

One year in Tantra: A scientist's tale

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Abstract

To many of us, orgasm is the greatest pleasure that can be experienced without the use of drugs. However, this pleasure is typically all too brief, or in some cases even not routinely attainable. Tantra promises to provide an alternative that is almost too good to be true: whole-body orgasms that last for minutes or even hours, and on top of that, a doorway into altered mind states, ultimately even including enlightenment. That's quite a promise. But does tantric practice deliver? Is it more than some New Age mumbo jumbo?

Due to a chance encounter, I started tantric practice about one and a half year ago, following the teachings of Alex Vartman's *The New Tantra* (TNT). As an atheist with a scientific background, and without any previous experiences – or even previous interest – in tantra, meditation, yoga or related practices, it's fair to say that I can offer a skeptic outsider's view. This is precisely the aim of this document. Where possible, I provide pointers to the relevant scientific literature, and also indulge in a bit of scientific speculation.

1 Welcome to rational tantra

There are many introductions to tantra available, both short and long, in the form of books, blogs or articles. So why add another one to the long list? Most information on tantra comes from two different sources. One might call the first source “spiritual”¹. This source consists of people that can confidently recite the names of the seven chakra's in Sanskrit, practice yoga, burn incense and wear colorful clothes. They see tantra as a way to reach *enlightenment*, a state of mind that is perceived to be peaceful and often associated with a feeling of unity with the universe [16]. The second source is more worldly and pragmatic. This source consists of people that see tantra as a set of techniques to improve the sex life, intensify orgasms and strengthen relationships.

This article adopts a viewpoint that is different from the previously mentioned sources, and is meant for an audience that is fairly rational and that has a healthy dose of skepticism towards “spirituality”. It should be absolutely clear

¹The word “spiritual” is next to useless, as it does not have a clear definition and means many different things depending on context.

that I do not claim to be especially versed in tantra. I want to share some of my experiences in dabbling with tantra, provide some scientific facts that might underly some of these experiences, and indulge in some speculations that at least sound possible, if not plausible.

Most of these experiences follow from practices learned from the mentors of The New Tantra, whose founder Alex Vartman is an Australian tantra teacher who is mainly active in Europe. His main interest is teaching a tantric path to enlightenment, partly through sex. If these last two sentences arouse your deep skeptic suspicion you belong to this article's intended target audience. Welcome!

2 A skeptic takes the plunge

I first came into contact with tantra by meeting a fairly experienced tantra practitioner. When we first had sex, we agreed that I – following the tantric way – would refrain from ejaculation. This turned out to be a very interesting experience, including many seemingly innocent actions – such as touching an arm or a finger – that seemed to evoke strong, orgasmic reactions in my partner.

In short, I was intrigued and decided to sign up for a tantra course. This turned to be a most exhilarating experience, with many unexpected rewards. One of the many surprises was experiencing so-called *whole-body orgasms* [11]. Conventional orgasms are *peak orgasms*; they last for a short time and the associated sensations are concentrated in the genital area. In contrast, whole body orgasms radiate through the whole body and can last for much longer, up to hours. I'll introduce and describe some more unusual experiences, such as kundalini awakenings and satori states, later on. Quickly, I began to ponder about the scientific foundations of what I was witnessing and experiencing. What exactly are full-body orgasms? Could one really induce altered states of mind, simply through tantric sex practices? Is there a scientific basis for the need to refrain from ejaculation?

What is clear to me now, is that tantric practice can lead to unique experiences that can confront you with the intricacies of the human mind, and most importantly, your own mind. I was surprised to see hard scientific evidence for implausible tantric claims, and *vice versa*, I was often baffled by the lack of scientific knowledge on such mundane topics as the mechanism behind male ejaculation.

Absorbing my tantric experiences in a rational way has been a true joy. Now I've introduced myself to the extent relevant to this article, let's turn to the key question that surely arises by now. What is tantra, exactly, apart from a ritual practice that originated in the East?

