

FLASHBACK TO THE FEDERAL ANALOG ACT OF 1986:
MIXING RULES AND STANDARDS IN THE CAULDRON

GREGORY KAU[†]

INTRODUCTION.....	1078
I. WHAT ARE DESIGNER DRUGS AND WHERE	
DID THEY COME FROM?	1081
A. <i>The Federal Analog Act: History of Designer Drugs</i>	1081
B. <i>The Source of Designer Drugs: A Close Relationship Between the Pharmaceutical Industry and Clandestine Chemists</i>	1083
C. <i>Designer Drugs: Legal Loopholes and Problems</i>	1086
II. RULES VERSUS STANDARDS AND THE CURRENT STATE OF DESIGNER DRUG LEGISLATION	1087
A. <i>Rules Versus Standards: A Witch's Brew of Approaches in Controlled Substance Analog Legislation</i>	1087
B. <i>Rules and Standards: Different Ingredients for Different Flavors</i>	1089
1. Costs.....	1090
2. Deterrence.....	1093
3. Fairness Concerns.....	1099
III. PROPOSED CHANGES	1107
A. <i>Mixing Rules and Standards in the Federal Analog Act: Putting It All in the Cauldron</i>	1107
B. <i>Practical Implementation: Changes to the Federal Analog Act</i>	1109
C. <i>Institutional Responses</i>	1111
CONCLUSION.....	1115

[†] B.S., 2004, Yale University; J.D. Candidate, 2008, University of Pennsylvania Law School. I would like to thank the Senior Editors of the *University of Pennsylvania Law Review* for their invaluable commentary and help, and the Associate Editors for all their help. I am particularly grateful to Evan Chyun and Aretae Ortiz for their sound advice and superhuman editing skills, and to Erica Lai and Christopher Fromherz for their resourcefulness in dealing with a labyrinth of strange and exotic sources. I would also like to thank the Yale Chemical Engineering faculty and graduate students for their impossible patience in putting up with my experiments in the laboratory. I bear sole responsibility for all errors.

INTRODUCTION

In 1982, a forty-two-year-old heroin addict staggered into a San Jose medical clinic.¹ His muscles were virtually frozen in place, so much so that “he seemed more of a mannequin than a man.”² Upon closer examination, the attending neurologist found that the patient exhibited symptoms of advanced Parkinson’s disease.³ The neurologist was astonished: Parkinson’s rarely struck before the age of fifty.⁴ The parties responsible for this early onset of Parkinson’s were two legal professionals who moonlighted as clandestine drug chemists.⁵ In the basement of their law office, they produced 1-methyl-4-propionoxy-4-phenylpyridine (MPPP), a synthetic version of heroin that was perfectly legal to manufacture.⁶ Unfortunately, the entrepreneurs were better lawyers than chemists. Even though they found the correct recipe for their concoction, they failed to keep the reaction at the proper temperature and acidity.⁷ As a result, they unknowingly introduced a highly poisonous by-product into the brew that caused severe brain damage.⁸ The chaos that ensued was the first “designer drug disaster” recorded in American history.⁹

The federal government was powerless to prosecute this behavior under existing federal drug statutes. The perpetrators had—quite literally—played by the rules, and had properly exploited loopholes to

¹ For a more detailed description of the incident, see Claudia Wallis, *Surprising Clue to Parkinson’s*, TIME, Apr. 8, 1985, at 61, 61-62.

² *Id.* at 61.

³ *Id.*

⁴ *Id.*

⁵ See Halle L. Weingarten, *1-Methyl-4-Phenyl-1,2,3,6-Tetrahydropyridine (MPTP): One Designer Drug and Serendipity*, 33 J. FORENSIC SCI. 588, 588-59 (1988).

⁶ *Id.*

⁷ See Anthony Trevor et al., *Pharmacology and Toxicology of MPTP: A Neurotoxic By-Product of Illicit Designer Drug Chemistry*, in COCAINE, MARIJUANA, DESIGNER DRUGS: CHEMISTRY, PHARMACOLOGY, AND BEHAVIOR 187, 188 (Kinfe K. Redda et al. eds., 1989) (“MPTP represents a side product formed through inadequate control of temperature and/or acidity . . .”).

⁸ See Weingarten, *supra* note 5, at 590-92 (describing the isolation of MPTP and its neurodegenerative effects on dopamine-producing neurons); see also Neal Castagnoli, Jr. & Kay P. Castagnoli, *Metabolic Bioactivation Reactions Potentially Related to Drug Toxicities*, in 173 NIDA RESEARCH MONOGRAPH 85, 91-94 (Rao S. Rapaka et al. eds., 1997), available at http://www.nida.nih.gov/pdf/Monographs/Monograph173/085-105_Castagnoli.pdf (discussing the biochemistry of MPTP’s effects).

