AN ECONOMIC ANALYSIS OF THE SILK ROAD AND RESEARCH CHEMICALS

Farzad Saif[1]

[1] *saif2@illinois.edu, 217-979-9458*

For the last decade or so, government agencies have had an impossible time battling the drug trade. Online drug markets completely circumvent any effort to stop drugs from being sold. Concurrently, current policy incentivizes manufacturers to create highly potent grey market drugs in an attempt to circumvent bans. This paper will attempt to break down the world of illegal drugs by analyzing it through two topics: The Silk Road—an online black market, and the research chemicals industry—the creation of newer drugs in an effort to sell recreational substances legally. I will cover the mechanisms that the Silk Road uses to anonymize everyone on the platform, the reputational methods it uses to mitigate scammers, and the philosophical motives by its leader, Dread Pirate Roberts. Using these topics as a lens, we can understand how and why the current drug market operates, and why current drug policies are the cause of both phenomena.

I. THE SILK ROAD

The dealing drugs face-to-face has a variety of issues. As Eileen Ormsby (2015) describes in the story of a man who bought drugs from a street dealer:

> [Sam Tyler] wanted some ecstasy for a night out and visited a friend-of-a-friend dealer he'd used twice before. 'I arranged to pick up a couple of green mitzis [ecstasy tablets stamped with the Mitsubishi logo]… but when I got there, they'd run out of them and gave me these other ones, yellow Russians, which they said were just as good.' Although he would have preferred to research the other pills before committing his $70, dealers could get pissed off when customers left empty-handed. 'When I got home, I checked them out on Pillreports [a website in which users provide feedback on pills available in the area],' Sam said. 'Flashed up red. Fuckin' pipes.' [pipes, or piperazines, are a family of drugs vaguely similar to ecstasy but have far more adverse side effects] (14)

Street dealing leaves a lot to be desired from consumers. When someone wants to buy a particular drug, he has to locate a dealer via word of mouth. If one wants to buy drugs, they have to locate some recluse dealer. Whatever the dealer has is what you get. There would be no way to check the quality of the product on the spot or even if it is not some other substance entirely—essentially blindly buying the pill. Tyler's story also points out the fear of physical violence in street dealing; he could not refuse to buy the pills because he was afraid that the seller might react violently. The dealer may also be an undercover cop. There is no supply to meet the demand for some products, and the products that do exist have high transaction costs. The illicit drug industry carries a large dead weight loss. This dead weight loss signifies that there is money that people *could be making*. With the huge profit opportunity just lying there, it is to be expected that someone will take advantage and cash in.

The Silk Road was just that someone. Like companies such as eBay and Amazon, the Silk Road was an online market which connected buyers and sellers around the world. Yes, you can receive any of your favorite mind-altering substances in something as mundane as the postal service. No longer do you have to rely on whatever the vendors in your area stock, the online markets let you buy whatever you want, directly from the manufacturer. Its webpages are filled with vendors trying to sell their wares, like Tony76: "I know everyone claims to have the best shit, but I actually guarantee my H [heroin] is the best you will ever find" (Ormsby 2015, 98) or EnterTheMatrix: "We have a 100 per cent satisfaction 5 out 5 [sic] rating and with over 49 transactions, we are proud of this!" (Ormsby 2015, 221). Now dealers present themselves to you, trying to sell you their product. Competition is high so sellers try to attract customers with their higher quality and lower prices. Online dealers try to provide only the best for their patrons.

II. BITCOIN

The Silk Road required two tools to really be successful: Bitcoin and Tor. These technologies created anonymity, which allowed the Silk Road to be so successful for so long. The first thing it needed was an anonymous way of sending money. Before the Silk Road, there were other websites selling drugs, but all of them either used credit card or wire transfer. As a 2005 news article from Wired states, "Most [black market websites] offered one-click shopping systems and let buyers make payments using credit cards, PayPal or Western Union" (McCandless 2005). Law enforcement can trace these transactions to either end, and they have on multiple occasions[2]. To close this loophole, the Silk Road used Bitcoin as their currency of exchange. All Bitcoin transaction can be seen by everyone through a shared ledger, so it is not inherently anonymous. However, using the right steps, buyers and sellers can heavily mitigate any chance of identification.