3 Tantra in a boundless nutshell

There are many definitions of tantra, ranging from the purely sexual to the purely ritual, and everything in between. Rather than repeating someone else's

definitions and descriptions, I will attempt to describe what tantric practice means to me in very concrete terms. Let me remind you again that I do not claim to be an expert in these matters! Broadly speaking, to me it seems that three aspects have been particularly relevant during my practices:

- Learning to live in the present moment. This is not as undefined or woolly as it sounds. The idea is to simply focus on the matters at hand, without such things as mental wandering, unfocused mental chattering or irrelevant worrying. This is a classic goal of practices such as yoga and meditation. Indeed, the wandering mind has been shown to be correlated with unhappiness [9].
- Relaxing and awakening the body. Many tantric practitioners can experience strong orgasmic feelings from seemingly innocent events such as touching an arm, kissing, dancing or even eating delicious food. Such orgasms are called *non-genital orgasms* [11]. The tantric view is that these experiences require a body that is not blunted by factors such as stress, abuse or simply lack of awareness.
- Learning to include all aspects of life in tantric practice. Many disciplines require strict adherence to rules such as refraining from drinking alcohol or eating meat. Not so with tantra – tantra is “all inclusive”; any action, such as for example drinking a beer, can be part of a tantric way of living provided it is done with the right awareness and attitude.
- The final aspect naturally arises as a consequence of the previous ones. By focusing on the present, with a relaxed and awakened body, one opens the doorway to whole-body orgasms and altered states of mind [16].

At this point, I should define what I mean by altered states of mind. These are often called “spiritual experiences”, but I want to avoid the word “spiritual”, as it is so vague and ill-defined. Altered states of mind include for example out-of-body sensations, feelings of unity with the universe and intense feelings of peace and quietness of the mind [16]. Following the philosopher William James and his classic work *The Varieties of Religious Experience*, first published in 1902 [8], I’ll briefly characterize these states as *transient*, difficult to describe in words (*ineffable*), enriching (*noetic*) and to a great extent beyond conscious control (*passive*). Kevin Nelson’s book *The God Impulse* provides an excellent overview of different altered states of mind from a modern scientific point of view [16].

4 Conquering the peak: whole-body orgasms

The average duration of a peak orgasm for women is around twenty seconds [15] and presumably even shorter for men. A brief pleasure indeed! However, it is a scientific fact that the classic *peak orgasm* – associated with stimulation of the

clitoris for women, and with ejaculation for men – is only the tip of the ice berg [10].

In women, various orgasms can be induced by stimulation of the G-spot and the surrounding urethral sponge, the vagina, the uterus and the cervix. These orgasms are described as *valley orgasms*²; they typically last longer than peak orgasms induced by clitoral stimulation, involve the whole-body and don't lead to the same state of sexual disinterest. These orgasms are clearly not simply induced by indirect stimulation of the clitoris, as is sometimes claimed. In addition to the pudendal nerve which connects the brain with the clitoris, the vagina, cervix and uterus are indeed connected to the brain by three additional pairs of nerves – the pelvic, hypogastric and vagus nerves (see Fig. 1). Strikingly, the vagus nerve is directly connected to the brain, bypassing the spinal cord. Its involvement in orgasms is proven by the fact that women with a severed spinal cord can still reach orgasms through the stimulation of the cervix [10].

Men experience the equivalent of clitoral orgasm as the classic penile peak orgasm and ejaculation, which involves the pudendal nerve. In addition, men can also reach valley orgasms through stimulation of the prostate, which involves the hypogastric nerve, and the rectum which involves the pelvic nerve. Stimulation of the prostate can lead to multiple valley orgasms where the semen gently oozes out [10]. In short, men can fairly easily attain valley orgasms by genital stimulation, just like women can, if they include anal stimulation.

The whole wiring network between genitals, rectum and brain is schematically shown in Fig. 1. It should be clear that a women's nerve wiring is much richer than a man's. Moreover, males that do not engage in anal stimulation only use one out of three nerve connections optimally. A dismal thought!