⁹ Weingarten, *supra* at note 5, at 588. Some five hundred people may have ultimately ingested the toxin-laced narcotic. Shari Roan, *Designer Drug Roulette*, S. FLA. SUN-SENTINEL, Nov. 7, 1985, at 1.E.

avoid punishment. Other clandestine chemists were inspired and followed their lead. Public pressure on Congress escalated as designer drugs spread around the world.¹⁰ In this atmosphere of panic, Congress responded¹¹ by enacting the Federal Analog Act¹² with the express purpose of preventing minor structural modifications to drugs prohibited under Schedule I of the Controlled Substances Act in order to evade legal penalty.¹³ The Federal Analog Act replaced rules with standards. Under the Federal Analog Act, if a chemical is “substantially similar” in structure and pharmacological effect to a drug prohibited by the Controlled Substances Act, this chemical is also prohibited. In the words of one Senator, “if it looks and quacks like a duck—then it’s a duck.”¹⁴ The Federal Analog Act is arguably one of the furthest-reaching federal drug laws enacted in the United States, prohibiting numerous chemical permutations and treating these substances on par with other Schedule I drugs like lysergic acid diethylamide (LSD) and heroin.¹⁵

¹⁰ See Walter Borges, *Designer Drug Sales Questioned*, DALLAS MORNING NEWS, Nov. 20, 1985, at 31A (describing a citizen movement to “counter the sales of legal designer drugs” near a local high school); Daniel L. Lungren, Letter, *The Rapid Spread of Synthetic Narcotics*, L.A. TIMES, Oct. 5, 1985, at A2 (outlining Congressman Lungren’s response to “[t]he rapid spread of the problem of synthetic narcotics”); Bill Romano, *Shootings Laid to “Drug Explosion,”* SAN JOSE MERCURY NEWS, Nov. 23, 1985 (describing an “explosion of PCP, LSD and designer drugs” in San Jose).

¹¹ See Lester Grinspoon & James B. Bakalar, *A Drug Bill’s Bad Side Effects*, N.Y. TIMES, Apr. 28, 1986, at A25 (citing numerous deaths and injuries from heroin analogs as the impetus for the then-proposed Federal Analog Act); Philip Shenon, *U.S. To Back Penalties for New Drug Threat*, N.Y. TIMES, July 11, 1985, at A13 (quoting Attorney General Edwin Meese, who announced the new federal legislation and called synthetics a “dangerous phenomenon in the illicit drug market”).

¹² Controlled Substance Analogue Enforcement Act of 1986, Pub. L. No. 99-570, § 1203, 100 Stat. 3207, 3213-14.

¹³ See *United States v. Turcotte*, 405 F.3d 515, 518 (7th Cir. 2005) (calling the Federal Analog Act “Congress’s attempt to adapt the nation’s controlled substances laws to the dizzying pace of innovations in drug technology”); *United States v. Forbes*, 806 F. Supp. 232, 238 (D. Colo. 1992) (“Congress declared that the purpose of the statute is to attack underground chemists who tinker with the molecules of controlled substances to create new drugs that are not yet illegal.”).

¹⁴ Nick Ravo, “*Designer Drugs*” *Head for Florida, Chiles Fears*, MIAMI HERALD, Aug. 8, 1985, at 3PB.

¹⁵ According to Alexander Shulgin, the number of known psychedelics will rise exponentially over the next century. See Drake Bennett, *Dr. Ecstasy*, N.Y. TIMES MAG., Jan. 30, 2005, available at <http://www.nytimes.com/2005/01/30/magazine/30ECSTASY.html> (“At the beginning of the 20th century, there were only two psychedelic compounds known to Western science: cannabis and mescaline. A little over 50 years later—with LSD, psilocybin, psilocin, 3,4,5-trimethoxyamphetamine (TMA), several compounds based on dimethyltryptamine (DMT) and various other isomers—the

Twenty years later, the backlash against “designer drugs” has begun to subside.¹⁶ Doctors and pharmacologists are beginning to take cautious steps toward reevaluating the medical value of these compounds.¹⁷ It is now possible to revisit the Federal Analog Act and examine whether replacing rules with standards was the correct move. This Comment focuses on the structural prong of the Federal Analog Act¹⁸ and argues that a rules-standards hybrid definition of a controlled substance analog under the Federal Analog Act offers both

number was up to almost 20. By 2000, there were well over 200. So you see, the growth is exponential [By 2050] we may have well over [2000].” (internal quotation marks omitted) (quoting Shulgin)). Since the vast majority of these drugs will most likely be permutations of existing drugs, *see infra* Part I.B (explaining the rarity of new structures and the method of discovering new drugs by permutation), the Federal Analog Act could potentially prohibit thousands of drugs under its broad reach.

¹⁶ *See id.* (“[T]here’s obviously been a significant shift at the regulatory agencies and the Institutional Review Boards. There are studies being approved that wouldn’t have been approved 10 years ago. And there are studies being proposed that wouldn’t have been proposed 10 years ago” (internal quotation marks omitted) (quoting Mark A.R. Kleiman, director of the Drug Policy Analysis Program at UCLA)); Roxanne Khamsi, *Magic Mushrooms Really Cause “Spiritual” Experiences*, NEWSIDENTIST, July 11, 2006, <http://www.newscientist.com/article.ns?id=dn9522> (describing how psilocybin—the hallucinogenic component in “magic mushrooms”—is beginning to spark interest in medical circles after being “ignored” by the scientific community for about forty years); Christopher Newton, *FDA OKs Clinical Testing of Ecstasy*, WASHINGTON-POST.COM, Nov. 6, 2001, http://www.washingtonpost.com/wp-srv/aponline/20011106/aponline215233_000.htm (remarking that recent approval by the Food and Drug Administration to test MDMA, commonly known as “Ecstasy,” on human subjects “marks a shift for the agency, which has virtually banned the drug from researchers for more than a decade”).

¹⁷ *See* Khamsi, *supra* note 16 (reporting the results of a recent study conducted at Johns Hopkins University School of Medicine, which found that more than a third of the volunteers in a double-blind psilocybin study described their encounter with the hallucinogen as “the single most spiritually significant experience in their lifetimes”).

