benefit of marital support on better cardiovascular health)
Here are some activities that studies show increase oxytocin:

1. Assisting others in selfless service (volunteers report decreased pain)
2. Affectionate, nurturing touch (In the United States we are drifting away from these important sources of balance – in favor of comforting ourselves with thrills as empty as rats hitting a lever.)
3. Socializing with others
4. Yoga, uplifting music
5. A feeling of connectedness with the Divine (meditation/prayer)

Unfortunately for our suicide bombers, there is no easy way to offer them a rewarding alternative focus that would also encourage production of oxytocin. In the ideal world they would be able to pour their fiery energy into building playgrounds, refurbishing housing, and learning new skills.23 Young people are often naturally drawn to channel their idealism and passions into service.

I have an additional suggestion for those of us lucky enough to have mates. Thousands of years ago Lao Tzu, a famous Chinese sage, observed that there is a way to make love that soothes cravings, improves health, and increases harmony. His discovery? Make love frequently (make lots of oxytocin), but avoid those passionate crescendos (and dopamine drop-offs) that make the ordinary way of doing things “a great backward leap.” Keeping things on an even keel makes perfect sense in light of the reward center. We avoid the withdrawal part of the cycle that makes our mate appear less “rewarding,” and leaves us susceptible to new thrills elsewhere.24 If we don’t go too high, our dopamine doesn’t drop so low.

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21 “Marital Status and Health: United States, 1999–2002”


23 “Youth Corps Holds a Key to Trails”
http://www.americantrails.org/resources/funding/FundHelfrichYouthCorps.html

24 Recent studies Italy, Germany and the USA have confirmed a natural pattern of alienation between committed mates. It usually shows up within a year or two, and is accompanied by various physiological and behavioral markers.

“Sexual Motivation and the Duration of Partnership” http://zp.m.uke.uni-hamburg.de/WebPdf/sexmotiv.pdf (A few years into relationships, women’s libido has declined, while men’s desire to be tender has declined.),

“Hormonal changes when falling in love”
Remember, low dopamine can be as uncomfortable as high dopamine.\textsuperscript{25} It, too, can push us to make unsound decisions and reach for addictions. In fact, I would venture to say that the reason Americans are so easily manipulated by fear is the same reason suicide bombers are fearless: dopamine extremes. Americans are often in withdrawal. Even though we have more than most of the world, we often feel like something is “not right.” We are then easily manipulated – and oblivious to the biggest threat…our bad habits. Like the Sunni bombers, we would be much better off with balanced dopamine.

I sincerely hope that humanity will soon recognize how to outsmart this primitive reward center. Clear perception is vital for lasting contentment, sound judgment, and a safer world.

\textsuperscript{25} “Subjective Experiences During Dopamine Depletion”
\textsuperscript{http://ajp.psychiatryonline.org/cgi/content/full/162/9/1755} (low dopamine associated with obsessive-compulsive symptoms, thought disorders, and anxiety and depressive symptoms)

[www.reuniting.info/nato.pdf Marnia Robinson]