Bitcoin accounts do not have to have any identifying information, so they cannot be traced back to a user. As Ormsby (2015) explains, "you might be able to see that $20,000 worth of bitcoin was transferred from bitcoin address 1LK5HQqU6M9qyWSUhfPnVxtKBCocUp6PY to bitcoin address 13g7xpD27XWDg5NX9dRLEdqumUNL6koh6H, unless the owners of those addresses have advertised the fact, there is no way of knowing who owns either of them" (39). To put money in or out anonymously, you can go to any bank and exchange cash for a bitcoin QR code on paper, which cuts off any electronic evidence of your transaction. Other common tactics include buying a Visa gift card with cash or buying a different digital currency using Western Union cash payments and converting that to Bitcoin.

[2] The Farmer's Market is an online illicit vendor which predates the Silk Road; their lack of anonymous payment was a key point in their demise.

Bitcoin accounts are generated anonymously and infinitely, so a buyer can easily send his Bitcoin through 1000 accounts before buying drugs to further obfuscate any trail. There are Bitcoin tumbling services where your Bitcoin gets transacted in and out of thousands of other accounts, just to make tracking even more difficult (Power 2014, 229). Silk Road even provided their own tumbler[3]: when buyers put their money into escrow, the Silk Road mixes the Bitcoin from everyone's deposits together. In addition, thousands of new low-volume accounts are created and added to this pool. When the buyer finalizes, a random selection is made from the total pool to pay the vendor. This is done primarily to prevent the buyer and vendor from identifying each other by Blockchain alone, and to prevent anyone from collecting statistics on the Silk Road's inner mechanics. The blockchain seems like it could allow law enforcement to trace buyers and sellers, but these mitigations have done a good job from preventing that. According to Power (2014, 230), for the Silk Road's entire tenure, not one person has been caught by evidence from the blockchain alone.

III. TOR

The transactions are anonymous, but the government can still track a person's internet history using their IP (Internet Protocol) address. An IP address is a long string of digits separated by decimal points, assigned to you by your ISP (Internet Service Provider). When you begin to load a website, your IP address uniquely identifies your computer and its location, which allows the networking path to be made. Your ISP

[3] Source discloser: Although page 54 of Ormsby's *Silk Road* mentioned that the Silk Road had an in-house tumbler, but she did not provide details of its operation. I found a Reddit user (therewontberiots) who copied and pasted a block of text into Pastebin which provided said details. The text implies that it was originally written by a Silk Road 2.0 administrator, who goes on to say, "We are currently using the same system that the former Silk Road market used."

stores this request and it can also be observed at many points along that route (Power 2014, 217). Therefore, your unique IP address associates you with every website you visit, not something that a Silk Road purveyor wants. A VPN (Virtual Private Network) can be used to combat this: it hides your IP address by sending all of your data through a different server before going to the final destination (Phoha 2002, 134–135, 139). Therefore, the IP address of the proxy server is associated with the destination, not your personal one.

The Silk Road used Tor, an anonymous internet browser which uses onion routing, a technology developed by the US Navy. Tor works similarly to a VPN, however it takes things up a notch by sending it through not one but three servers before hitting the final destination. The data is encrypted three times, then each layer of encryption is peeled off at each proxy node, like layers of an onion. Encryption prevents anyone other than the sender and the receiver from deciphering the contents of the data transferred. Data can still be intercepted, but encryption pushes the plaintext through a cipher, making it gibberish unless you have the key to decode it (Phoha 2002, 21). The Silk Road's URL ended in dot-onion (as opposed to dot-com or dot-org), which means that it's entirely contained within Tor's network and is inaccessible from a regular browser. Dot-onion links are reserved for "hidden services,"[4] a feature of Tor that allows the website host to be anonymous just like the client. Normally websites's servers can be revealed by their IP address just like yours or mine, but by hosting as a hidden service the Silk Road could keep its location secret. Hidden services cannot be found by search engines, so to get access either you have to know the exact URL (a string of 16 random characters[5]) or using a gateway site such as the Hidden Wiki.

[4] Now renamed to "onion services."
[5] With newer versions of Tor, this has been increased to 56 random characters.