¹⁸ The Act defines a “controlled substance analogue” as a substance,

(i) the chemical structure of which is substantially similar to the chemical structure of a controlled substance in schedule I or II;

(ii) which has a stimulant, depressant, or hallucinogenic effect on the central nervous system that is substantially similar to or greater than the stimulant, depressant, or hallucinogenic effect on the central nervous system of a controlled substance in schedule I or II; or

(iii) with respect to a particular person, which such person represents or intends to have a stimulant, depressant, or hallucinogenic effect on the central nervous system that is substantially similar to or greater than the stimulant, depressant, or hallucinogenic effect on the central nervous system of a controlled substance in schedule I or II.

21 U.S.C. § 802(32)(A) (2000). While § 802(32)(A)(ii), the “effect” prong of the Federal Analog Act, is also an interesting topic, it does not implicate the same concerns as the first prong and is beyond the scope of this Comment.

practical and theoretical advantages to the current standards-based incarnation. After providing a brief overview of the “designer drug” phenomenon, Part I introduces the Federal Analog Act. Part II considers the rules versus standards debate in the context of “designer drugs” and discusses advantages and disadvantages associated with each model. Part III explores peculiar problems that arise from the Federal Analog Act’s current standards-based implementation, explores justifications for deploying a hybrid rules-standards approach to the Federal Analog Act, and considers possible methods of implementing a hybrid rules-standards approach in the Federal Analog Act.

I. WHAT ARE DESIGNER DRUGS AND WHERE DID THEY COME FROM?

A. *The Federal Analog Act: History of Designer Drugs*

The Federal Analog Act was originally called the “Designer Drug Enforcement Act.”¹⁹ Instead of requiring the Drug Enforcement Administration (DEA) to promulgate a rule banning each chemical as it emerges on the black market, the Federal Analog Act automatically prohibits a chemical if it is “substantially similar in structure” to an already-prohibited drug, and has a “substantially similar chemical effect” or is “represented to have such an effect.”²⁰ The Federal Analog Act classifies these controlled substance analogs as Schedule I drugs²¹—the most stringently controlled drugs in the United States, including heroin and LSD.²² To understand how the Federal Analog Act operates in the context of drug trends, it is useful to explore a brief history of federal controlled substance legislation and designer drugs in the United States.

The cultural upheaval of the 1960s brought a vast proliferation of recreational drugs to America. In 1973, President Richard Nixon declared an “all-out global war on the drug menace.”²³ “Right now,” he said, “the federal government is fighting the war on drug abuse under

¹⁹ See *United States v. Forbes*, 806 F. Supp. 232, 235 (D. Colo. 1992) (describing the legislative history of the Federal Analog Act).

²⁰ 21 U.S.C. § 802(32)(A).

²¹ See *supra* note 18 (explaining and providing the text of the Federal Analog Act’s definition of “controlled substance analog”).

²² See U.S. DEA, Drug Scheduling, <http://www.dea.gov/pubs/scheduling.html> (last visited Feb. 15, 2008) (providing a list of drugs in Schedules I through V).

²³ U.S. DEA, DRUG ENFORCEMENT ADMINISTRATION: A TRADITION OF EXCELLENCE 1973–2003, at 13 (2003), available at http://www.dea.gov/pubs/history/history_part1.pdf (quoting President Richard Nixon’s 1973 declaration).

a distinct handicap, for its efforts are those of a loosely confederated alliance facing a resourceful, elusive, worldwide enemy.”²⁴ In an effort to contain the burgeoning drug epidemic, Congress enacted the Controlled Substances Act of 1970, the first comprehensive federal drug prohibition legislation.²⁵ President Nixon also sent Reorganization Plan No. 2 to Congress, creating the DEA and tasking it with enforcing the Controlled Substances Act of 1970.²⁶

From 1973 through 1980, the DEA fought the influx of stock controlled substances—such as cocaine, marijuana, and heroin—on an international scale. The DEA infiltrated Colombian cocaine and marijuana cartels, broke up Mexican heroin syndicates, and shut down central Asian drug pipelines.²⁷ However, the 1980s opened up a new domestic front in the War on Drugs. Synthetic drugs came into vogue again—drugs like methamphetamine, 3,4-methylenedioxy-*N*-methylamphetamine (MDMA), and 3,4-methylenedioxyamphetamine (MDA). Unlike stock drugs such as cocaine and heroin, synthetic drugs did not require a large initial investment and the support infrastructure of an international cartel. Instead, a small laboratory, supplied with a cheap investment of precursor chemicals and reagents, could produce a staggeringly large number of doses.²⁸ Furthermore, a laboratory was easily concealed and moved from state to state to avoid detection. The United States faced a new menace that seemed to be everywhere and nowhere at once. Synthetic drugs brought the War on Drugs to home turf. The old enemy—stodgy drug syndicates abroad—was dwarfed by a new fluid adversary at home.

²⁴ *Id.*

²⁵ *See id.* at 9 (“[The Controlled Substances Act of 1970], along with its implementing regulations, established a single system of control for both narcotic and psychotropic drugs for the first time in U.S. history.”).

²⁶ *See id.* at 13-14 (describing the founding of the DEA and its *raison d’être*).

²⁷ *See generally id.* at 3-42 (describing the DEA’s global operations in the early 1970s).