However, orgasms don't necessarily involve stimulation of the genitals or rectum. Orgasms can be induced by stimulation of the nipples or breasts, stroking the arms or the back, or even by thinking [10, 11]. From a sexual point of view, tantra involves going beyond the peak orgasm, and opening up the body to multiple valley orgasms that do not necessarily involve genital stimulation. This applies to both men and women, though without any doubt, attaining multiple valley orgasms is harder for men than for women. These orgasms last much longer than peak orgasms, and can go on for hours. In addition, these orgasms are not associated with the loss of sexual interest and excitation that is associated with peak orgasms.

5 To come or not to come, that is the question

Peak orgasms accompanied with male ejaculation are generally not well seen in tantra, and most schools recommend to limit the number of ejaculations, or stop ejaculating altogether. Needless to say, this is a show stopper for many men. “What, me, giving up orgasm – never!” However, the underlying idea is that peak orgasms inhibit the emergence of other, more intense sexual and

²According to anecdotal evidence, G-spot orgasms, especially if accompanied with female ejaculation (“squirting”), can also occur as peak orgasms.

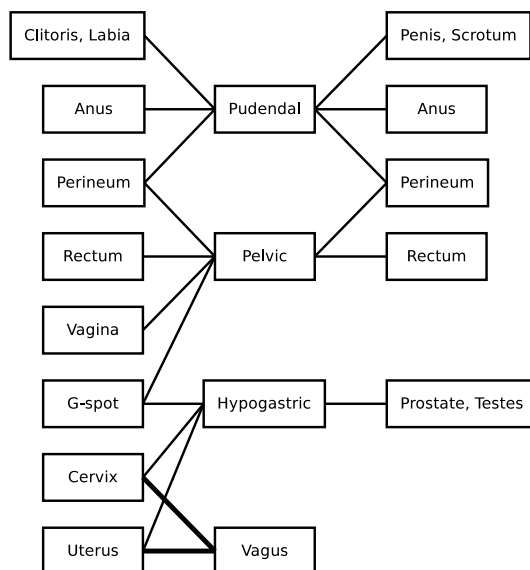


Figure 1: The genitals are connected to the brain via the spine by the pudendal, hypogastric and pelvic nerves [10]. Women also have a direct connection – bypassing the spine – from the cervix to the brain via the vagus nerve (shown as bold lines) [10]. The picture shows a schematic view on the connections for females (left) and males (right), with the nerves in the center. One could say that men without the use of anal stimulation largely miss out on two out of three possible nerve connection to the brain, while women can access four nerve connections without it. The hypogastric nerve in males can however also be accessed via the testes; it is this nerve that makes a kick in the groin such a painful experience. Luckily the nerve can also serve more pleasurable purposes.

altered mind experiences. In addition, orgasm in males is not the same thing as ejaculation, though most males are oblivious to this fact as both occur in fast succession and are difficult to separate [10].

Some schools, including The New Tantra, go so far as to speak about *orgasm addiction* and *orgasm hangover*, lasting around twenty days. Orgasm hangover is said to be associated with mood swings, lack of energy and general disinterest in familiar partners.

Although far from scientifically confirmed, these ideas are not as far-fetched as it seems at first glance; substantial evidence for long term effects induced by ejaculation is available. As far as I could find out from a search through the scientific literature, there is simply no data on this topic for humans. However, several animal models – notably rats³ – confirm that ejaculation can be associated with long terms affects, such as sexual disinterest. Male rats that are allowed to ejaculate until full sexual exhaustion (SE) indeed need a staggering

³Rats are a surprisingly good model for human sexuality [17].

six to fourteen days for full recovery [4]. Note that these long term effects are not simply due to physical exhaustion. Interestingly, the SE is physiologically different from the so-called post-ejaculation refractory period (PERT), which is the period after ejaculation when further ejaculations are inhibited [14]. Notably, the drug bicuculline diminishes the duration of PERT, but has no effect on SE [4]. It is not clear if SE and PERT are also present in some form in female rats or – more interestingly to the reader perhaps – in women [14].

A second argument in favor of the tantric view on male ejaculation and peak orgasms stems from male-to-female transsexuals [10]. Over the course of years, many such transsexuals slowly evolve from experiencing male peak orgasms, to female patterns, including becoming multi-orgasmic. This might indicate that the brain can re-wire its sexual circuits in response to a physical change. Perhaps, by refraining from peak orgasms, a similar re-wiring can occur? A fascinating, and – at least in principle – possible explanation.