The Navy developed initially this powerful onion technology for their personal use, but eventually they decided to release to the public in an easy-to-use Tor browser format (Power 2014, 216). Why did they do so? It's because a Navy-only anonymous network is self-defeating. If someone receives or intercepts a piece of information in onion format, they will know it's the Navy's and will treat it as such. But if the Navy releases their invention to the public, then the onion signal could be anybody. Thousands of regular folks use Tor; the Navy takes up only a small part of the traffic. Adding noise to the signal allows the Navy to take advantage of an asymmetric information environment.

IV. TRADE ON THE SILK ROAD

Besides anonymity, a number of other institutions helped trade on the Silk Road to flourish. Here I describe PGP, discreet packaging, protection against fraud, and money laundering.

Shipping information can be sent through PGP (Pretty Good Privacy), so nobody but the vendor and the consumer can know where the package will arrive. PGP is a program which allows its users to send encrypted messages to one another (Phoha 2002, 103–104). Law enforcement investigations repeatedly reported that PGP is an extremely strong tool for anonymizing one's messages (Ormsby 2015, 154). Vendors report that 10 percent of users used PGP (Ormsby 2015, 110). This tool was not a widely used one, but nonetheless it can provide extra safety to the more security-conscious buyers.

Most vendors, sending out small quantities of powders, would supply the goods in a vacuum sealed pouch, flattened in a standard business envelope, complete with a window and a legitimate looking return address (Ormsby 2015, 85). Vacuum sealing a

bag prevents canines from being able to detect your product, and the rest of the envelope is so ordinary looking it blends in with the billions of other pieces of mail sent every day. Some items however required more complicated shipping techniques, as Ormsby (2015) describes,

> Those who were sending pills, plants or larger quantities of powders might hide them inside cheap plastic 'gifts,' in cut-out pages of thick catalogues or behind false cardboard 'walls' of a padded envelope. One member received pills stuffed inside a hollow marker pen, and another was sent cocaine in hollowed-out batteries inside a toy… A sheet of acid might be disguised as a business card, or pills [may be] distributed inside the bubbles of a bubble-wrap package. (85)

If a customs check finds drugs in a package, the customer can always claim that they haven't ordered anything and that "anyone can send anyone anything in the mail." Bitcoin and Tor will suffice to cover their digital tracks. However, the seller cannot claim to never have shipped it, so they have a heavy incentive to cover their tracks and make their packages as discrete as possible. The Silk Road provided some advice for buyers as how to minimize their chances of getting caught:

> Use a different, unrelated address than the one where your item will be kept, such as a friend's house or P.O. box. Once the item arrives, transport it discreetly to its final destination. Avoid abandoned buildings or any place where it would be suspicious to have mail delivered. Do not sign for your package. If you are expecting a package from us, do not answer the door for the postman, let him [deliver it] and then transport it as described above. Do not use your real name. This tactic doesn't work in some places because deliveries won't be made to names not registered with the address. If you think this is a problem, send yourself a test letter with the fake name and see if it arrives. If you follow these guidelines, your chances of being detected are minimal. In the event that you are detected, deny requesting the package. Anyone can send anyone else anything in the mail. (Power 2014, 213)

The police will have a hard time catching buyers and sellers. However, you also can't go to them if you get defrauded. To mitigate fraud, the Silk Road uses escrow. Instead of directly transferring the payment to the dealer, the Silk Road's escrow system lets you use them as an intermediary. The money gets transferred to the Silk Road wallet while the product ships. When the product is received, then the buyer 'finalizes' the purchase, which means he releases his money from escrow. Both sellers and buyers have ratings and statistics. Buyers can mark bad sellers using ratings, but sellers can also see unreliable buyers through statistics, and a seller can refuse a trade with any particular buyer. Vendors can see how much a buyer has spent in the past, how much they had refunded and what percentage of their sales had been auto-finalized (they never allowed or denied their finalization, and the money goes to the seller after 30 days). Sellers will also mention if a buyer is problematic in the Vendor's Roundtable, a secret forum only accessible by experienced vendors. Therefore, just as sellers are incentivized to not scam buyers through ratings, buyers are incentivized not to scam sellers through buyer statistics. Any conflicts are expected to be taken care of between the traders at first, and if things don't work out then the Silk Road provided a mediation service to help resolve conflicts (Ormsby 2015, 54). New buyers and sellers often work hard to raise their reviews/stats to gain a reputation. Vendors would provide free samples in the forums (Ormsby 2015, 99) and buyers would finalize early to improve their buyer stats (Ormsby 2015, 87).