²⁸ *See* Donald A. Cooper, DEA, Future Synthetic Drugs of Abuse, <http://designer-drug.com/synth/index.html> (last visited Feb. 15, 2008) (“[S]everal fentanyl derivatives have such high potencies that the quantities required to be synthesized are trivial. For instance, carfentanil is approximately 400 times as potent as heroin and has an extremely favorable therapeutic index. Hence, an easy week’s work for two chemists could provide 10 kilograms of carfentanil which would be equivalent to 40 metric tons of pure heroin.” (citations omitted)).

B. *The Source of Designer Drugs: A Close Relationship Between the Pharmaceutical Industry and Clandestine Chemists*

The term “designer drug” was originally coined to describe these seemingly novel concoctions. But twenty years later, this branding has proved to be misleading. As the DEA noted, the label “designer drug” “tends to cast a somewhat glamorous aura onto the concept”²⁹—a perception that is especially misguided considering that designer drugs are not new at all. Virtually all “designer drugs” are either legitimate pharmaceutical products on the market or potential products that were synthesized in medical research and development³⁰ but discarded because they didn’t produce an intended effect. As Albert Hofmann—the first chemist to synthesize LSD³¹—explains:

When a new type of active compound is discovered in pharmaceutical-chemical research, whether by isolation from a plant drug or from animal organs, or through synthetic production as in the case of LSD, then the chemist attempts, through alterations in its molecular structure, to produce new compounds with similar, perhaps improved activity, or with other valuable active properties. We call this process a *chemical modification* of this type of active substance. Of the approximately 20,000 new substances that are produced annually in the pharmaceutical-chemical research laboratories of the world, the overwhelming majority are modification products of proportionally few types of active compounds. The discovery of a really new type of active substance—new with regard to chemical structure and pharmacological effect—is a rare stroke of luck.³²

As new pharmaceuticals emerged in academic and industrial research, clandestine chemists and drug distributors found a winning business strategy. They would wait until a psychoactive compound was

²⁹ See *id.* (“The Drug Enforcement Administration (DEA) has noted that the designer drug terminology tends to cast a somewhat glamorous aura onto the concept, and as a result, the DEA feels that it would be wise to refer to these compounds in some other manner and suggests the use of the term Controlled Substance Analogs.”).

³⁰ See Robert Seidenberg, Letter to the Editor, *Dangers of Prescribing Mind-Bending Drugs*, N.Y. TIMES, May 9, 1986, at A34 (“[D]rugs dispensed in the office and those on the ‘street’ have very much in common.”).

³¹ See ALBERT HOFMANN, LSD: MY PROBLEM CHILD 12 (1980) (“In 1938, I produced the twenty-fifth substance in this series of lysergic acid derivatives: lysergic acid diethylamide, abbreviated LSD-25 (*Lysergsäure-diäthylamid*) for laboratory use.”).

³² *Id.* at 31; see also Paul Anacker & Edward J. Imwinkelried, *The Confusing World of the Controlled Substance Analogue (CSA) Criminal Defense*, 42 CRIM. L. BULL. 744, 744 (2006) (describing chemists’ efforts “to slightly modify the chemical structure of prohibited substances to create a new substance that technically differs from the controlled substance”).

discovered, and then they would copy and sell it. When researcher Albert Hofmann of Sandoz, Inc. discovered LSD-25 and began exploring its different variations,³³ clandestine chemists hijacked the molecule and sold it on the black market. Similarly, in the 1980s, Alexander Shulgin of Dow Chemical—an eminent Berkeley pharmacologist who *The New York Times* called a “one-man psychopharmaceutical research sector”³⁴—discovered and rediscovered hundreds of variations on phenylethylamines and tryptamines. One of these was MDMA (known commonly as Ecstasy), a forgotten compound discovered by German pharmaceutical company Merck in 1912 that had been relegated to obscurity in dusty old academic journals.³⁵ Shulgin’s discoveries were hijacked by clandestine chemists and released into the black market. This misappropriation fueled the MDMA crisis of the 1980s, much to the chagrin of medical professionals who believed that the illicit distribution of drugs would provoke a political backlash and prevent research into the drug’s legitimate use.

This copy-and-sell approach offered twin advantages to black market entrepreneurs. First, black market entrepreneurs could free-ride on the research and development costs of legitimate pharmaceutical companies. Since the average cost of developing a new innovative drug is staggering,³⁶ this gave black market entrepreneurs a cheap and guaranteed method of determining which compounds had potential black market value. As a DEA official remarked, “The most important of the[] factors [that control the appearance of future synthetic drugs of abuse] is user acceptance of the marketed drug. . . . A reputation for selling ‘bad stuff’ would not be conducive to good business.”³⁷ Second, once black market entrepreneurs identified a target drug for production, prior academic and industrial research provided a virtual

³³ Although Hofmann ultimately produced hundreds of lysergic acid analogs, he found that LSD-25 was still by far the most potent compound. See HOFMANN, *supra* note 31, at 32-33 (describing the search that yielded compounds such as LA-111 and LAE-32, which were psychoactive but considerably weaker than LSD-25).

³⁴ Bennett, *supra* note 15.

³⁵ See Roland W. Freudenmann et al., *The Origin of MDMA (Ecstasy) Revisited: The True Story Reconstructed from the Original Documents*, 101 ADDICTION 1241, 1242-45 (2006) (explaining the history of Merck’s discovery of MDMA as part of a project to evade patents on a clotting agent).