As for me, occasional peak orgasms do not necessarily seem to interfere with the possibility of experiencing full body orgasms. Perhaps it is important to avoid SE, while occasional PERT is acceptable? This fascinating topic most certainly deserves more attention, and could well be the subject of scientific scrutiny.

6 This is your brain on sex

Surprisingly, the concept of “orgasm addiction” and “orgasm hangover” has some indirect scientific support. Indeed, the pleasurable effects of orgasm and various addictive drugs, such as heroin or cocaine, are largely caused by the same mechanism in the brain: the *dopamine reward system* [19]. An article that described brain activation during male orgasm drew parallels with a heroin rush [7]. Indeed, not only orgasm, but also social attachment and love has also been viewed as some form of addiction [3]. Orgasm is pleasurable because it floods the brain with the neurotransmitter dopamine, which plays a key role in addiction, though the details are not clear [18, 1, 20, 19]. In addiction, the frequent surge of dopamine induced by drugs is accompanied with changes in the brain. These changes induce craving for a new drug-induced dopamine high. Since orgasm is essentially based on the same system, it is conceivable that in a very real sense most of us are actually addicted to orgasm. Any “hangover” or withdrawal effects simply go unnoticed because they are masked by frequent orgasms.

Recently, it has become clear that addicts actually experience a *blunted* dopamine rush when taking drugs, but a strong dopamine rush during craving [20]. It is the discrepancy between the blunted response to the drug and the high expected reward that seems to drive addiction. Extrapolating to tantra, frequent ejaculation might via this mechanism lead to a strong craving for sex, but diminished satisfaction. Again, this is pure speculation.

Although the dependency of orgasm on the dopamine reward system is well established, it is far from clear what actually causes the PERT and SE periods. After orgasm in both men and women, several hormones are released in

the blood, including prolactin, oxytocin and vasopressin. Prolactin is suspected to be the off-switch in males that causes the PERT period after ejaculation [12, 6, 13, 14]. Indeed, prolactin release after orgasm was absent in a multi-orgasmic male subject [6]. Another key player in orgasm is the neurotransmitter serotonin. Serotonin by default exerts an inhibitory effect, and a transient drop in serotonin is probably required to enable the occurrence of orgasm [10]. Serotonin also plays a key role in establishing PERT after ejaculation [14]. SE on the other hand seems to be associated with changes in the number of hormone receptors in the brain, including receptors for androgen and estrogen- α [4]. Hence, it is clear that orgasm and ejaculation are associated with a wide range of neurochemical and hormonal effects [14], some of which may last for a longer period [4].

In conclusion, the tantric practice of avoiding ejaculation and peak orgasm might be an attempt to avoid the cyclic rise and fall of dopamine levels in the brain, the effects of feedback switches such as prolactin and hormonal changes. Presumably, these phenomena could lie at the base of sexual disinterest in long term partners and mood swings following sexual activity. Whether it is necessary to give up ejaculation altogether is unclear.

7 The infamous Kundalini snake

Whole-body orgasms are a firmly established scientific fact [10]. This is not the case for the topic that I now turn to: the so-called *Kundalini energy*. The Kundalini energy is said to be a “life force energy” that lies coiled up at the base of the spine (see Fig. 2). It is often visualized in the form of a coiled up snake. Normally, this energy is said to be dormant. Through various practices, such as meditation and yoga, this energy can be awakened and circulated through the body. The rising of the energy up the spine, all the way to the head, is said to produce deep altered states of mind. Circulation of the kundalini energy leads to spontaneous movements of the body, which can include twitching, shaking, movements of the spine, adopting yoga-like postures or singing and dancing. Abrupt movements are called *kriya*’s (pronounced “kree-yuhz”), while more flowing motions, typically involving the hands, are called *mudra*’s⁴. It often looks quite impressive! Sometimes, a kundalini awakening can occur spontaneously to individuals that are not involved in any tantric or yogic practice, leading to great bewilderment. Scientific research on the subject of kundalini energy is essentially non-existent; one study suggests a relation between kundalini awakening and near-death experiences [5].