Anonymously buying small amounts of Bitcoin for buying is fairly simple. Sellers however faced the issue of converting large amounts of Bitcoin to usable currency. Methods of cashing out were a frequent discussion topic at the Vendor's Roundtable (Ormsby 2015, 91). Exchanging Bitcoin for gold, which would be melted down and sold for cash, was suggested by some. Others "sold" modern art pieces on

clear market websites for outrageous prices. A similar tactic was to provide "consulting services" or "personal training" at inflated hourly rates. If questioned, they can claim high-profile, wealthy clients, and obligations of anonymity and privacy. Online gambling is also common where allowed, where the seller takes high-probability bets, like betting both black and red at a roulette table. The infrequent losses are taken as a cost of the laundering.

More sophisticated methods involved starting a legitimate looking bitcoin-based business which purchased a high volume of low-cost goods and "selling" them at massive markup to a number of shill accounts. Members who suggested this method recommended proper books be kept and taxes paid if income was substantial. A variation of this was to set up a small company that mined bitcoins and over-report the earnings. This could be simple for those earning an average wage from selling but needed to be a more sophisticated for those earning millions; they would need to actually purchase mining equipment for tens of thousands of dollars to attribute their wealth to the machine. Mining machines are twice useful marijuana growers; a cannabis seller can attribute both his high electricity consumption and his wealth to the machine.

V. DREAD PIRATE ROBERTS

The Silk Road did not limit its wares to only drugs. Small time weapons vendors once made some business on the site, and Fake IDs were a flourishing industry within the Silk Road marketplace (Ormsby 2015, 121). However, the leader of the site, Dread Pirate Roberts, had a list of things that were banned from being sold on the Silk Road. These included but were not limited to: stolen credit cards, assassinations, weapons of mass destruction, personal information, and child pornography (Ormsby 2015, 118). The restrictions revolved around the principle that sellers were not allowed to sell

anything whose "purpose is to harm for defraud." This is a different approach to other online black markets. The Silk Road's closest competitor, Black Market Reloaded, allowed the sale of anything except assassinations and child pornography. These included poisons, explosives, and stolen financial information. Assassinations were banned after 18 months because all listings were scams, and child pornography is most likely banned because it pins you as a target from hacktivist groups like Anonymous.

Stolen credit cards, hacked PayPal and bank accounts, and personal information are staple items on the black market, and the fact that the Silk Road banned them surprised many users. But Dread Pirate Roberts wanted no part of it. The Silk Road was not just another online black market, it was a product of Dread Pirate Roberts's libertarian outlook. Here is the beginning of the Silk Road charter: "Silk Road is a global enterprise whose purpose is to empower people to live as free individuals. We provide systems and platforms that allow our customers to defend their basic human rights and pursue their own ends, provided those ends do not infringe on the rights of others" (Ormsby 2015, 11). And here is an excerpt from a post written by Roberts on March 2012,

> Some day, we could be a shining beacon of hope for the oppressed people of the world just as so many oppressed and violated souls have found refuge here already. Will it happen overnight? No. Will it happen in a lifetime? I don't know. Is it worth fighting for until my last breath? Of course. Once you've seen what's possible, how can you do otherwise? How can you plug yourself into the tax eating, life sucking, violent, sadistic, war mongering, oppressive machine ever again? How can you kneel when you've felt the power of your own legs? Felt them stretch and flex as you learn to walk and think as a free person? I would rather live my life in rags now than in golden chains. And now we can have both! Now it is profitable to throw off one's chains, with amazing crypto technology reducing the risk of doing so dramatically. How many niches have yet to be

> filled in the world of anonymous online markets? The opportunity to prosper and take part in a revolution of epic proportions is at our fingertips! (Ormsby 2015, 106)

Dread Pirate Roberts has stated very clearly from the beginning that his intention was not only to create a profitable business. He wanted to ultimately to contribute to a peaceful revolution against coercive state-run enterprise.