³⁶ See CONG. BUDGET OFFICE, RESEARCH AND DEVELOPMENT IN THE PHARMACEUTICAL INDUSTRY 2 (2006), available at <http://www.cbo.gov/ftpdocs/76xx/doc7615/10-02-DrugR-D.pdf> (“A recent, widely circulated estimate put the average cost of developing an innovative new drug at more than \$800 million, including expenditures on failed projects and the value of forgone alternative investments.”).

³⁷ Cooper, *supra* note 28.

blueprint for production. The same academic journals that published cutting-edge pharmaceutical and chemical research also published the synthetic methods required to produce new compounds.³⁸ Clandestine chemists simply copied chemical blueprints out of university libraries.³⁹

Thus, a “designer drug” is nothing more than a legitimate pharmaceutical product, or a rejected pharmaceutical research and development project, that has been released into the black market.⁴⁰

³⁸ See Trevor et al., *supra* note 7, at 188 (discussing how the two “entrepreneurs” copied the chemical blueprints for producing MPPP out of a university library); Carl Wilkinson, *The Next Big High?*, OBSERVER, Apr. 21, 2002, available at <http://observer.guardian.co.uk/drugs/story/0,11908,686710,00.html> (“[I]t is felt by many pharmacologists that the creation of new substances from scratch has become far less likely simply through the exhaustion of possibilities. What is more likely is for a previously discovered substance, created through bona fide medical research, to be uncovered in an obscure academic journal and recreated in an underground lab . . .”). Shulgin observed that

[t]he raw material for such technologic predictions is available in the scientific literature. In every issue of the journals in the fields of pharmacology, medicinal chemistry, the botanical sciences, and biochemistry, articles appear that advertise the isolation, synthesis, or evaluation of materials which have some pharmacologic action. Any article describing a new family of compounds (“Potential Centrally Active Stimulants Evaluated in Experimental Animals,” for example) will encourage an unknown number of synthetic repetitions by underground researchers and manufacturers (with immediate pharmacologic evaluation in man).

Alexander T. Shulgin, *Drugs of Abuse in the Future*, 8 CLINICAL TOXICOLOGY 405, 406 (1975).

³⁹ The process of researching a synthetic path to a target chemical is remarkably similar to doing legal research with Westlaw or LexisNexis. A curious chemist need only access an online science database, draw a diagram of his target chemical structure, gather a number of citations to chemical journals, and explore the proven synthetic methods blazed by previous chemists. Compounds that emerged as problematic “designer drugs” were not only reported in research journals, but also often came with explicit synthesis instructions.

⁴⁰ See *infra* notes 69-70 and accompanying text (providing an informal survey of DEA Microgram Bulletins throughout the last five years). Between 2003 and 2007, nearly all reported “new designer drugs” were actually discovered a number of years earlier by academic and pharmaceutical researchers. The only exceptions were certain exotic plants with hallucinogenic properties, such as *Salvia divinorum*, and *Mitragyna speciosa*, which would not have fallen under the Federal Analog Act because of the wholly unique chemical structures of their psychoactive components. A survey of the case law stretching back to the enactment of the Federal Analog Act suggests that truly novel designer drugs have not appeared in at least two decades. See *infra* notes 98-106 (listing the analog cases and the chemicals that have appeared in them).

C. *Designer Drugs: Legal Loopholes and Problems*

The close relationship between legitimate pharmaceutical research and black market products is the key to understanding the evolution of the Federal Analog Act. The importance of legitimate pharmaceutical research is too compelling to be overstated. However, the designer drug crisis, unintentionally fueled by pharmaceutical research, highlights the pitfalls of the Controlled Substances Act's purely rules-based system.

Before the passage of the Federal Analog Act, the DEA administrator issued individual prohibitions for each illicit chemical. Under the directives of the Controlled Substances Act, this was a very slow and costly process. First, the DEA had to gather data and investigate the drug.⁴¹ The DEA would then request an assessment from the Department of Health and Human Services (HHS). The HHS would confer with two agencies—the Food and Drug Agency (FDA) and the National Institute of Drug Abuse (NIDA)—and return a recommendation to the DEA. The DEA administrator would then decide whether the drug should be prohibited.⁴² Since other interested parties could challenge the decision in an adversarial proceeding, it sometimes took years for the DEA to ban a single drug.⁴³

Clandestine chemists became adept at taking advantage of the DEA's slow, rules-based system. The Controlled Substances Act prohibited a number of particular drugs, but clandestine chemists easily circumvented the rules by producing a slight variation on the chemical, resulting in a completely legal drug—often with similar pharmacological properties and potency.

Congress enacted the Federal Analog Act to stop the exploitation of these loopholes with a model based on standards, not rules. At first glance, the Federal Analog Act appears to completely solve the prob-

⁴¹ See U.S. DEP'T OF JUSTICE, DEA, DRUGS OF ABUSE 2-3 (2005 ed.), available at <http://www.usdoj.gov/dea/pubs/abuse/doa-p.pdf> (describing the procedural requirements for formally prohibiting a chemical as a controlled substance).

⁴² See 21 U.S.C. § 812(b) (2000) (setting out the criteria and procedures for placing a drug on a controlled substances schedule).