When I first heard about kundalini energy I was deeply skeptical. The “spiritual” and new age communities are rife with nonsense about “energies” and “frequencies”. In physics and science, “energy” and “frequencies” have a well defined meaning – surely kundalini energy was yet another example of pointless mumbo jumbo at its worst. However, I decided to put the kundalini energy

⁴The words *kriya* and *mudra* can have different meanings in different traditions and depending on the context.



Figure 2: 18th century depiction of kundalini awakening, India. The ancient depictions of the kundalini snake are often fascinating and beautiful.

concept to an empirical test. After all, it was quite possible that “energy” could be interpreted in a metaphorical sense, that is, as a strong feeling or experience arising at the bottom of the spine and rising up to the head.

The New Tantra uses a simple procedure to awake the kundalini energy, which involves manual pressure on various points of the body, followed by manipulation of the spine. The first time I tried out the procedure, I am not sure I experienced anything that could not be attributed to hyperventilation or sensory deprivation. However, shortly after, with the gentle help of some fellow tantra practitioners, I experienced a strong surge of what I can only describe as an intense orgasmic feeling shooting up through the spine to the head, accompanied with involuntary motions of the spine. My experience could indeed be described as an “awakening”, as these sensations could subsequently be activated easily at will by focusing attention on the base of the spine. The intensity of the feelings vary from time to time, but their presence can be experienced continuously.

In conclusion, kundalini energy, in the sense of a strong sensory experience associated with the spine, seems to be real and can be attained by simple practices. Given my strong initial skepticism, I find it impressive that such simple practices can deliver such spectacular results. Though the explanations of kundalini energy as a “life force energy” are clearly nonsensical from a scientific point of view, kundalini energy as a sensory experience is apparently real and actually quite pleasant. Gradually, the kundalini effect can become part of the tantric sexual practice, through simple interactions along the spine. It’s surprisingly simple and pleasurable.

8 Satori, samadhi and so on

I now turn to the most controversial aspect of tantra: its claim that sex can be used to elicit “spiritual experiences” and “spiritual awakenings”, which I will designate as altered states of mind. These altered states of mind include for example near death experiences⁵, out-of-body experiences and feelings of unity with the universe [16]. These experiences are closely related to the concept of *enlightenment*: many believe that our conventional mindset offers a limited view on reality. An enlightened mindset is typically associated with a lack of mind wandering [9], a feeling of unity with the universe and freedom of suffering induced by human emotions such as sadness, greed or lust. Enlightenment is a concept that is central to religions such as Buddhism, Hinduism and Jainism, but is now increasingly embraced by secular practitioners of meditation and tantra. Roughly speaking, temporary states of enlightenment are called satori⁶ or samadhi⁷.

As far as I know, there is currently no scientific evidence that the human brain can make a transition from a conventional state to an “enlightened” state. On the other hand, it has unequivocally been shown that meditation practices can have a pronounced effect on the brain [2], and that mind wandering is associated with unhappiness [9]. Roughly speaking, the human mind is always in one of three states: dreamless sleep, REM sleep and wakefulness [16]. Which of these three states prevails is under the firm control of a switch, namely the *brain stem*. The brain stem is very ancient from an evolutionary point of view, and all mammals essential share the same brain stem. Altered states of mind are thought to arise when the switch gets stuck in between the three normal states, and a hybrid state that is neither wakefulness or sleep is induced [16]. If enlightenment exists at all, it is tempting to speculate that it is one of these hybrid states, or even a fourth, currently unknown state. I haste to emphasize that this is pure speculation at this point, though not scientifically impossible.

As a skeptic, when I first started tantric practice, I was deeply skeptical about any “spiritual experiences” and did not expect to experience any. I considered this the privilege of religious fanatics or guru worshipers. To my enormous surprise, within months, I started regularly experiencing quite spectacular altered states, associated with various sexual practices. Two of these altered states are briefly described below. Neither of them involved the use of drugs, apart from the occasional beer.