Before starting the Silk Road, Roberts had read the works of Mises, Rothbard, Salerno, and Rockwell, but most importantly he read *Alongside Night* and the works of Samuel Edward Konkin III. *Alongside Night*, written by J. Niel Shulman, is a novel which articulated the political philosophy of Konkin III. This philosophy, agorism, called for the weakening of the state by engaging in only voluntary transactions outside of state control. As Roberts explains, "every action you take outside the scope of government control strengthens the market and weakens the state. I saw how the state lives parasitically off the productive people of the world, and how quickly it would crumble if it didn't have it's [sic] tax revenues" (Ormsby 2015, 103). The Silk Road was not just a black market for profit, it was Roberts's way of actively trading outside of the state-held system. "No soldiers if you can't pay them. No drug war without billions of dollars being siphoned off the very people you are oppressing."

The 'Philosophy, Economics and Law' section of the Silk Road forums held many debates over prohibition. Roberts was not keen on seeing drugs being regulated by the state; he and many others believed that governments would act as corrupt as the cartels that they would replace. "Here's the rub: the drug war is an acute symptom of a deeper problem, and that problem is the state. If they 'legalize, regulate and tax' it, it's just one more part of society under their thumb, another productive sector that they can leech off of" (Ormsby 2015, 149). Roberts had also claimed that the war on drugs had been lost, using the Silk Road as evidence. "With the Silk Road, you can now get virtually

any drug you want delivered directly to you, with little chance of them even knowing about it… In a very real sense, we've won the war on drugs." Eventually the Philosophy, Economics and Law section became home to "DPR's Book Club," which was launched August 2012. Here's an excerpt of the club's introductory statement:

> We will focus on agorism, counter-economics, anarchocapitalism, Austrian economics, political philosophy, freedom issues and related topics. My hope is that through this, we will discover what we stand for and foster a culture of peace, prosperity, justice and freedom. There is so much double-speak and misinformation in the world today that we must take our education into our own hands, and defend our minds with reason and critical thinking. (Ormsby 2015, 109)

VI. RESEARCH CHEMICALS

By partaking in illicit substance use, buyers risk a prison sentence, which prevents many potential customers from jumping into the market. This is where the research chemicals industry comes in. According to Pharmacotherapy review, "Designer drugs [research chemicals] are substances produced in laboratories that are intended to elicit psychoactive responses resembling those of drugs that are illegal for distribution and possession" (Muscleman et al. 2015, 2). In response to the bans on certain substances, chemical manufacturers have attempted to evade the law by creating analogues of illegal drugs. These "grey market" drugs aren't technically illegal and can't get you arrested for possession. However, in order for these to be sold legally, the manufacturers have to label the drugs with "not for human consumption" and sell the product disguised as something else, like plant food or bath salts. Mike Power (2014, 88) provides an example, "A drug marketed as Explosion was sold diluted in bottles of so-called 'room deodorizer' in Holland." When disguising drugs as everyday chemicals, drug manufactures cannot have any safety information on their packages.

No recommended dosage, side effects, or warnings can be placed anywhere. It's pretty suspicious when the "lawn feed" you're selling tells you not to inject the substance. The lack of safety information directly leads to injury and death. Power gives an example about a designer drugs produced by the company JLF Poisonous Non-Consumables, "Several people died after dosing on 2C-T-7 incorrectly—they snorted it, which intensifies its effects since the drug is not metabolized first by the digestive system" (Power 2014, 90). Incorrect administration methods can do serious harm to drug users. Even if you take the right dose, drugs can have variable effects if taken in different ways. Without information, the chance for something to go wrong goes up dramatically.

Research chemicals tend to be more toxic than their illegal counterparts. As Mike Power (2014) gives his case on cannabis analogues, "the hundreds of legal chemicals now available as replacements for cannabis are far more harmful than the illegal drug itself… they may be smoked by any young person without fear of prosecution, or a criminal record, or the loss of travel rights, but they bring far more serious health consequences than marijuana" (250). Banning drugs seems to lead to more dangerous drugs. The manufacturers do not dissolve their business when they find out they are not allowed to sell their product, instead they find some sort of replacement. According to Barbara Carreno, a DEA spokesperson speaking to Science News:

> Drugmakers can tweak substances and come up with new ones faster than the regulatory process allows us to schedule them… The people that are doing this, they're probably Ph.D.-level chemists that are mining the medical literature for these structural templates. This isn't the Hell's Angels brewing stuff in a bathtub; this is a very sophisticated operation. (Baggaley 2015)

By mining the scientific literature, one can find chemicals that have similar structures to their desired but illegal substance. Your new, legal product is ready to serve your customers's demands, even though the effects are not well known. Every manufacturer comes out with a different replacement for the banned drug, so one drug gone means many replacements will come. Unlike classic drugs like marijuana and heroin, which are thousands of years old, medical professionals are not very familiar with the new drugs and are not sure how to provide treatment for complications. The newer drugs have a tendency to grow in potency over the previous generation. This is to be expected, higher potency drugs allow for shipping more dosages in a smaller, more discrete packages. Criminalization heavily incentivizes reducing the total volume of product, so smuggling is easier while attempting to satisfy a large number of customers. Power describes a situation where all of Alexander Shulgin's[6] psychedelics were banned in the US:

> Within weeks of these laws being passed, there were dozens more new drugs available in the US. One category, known as the NBOME-series of chemicals, is composed of unscheduled analogues of the banned Shulgin psychedelics 2C–I, 2C-B, 2C-D, and so on. Where Shulgin's chemicals were generally active between 10 mg and 20 mg, these new compounds, created in legitimate medical settings for experimental purposes, are more potent by a large order of magnitude, active at around 200 μg. Each gram of these new, unresearched drugs contains around 5,000 doses, and they cost fractions of a penny per dose. The compounds existed before the recent bans, but it was the new laws that inspired their wider use; use that will only grow as talk of their effects is amplified online. They have already claimed victims. At the Voodoo Fest in New Orleans in October 2012, twenty-one-year-old Clayton Orwell dies after taking one drop of an

[6] Shulgin is a Dow biochemist who created and tested over 200 psychedelic compounds. He documented the compounds's synthesis, dosages, and effects in *PiHKAL (Phenethylamines I Have Known and Loved): A Chemical Love Story* and *TiHKAL (Tryptamines I Have Known and Loved): The Continuation*.

> NBOME drug. The *New Orleans Times Picayune* newspaper spoke to festival goers who said many dealers were selling the drug 25I-NBOME as artificial LSD or Mescaline at the event. (Power 2014, 242)

Overdose is highly likely when you have doses as small as 200 μg—approximately equal to 1/15 of a snowflake. For doses that low, specialized equipment is needed to properly get your fix. At least six other people have died of an overdose of 251-NBOME. Even if you do your research, it is still very easy to overdose off of these highly potent substances.

VII. END OF THE ROAD

On October 2, 2013, the Silk Road was shut down by a collaborative effort of multiple government agencies. The FBI stormed a library in San Francisco, where they captured Ross Ulbricht, the head of the entire Silk Road operation, before he had the chance to shut down his laptop. Ulbricht did not cover his tracks well in his early days, which gave the FBI just enough evidence to file the warrant they needed. He had a bachelors in physics and a masters in materials science but had no formal training in computer science or cryptography. He was learning while doing, and eventually his early mistakes caught up to him. As one vendor laments, "The authorities chasing him could make a thousand mistakes but he only had to make one tiny slip up and it could be his downfall" (Ormsby 2015, 298). The FBI ransacked the Silk Road server, arresting anyone they could identify as being a part of the Silk Road operation (Power 2014, 264).

As I said before, this profit opportunity is way too high for anyone to just ignore it. Just like with designer drugs, the death of the Silk Road has only caused 40 carbon copies to appear. Agora, Blue Sky, and RoadSilk are just a few of the many new darknet markets that have popped up over the months after the Silk Road was taken down

(Power 2014, 276). This may be the end of the Silk Road, but dozens of marketplaces happily took its place.