⁴³ See *id.* (providing the various factors considered in scheduling a suspected controlled substance); Amanda Kay, *The Agony of Ecstasy: Reconsidering the Punitive Approach to United States Drug Policy*, 29 FORDHAM URB. L.J. 2133, 2163-66 (2002) (outlining the four-year period from the time that the DEA published a notification of its intention to control MDMA to when MDMA was actually placed on the schedule); Brian Rubens, *Common Law Versus Regulatory Fraud: Parsing the Intent Requirement of the Felony Penalty Provision of the Food, Drug, and Cosmetic Act*, 72 U. CHI. L. REV. 1501, 1501 (2005) (describing the scheduling process as "long and involved").

lem of controlled substance analogs by implementing a universal standard. However, the passage of twenty years has revealed both theoretical and practical problems with the Federal Analog Act's implementation of a standards-based model. Some of these problems appear to be a direct result of the use of a standard, and thus incurable. Other problems appear to be correctable. This Comment begins by considering the theoretical foundations of the rules versus standards debate in the context of the designer drug problem.

II. RULES VERSUS STANDARDS AND THE CURRENT STATE OF DESIGNER DRUG LEGISLATION

A. *Rules Versus Standards: A Witch's Brew of Approaches in Controlled Substance Analog Legislation*

The rules versus standards debate existed before the designer drug problem, but there has been a lack of attention in scholarly literature on the Federal Analog Act's use of a standard instead of a rule. This lack of attention is made even more curious by the diverse policies of different countries and states toward the global designer drug epidemic. While the Federal Analog Act implements a pure standards-based approach, this is by no means the only solution to the problem.

For example, many European countries use a rules-based approach. As of the writing of this Comment, France, Germany, the Netherlands, and Thailand have not enacted analog acts, but simply ban each individual chemical as it emerges on the black market.⁴⁴

Other jurisdictions, like the United States, use standards. However, there are wide-ranging differences even among jurisdictions that use standards. Some jurisdictions use a very open-ended standards approach toward controlled substance analogs. Arkansas, California, South Australia, Canada, and the United Kingdom deploy particularly broad standards. These jurisdictions treat chemicals as controlled substance analogs if they (1) have a "substantially similar" structure to

⁴⁴ Many countries follow a pure rules approach. *See generally* Agence française de sécurité sanitaire des produits de santé, Réglementation, <http://afssaps.sante.fr/htm/10/pharma/pharma8.htm> (last visited Feb. 15, 2008) (France); *Betäubungsmittelgesetz (BtMG)*, <http://www.eve-rave.net/abfahrer/recht.sp?text=1> (last visited Feb. 15, 2008) (Germany); *Wet van 13 juli 2002 tot wijziging van de Opiumwet, Stb. 2002, 520, translation at* http://www.cannabisbureau.nl/pdf/Opiumwet_EN_29nov2004.pdf (Netherlands); *Erowid.org, Thailand Law*, http://www.erowid.org/psychoactives/law/countries/law_thailand.shtml (last visited Feb. 15, 2008) (Thailand).

a controlled substance; *or* (2) have a hallucinogenic or stimulant effect, or are represented or intended to have a hallucinogenic or stimulant effect.⁴⁵ Under these “disjunctive” jurisdictions, analog laws are very broad and potentially reach chemicals that are not outlawed under U.S. federal law. For example, in a disjunctive jurisdiction, a hallucinogen like salvinorin A—which has a unique and complex chemical structure unlike that of any currently controlled substance—would probably be prohibited because its hallucinogenic effect may be “substantially similar” to other controlled substances like DMT or LSD. Indeed, some courts have pointed out the problems with this approach in less obvious situations: an actor could be convicted of distributing a Schedule I drug like cocaine, even if she actually distributed caffeine and only represented that the caffeine was “a lot like cocaine.”⁴⁶

On the other hand, other standards-based jurisdictions mirror the Federal Analog Act’s language⁴⁷ and treat chemicals as controlled substance analogs only if they (1) have a “substantially similar” structure to a controlled substance; *and* (2) have a hallucinogenic or stimulant effect, or are represented or intended to have a hallucinogenic or stimulant effect.⁴⁸ Although the Federal Analog Act’s language is ambiguous, federal courts have generally found that a conjunctive interpretation is necessary to prevent absurd results.⁴⁹ Under a conjunctive

⁴⁵ See, e.g., ARK. CODE ANN. § 5-64-414(a)(1) (2005); CAL. HEALTH & SAFETY CODE § 11401(b) (West 2007); Controlled Substances Act 1984 § 4(2), available at http://www.austlii.edu.au/au/legis/sa/consol_act/csa1984242/s4.html; Controlled Drugs and Substances Act 1996 S.C., Ch. 19 (Canada) (defining an analog broadly as “a substance that, in relation to a controlled substance, has a substantially similar chemical structure” irrespective of the pharmacological properties of the substance in question); Wilkinson, *supra* note 38 (noting that the United Kingdom has no analog statute but a blanket prohibition on “hallucinogens”).

⁴⁶ See *United States v. Turcotte*, 405 F.3d 515, 522-23 (7th Cir. 2005).

⁴⁷ Under the Federal Analog Act and many other state analog statutes, a controlled substance analog must have both a “substantially similar” structure *and* a “substantially similar” pharmacological effect. See COLO. REV. STAT. § 12-22-303(7.5)(a) (2007); D.C. CODE ANN. § 48-902.14(b) (LexisNexis 2004); GUAM CODE ANN. tit. 9, § 67.100(5)(i) (2007); IND. CODE ANN. 35-48-1-9.3(a) (West 2004); KAN. STAT. ANN. § 65-4101(bb)(1) (2001) (mirroring the Federal Analog Act in Kansas); LA. REV. STAT. ANN. § 40:961(8) (2001); MICH. COMP. LAWS ANN. § 333.7104(3) (West 1999).