The first experience happened during the first tantric workshop I ever attended, during sex with my partner in the privacy of our room. I suddenly entered a very pleasurable and warm state of absolute peace. Though I was awake and conscious, I felt as I was engulfed in a deep sea of nothingness and blackness. When I emerged from this state, more than ten minutes had passed,

⁵Near death experiences are a misnomer, as they occur when the brain is very much alive, though the heart might have stopped beating [16]. A truly dead brain does not return to tell any tales; near death experiences thus do not in any way provide evidence for any afterlife.

⁶A Japanese Buddhist term.

⁷The word is derived from Sanskrit.

though it seemed much shorter to me.

The second experience, which happened a few months later, was much more profound and probably one of the most intense experiences I had in my life. Following some simple practices in a workshop concerning kundalini energy, I suddenly felt euphoric and became unable to understand anything that was said beyond the occasional word. Gradually, the disconnection from conventional reality become more and more substantial, until it culminated in a vision of a perfectly mathematically ordered universe. This vision was of an extreme beauty. This altered state continued and lasted for several hours, with many interesting visual and bodily experiences.

In conclusion, it seems to be possible to reach various altered states using tantric practices, without any special religious zeal or guru worshiping. Obviously, from a scientific viewpoint, tantra thus seems to offer a wide range of opportunities for research into human consciousness.

9 Words of advice to the timid skeptic

As a skeptic, jumping in the muddy pond of “spirituality” and tantra is initially a sobering – but also often hilarious – experience. First, you will find yourself part of a very motley crew. There will be a lot of talking about “frequencies”, “dimensions”, “resonances” and “energies”. There will be a lot of talking about Jesus, Buddha and Shiva. They will horribly mutilate quantum theory without even blinking. But what does it matter if the practices and exercises lead to interesting first-hand experiences? Figuring out the true – or at least plausible – how and why is for me actually half of the fun.

Second, it can be difficult to share these experiences with your friends, let alone your family. Talking about altered states of mind in mixed company usually leads to amusing social disasters. On the other hand, it is important to keep in mind that even after all your spectacular and mind blowing insights, *Thou Shalt Not Proselytize!*

Finally, it’s fair to say that “spiritual guidance” is the hunting ground of both charlatans, out for your money, and cults, out for your money *and* your mind. I recommend avoiding these two options. Apart from these obvious concerns, it is of course also important to pick a teacher or school that fits your general preferences. Practices vary from school to school, ranging from an emphasis on eye gazing, holding hands and burning candles, to including fairly mind boggling sexual extravaganza that make surprisingly poor subject matter over the Sunday roast. I, for one, am proud to say that I never memorized any Sanskrit names of chakra’s!

10 More information

For those interested in the physiology and neurochemistry of sex, the book “*The science of orgasm*” by Komisariuk, Beyer-Flores and Whipple [10] is highly

recommended. For a scientific view on various altered states of mind, *“The God impulse”* by neurologist Kevin Nelson [16] is an excellent resource. The title is misleading, as the book is not so much about religion, as about various types of altered states of mind and their possible explanations.

The following three references make no claim on scientific rigor, but provide fascinating reading to the careful reader. For a pragmatic introduction to tantra, I recommend Barbara Carrellas’ book *“Urban Tantra”*. An excellent resource on enlightenment is Georg Feuerstein’s *“Holy madness”*, while *“Tantra – the path of ecstasy”* by the same author provides an uncritical overview of traditional tantric practices, beliefs and concepts.

Information on The New Tantra and their courses can be found on their website, <http://www.thenewtantra.com>.

11 Thank you

I thank Alex Vartman, founder of The New Tantra, for his support and his interest in a critical, scientific approach to tantra, which culminated in this short article. I thank the many people I encountered in the last year who shared some tantric knowledge with me, and especially the former and current members of The New Tantra crew (Baba, Bodhi, Frack, Maya, Obelix, Redbull and Quirky). Finally, thanks to everyone who provided comments on the article: Alex, Eliane, Johan, Joy, Karen, Karin, Kurt, Søren and Yves. Special thanks to Joy for introducing me to tantra in a very thorough yet pleasurable way.