The demand for underground markets such as the Silk Road and grey market alternatives such as research chemicals seem to be pushed for by current policy. Outlawing drugs in the clear market pushes many buyers to evade the law, whether it is covering your criminal tracks or by buying drugs that are technically legal. Looking at a market where decriminalization has taken place may provide more evidence for this claim. Back in 2001, Portugal has severely reduced the penalties of drug possession; instead of a jail sentence you get may get a small fine or a referral to a treatment program. According to Christopher Ingram, a Washington Post writer who wrote his article 14 years after the legislation was passed, "Among Portuguese adults … the use of 'legal highs' – like so-called 'synthetic' marijuana, 'bath salts' and the like – is lower in Portugal than in any of the other countries for which reliable data exists." When the classic drugs do not have a huge consequence for taking them, why would anyone experiment with their analogues? Research chemicals lose their value when their medical consequences outweigh the legal ones. See the contrast between Portugal and Sweden. As Power (2014) states,

> Why have there been far more overdoses and deaths due to the more novel psychoactives in Sweden than in neighboring countries, such as Germany? The answer might be found in the country's drug laws, which are today the most stringent in Europe, and have been for decades… To have a drugs conviction in Sweden is to be an instant member of the underclass, with education and employment opportunities denied outright for many. (192)

Research chemicals seem to be a direct outcome from the criminalization of regular drugs, and Portugal shows that loosening the laws around regular drugs decreases the use of these experimental compounds. As for online black markets, in a

world where drugs are legal, I simply expect for these drugs to move to the online clear market. You can already buy over-the-counter drugs on websites such as Amazon, why would not they also offer recreational narcotics? Still, if legalized drugs are subjected to a heavy tax premium, then we still might see online black markets to continue to operate.

Besides the point of legalization, it is hard to argue that the Silk Road has not been a positive force in the world of drugs. Removing the violence of street dealing and allowing for reputational mechanisms to alleviate quality issues has made the use of recreational narcotics much safer than it was before. I will end with the words of Silk Road member Arlingtonbridge, who claimed to have terminal cancer, and used marijuana from a Silk Road vendor to help ease his pain:

> Thank you Silk Road and DPR for everything you have done for me, personally. I wouldn't be able to have quality of life without you people. Doesn't matter if your [sic] an opiate addict or a cancer patient just like me… The safety you provide me and others, in exchange for your own is amazing. You give your freedom for us, anonymous people you will never see… I'm proud to be a part of you all. Stay strong and stay free. Live your lives happy, and enjoy everything while you can. (Ormsby 2015, 181)

BIBLIOGRAPHY

Baggaley, Kate. 2015. "Drugs by Design." *Science News*, May 2015, 22–25.

Crowe, Sam. 1998. "Love-Life of a Maverick Psychopharmacologist." Review of *TIHKAL (Tryptamines I have Known and Loved): The Continuation*, by Alexander Shulgin and Ann Shulgin. *Lancet* 351, no. 9111 (April): 804.

Hughes, Caitlin and Alex Stevens. 2010. "What Can We Learn from the Portuguese Decriminalization of Illicit Drugs?" *The British Journal of Criminology* 50, no. 6 (November): 999–1022.

Ingraham, Christopher. "Why hardly anyone dies from a drug overdose in Portugal," *The Washington Post*, June 5, 2015.

McCandless, David. "Bad Trip for Online Drug Peddlers." *Wired*, July 6, 2005.

Muscleman, Megan E. and Jeremy P. Hampton. 2014. "'Not for Human Consumption': A Review of Emerging Designer Drugs," *Pharmacotherapy* 34, no. 7 (April): 7–4557.

Ormsby, Eileen. [2014] 2015. *Silk Road*. New South Wales: Pan Macmillan Australia. Reprint.

Phoha, Vir V. *Internet Security Dictionary*. 2002. New York: Springer-Verlag.

Power, Mike. [2013] 2014. *Drugs Unlimited*. London: Portobello Books. Reprint, New York: St. Martin's Press. Citations refer to the St. Martin's Press edition.

Schulman, J. Neil. *Alongside Night*. 1979. New York: Crown Publishers, Inc.

"Tor protocol specifications," The Tor Project, updated May 26, 2015, https://gitweb.torproject.org/torspec.git/tree/rend-spec-v3.txt.

therewontberiots, "How Silk Road 2.0's Bitcoin tumbler works," Reddit, December 4, 2013, https://www.reddit.com/r/SilkRoad/comments/1s4q7j/how_silk_road_20s_bi

tcoin_tumbler_works/?utm_source=share&utm_medium=web2x.