⁴⁸ Technically, neither model implies any intrinsic breadth of coverage. It is possible, for instance, for a rules-based model to list a vast number of prohibited substances that cut through a wider swath than a standards-based model, and vice versa. In practice, however, the number of potentially banned analogs far exceeds the number of explicitly scheduled chemicals in every jurisdiction.

⁴⁹ The majority of cases find a conjunctive reading between 21 U.S.C. § 802(32)(A)(i) and 21 U.S.C. § 802(32)(A)(ii). See *Turcotte*, 405 F.3d at 518 (“The

jurisdiction, a chemical with a truly novel structure like salvinorin A would be legal, even though it is the most powerful naturally occurring hallucinogen ever discovered.⁵⁰

Still other jurisdictions take a more creative approach by mixing rules with standards. For example, Illinois' controlled substance analog statute uses a blend of permissive inferences to signal what types of analogs are prohibited.⁵¹ In these hybrid jurisdictions, the legal status of a chemical like salvinorin A would depend on the particular wording of the statute. Under Illinois state law, for instance, salvinorin A would be legal.

B. Rules and Standards: Different Ingredients for Different Flavors

The main distinction between rules and standards is that rules give ex ante "content" to the law, while standards give ex post "content" to the law.⁵² In the context of controlled substance analog legislation, rules explicitly define which chemicals are prohibited ex ante.

majority of these courts base their rulings largely on the absurd results that might obtain under a disjunctive reading, noting that alcohol and caffeine could be criminalized as controlled substance analogues based solely on the fact that, in concentrated form, they might have depressant or stimulant effects similar to illegal drugs."); see also *United States v. Hodge*, 321 F.3d 429, 432-39 (3d Cir. 2003) (analyzing the statute and overturning a conviction based on a trial court's finding that a mixture of "wax-and-flour" qualified as a controlled substance analog of crack cocaine); *United States v. Forbes*, 806 F. Supp. 232, 234-36 (D. Colo. 1992) (reading the structural prong and the effect prong conjunctively).

⁵⁰ See Mohsen Imanshahidi & Hossein Hosseinzadeh, *The Pharmacological Effects of Salvia Species on the Central Nervous System*, 20 PHYTOTHERAPY RES., 427, 431 (2006).

⁵¹ Under Illinois law, an analog is a

substance which is intended for human consumption, other than a controlled substance, that has a chemical structure substantially similar to that of a controlled substance in Schedule I or II, or that was specifically designed to produce an effect substantially similar to that of a controlled substance in Schedule I or II. Examples of chemical classes in which controlled substance analogs are found include, but are not limited to, the following: phenethylamines, N-substituted piperidines, morphinans, ecgonines, quinazolinones, substituted indoles, and arylcycloalkylamines.

ILL. COMP. STAT. ANN. 570/401 (West 2007); see also FLA. STAT. ANN. § 893.02(2) (West 2000) (defining an analog under Florida law to be "a structural derivative of a parent compound that is a controlled substance"). Illinois treats the analog as equivalent to its predecessor: "a controlled substance analog shall be treated in the same manner as the controlled substance to which it is substantially similar." ILL. COMP. STAT. ANN. 570/401.

⁵² See Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 560 (1992) ("[T]he only distinction between rules and standards is the extent to which efforts to give content to the law are undertaken before or after individuals act.").

For example, if the legislature in a rules district wanted to prohibit methamphetamine, MDMA, and MDBU, it might issue this law: “Methamphetamine, 3,4-methylenedioxyamphetamine (MDMA), and 3,4-methylenedioxy-*N*-butylamphetamine (MDBU) are prohibited.” Conversely, a standards-based jurisdiction might issue a law like the Federal Analog Act: “All drugs that are substantially similar to amphetamine in structure are prohibited.”

The difference between the results of rules and standards is striking. Rules would signal that MDMA, MDBU, and methamphetamine were explicitly prohibited. Standards, on the other hand, would require an individual to determine whether MDMA, MDBU, or methamphetamine was “substantially similar” to amphetamine. An individual might think that methamphetamine is “substantially similar” to amphetamine, since it only differs by one functional group. On the other hand, the same individual might pause when asked whether MDMA is “substantially similar” to amphetamine, since MDMA adds two additional functional groups—one of them quite exotic—to amphetamine.⁵³ When asked about whether MDBU and methamphetamine are “substantially similar,” an individual might draw the line; the fact that MDBU adds two additional functional groups to methamphetamine—one of them a longer alkane—might be the straw that breaks the camel’s back. However, an individual would never know whether he or she was right until the particular matter was litigated in criminal court.

This distinction between *ex ante* and *ex post* adjudication gives rise to a set of situations in which either rules may be favored over standards, or vice versa. This Comment examines these situations below as applied the Federal Analog Act’s history over the last twenty years.

1. Costs

The starting point in the rules versus standards debate is the costs to the different actors. There are three different types of costs associated with rules and standards: adjudication costs, information costs, and invisible costs.