12 Contact

I hope this short article was of some use – please send any suggestions or remarks to TNT. Apollo@gmail.com.

References

- [1] K.C. Berridge. The debate over dopamine's role in reward: the case for incentive salience. *Psychopharmacology*, 191:391–431, 2007.
- [2] J.A. Brewer, P.D. Worhunsky, J.R. Gray, Y.Y. Tang, J. Weber, and H. Kober. Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences U S A*, 108:20254–20259, 2011.
- [3] J.P. Burkett and L.J. Young. The behavioral, anatomical and pharmacological parallels between social attachment, love and addiction. *Psychopharmacology*, pages 1–26, 2012.
- [4] A. Fernández-Guasti and G. Rodríguez-Manzo. Pharmacological and physiological aspects of sexual exhaustion in male rats. *Scandinavian Journal of Psychology*, 44:257–263, 2003.
- [5] B. Greyson. Near-death experiences and the physio-kundalini syndrome. *Journal of Religion and Health*, 32:277–290, 1993.
- [6] P. Haake, MS Exton, J. Haverkamp, M. Krämer, N. Leygraf, U. Hartmann, M. Schedlowski, TH Krueger, et al. Absence of orgasm-induced prolactin secretion in a healthy multi-orgasmic male subject. *International journal of impotence research*, 14:133, 2002.
- [7] G. Holstege, J.R. Georgiadis, A.M.J. Paans, L.C. Meiners, F.H.C.E. van der Graaf, and A.A.T.S. Reinders. Brain activation during human male ejaculation. *The Journal of Neuroscience*, 23:9185–9193, 2003.
- [8] W. James. *The Varieties of Religious Experience: A Study in Human Nature*. Longmans, Green & Co., UK, 1902.
- [9] M.A. Killingsworth and D.T. Gilbert. A wandering mind is an unhappy mind. *Science*, 330:932–932, 2010.
- [10] B.R. Komisaruk, C. Beyer, and B. Whipple. *The Science of Orgasm*. Johns Hopkins University Press, USA, 2006.
- [11] B.R. Komisaruk and B. Whipple. Non-genital orgasms. *Sexual and Relationship Therapy*, 26:356–372, 2011.
- [12] T.H.C. Krüger, P. Haake, U. Hartmann, M. Schedlowski, and M.S. Exton. Orgasm-induced prolactin secretion: feedback control of sexual drive? *Neuroscience & Biobehavioral Reviews*, 26:31–44, 2002.
- [13] R. Levin. Is prolactin the biological 'off switch' for human sexual arousal? *Sexual and Relationship Therapy*, 18:237–243, 2003.

- [14] R.J. Levin. Revisiting post-ejaculation refractory time – What we know and what we do not know in males and in females. *Journal of Sexual Medicine*, 6:2376–2389, 2009.
- [15] R.J. Levin. Physiology of orgasm. *Cancer and Sexual Health*, pages 35–49, 2011.
- [16] K. Nelson. *The God Impulse: Is Religion Hardwired Into the Brain?* Simon & Schuster, UK.
- [17] J.J. Normandin and A.Z. Murphy. Somatic genital reflexes in rats with a nod to humans: Anatomy, physiology, and the role of the social neuropeptides. *Hormones and behavior*, 59:656–665, 2011.
- [18] S. Pecina, B. Cagniard, K.C. Berridge, J.W. Aldridge, and X. Zhuang. Hyperdopaminergic mutant mice have higher "wanting" but not "liking" for sweet rewards. *The Journal of neuroscience*, 23:9395–9402, 2003.
- [19] N.D. Volkow, G.J. Wang, J.S. Fowler, and D. Tomasi. Addiction circuitry in the human brain. *Annual review of pharmacology and toxicology*, 52:321–336, 2012.
- [20] N.D. Volkow, G.J. Wang, J.S. Fowler, D. Tomasi, and F. Telang. Addiction: Beyond dopamine reward circuitry. *Proceedings of the National Academy of Sciences U S A*, 108:15037–15042, 2011.