Adjudication costs are costs to the rulemaker. Rules cost more to promulgate than standards. Because the rulemaker must decide the content of the law *ex ante*, the rulemaker must also make an informed decision as to the rule that she will promulgate. Thus, rules are more

⁵³ See *infra* note 88 (discussing the chemical structure of MDBU in depth).

efficient where many similar situations arise, because the initial cost of promulgating the rule will be amortized over many efficient transactions. Standards, on the other hand, are more efficient where there are a relatively small number of heterogeneous situations.⁵⁴

Before the Federal Analog Act was enacted, the DEA was swamped with the costs of promulgating rules—both in terms of time and money. Under the Controlled Substances Act, each rule had to be recommended by multiple agencies before the DEA Administrator could sign it into law. Because designer drugs are highly heterogeneous—arising in many different structural configurations—it would be nearly impossible for the DEA to study each of the potential designer drug’s medical effects before deciding whether it should be prohibited. Furthermore, once the decision maker made an *ex post* adjudication, this precedent would effectively transform the standard into an *ex ante* rule for this particular drug. Thus, given the high degree of heterogeneity, the low number of identical transactions that require *ex post* determination, and the fact that only a relatively small number of potential designer drugs have been released on the black market, costs of adjudication appear to favor the use of a standard for the Federal Analog Act.

Information costs, however, cut in a different direction. Information costs determine not only who bears the costs of adjudication, but also who *should* bear the costs of adjudication. Under the standards-based Federal Analog Act, the information costs fall on the parties to the litigation—the federal prosecutor’s office, the defendant, and the court—instead of falling on Congress, as they would in a rules-based system. In the context of controlled substances legislation, these parties are not well equipped to make a decision on a legislative matter. Federal prosecutors have limited resources and are not in an optimal position to litigate whether one chemical is “substantially similar” to a controlled substance. Likewise, defendants may not have sufficient resources to hire expert witnesses to bolster their side. Courts may be able to absorb the costs of litigation, but they should not bear those costs for another reason: they have expertise in determining facts, but they do not have any particular expertise in making policy judgments to determine which drugs should or should not be prohibited. Fur-

⁵⁴ Russell B. Korobkin, *Behavior Analysis and Legal Form: Rules vs. Standards Revisited*, 79 OR. L. REV. 23, 33 (2000) (“[R]ules will be relatively cheaper . . . in areas of law where identical disputes arise frequently. . . . In high-frequency disputes, standards are relatively less efficient because adjudicators must match the same facts to legal consequences over and over, effectively reinventing the wheel every time.” (footnote omitted)).

thermore, in a criminal case, the legal determination of a court is vulnerable to information contamination from the irrelevant facts of a case.⁵⁵ Thus, information costs favor rules promulgated by Congress or the DEA⁵⁶—parties that are well equipped with both adequate monetary resources and technical expertise.⁵⁷

Finally, invisible costs are a special type of information cost embedded in rule- or standard-making apparatuses. Invisible costs arise from the collateral effects of interactions between ex post and ex ante proceedings. Since rules favor a dialogue between the rulemaking body and the citizen, rules create a framework where it is easier for citizens to react, whereas this reaction might be impossible in a standards-based system. Invisible costs are the most striking costs associated with the Federal Analog Act's standards-based scheme. For example, if an interested party wishes to challenge an ex ante prohibition on a controlled substance such as MDMA, she can file a petition with the DEA and advance her arguments at a special hearing.⁵⁸ This is not uncommon; pharmaceutical companies occasionally file petitions in order to argue for the deregulation of a potential product.⁵⁹ However, this dialogue is simply impossible with ex post standards implementation. For example, under the Federal Analog Act, no content has been given to the law. Thus, no one may file a petition with the DEA to argue for the deregulation of an alleged controlled substance analog, since the alleged controlled substance ana-

⁵⁵ See *id.* at 48 (“When the law is determined on a case-by-case basis after disputes arise rather than prospectively, adjudicators’ evaluations about what an individual should have done are likely to be tainted by information about the results of the individual’s actions.”).

⁵⁶ See *United States v. Roberts*, 363 F.3d 118, 124 n.3 (2d Cir. 2004) (“It is perhaps unfortunate that Congress did not opt to list known controlled substance analogues itself, and then to delegate to an appropriate designee . . . the authority to expand that list as necessary, but rather left the determination of what qualifies as a controlled substance analogue to the courts and to informal legislative or administrative commentary.”); *United States v. Lusk*, No. A05-052, 2005 WL 2704988, at *2 (D. Alaska Oct. 5, 2005) (“Congress did not choose to list known controlled substance analogue [sic] themselves. Rather, it left the determination of what qualifies as a controlled substance analogue to legislative or administrative commentary (and to the courts).”).

⁵⁷ See Kaplow, *supra* note 52, at 608 (“Legislatures may be better equipped to draw upon technical expertise than courts.”).

⁵⁸ The saga of medical marijuana provides interesting insights into the practical difficulties encountered with challenging Schedule I status, although this topic is beyond the scope of this Comment.

⁵⁹ See *supra* text accompanying note 43 (recounting the long regulatory litigation surrounding doctors’ efforts to stop the DEA from officially listing MDMA as a Schedule I drug).

log—no matter how “substantially similar” it is in structure and effect to a controlled substance—is not explicitly regulated. Although declaratory judgments may provide relief in certain cases, standing issues may present problems in adjudication.⁶⁰ Thus, it is possible that no one will discover if the alleged controlled substance analog is in fact a prohibited drug, without risking criminal sanction. Paradoxically, the suspected controlled substance is simultaneously both a Schedule I drug and yet not a Schedule I drug. This gridlock creates an invisible cost—a situation where both the government and the interested party are deadlocked until the government either removes the prohibition on the parent compound or explicitly prohibits the problem compound.⁶¹ Thus, invisible costs favor the use of rules, which allow dialogue to proceed and information to be exchanged.

2. Deterrence

The Federal Analog Act is a criminal statute, and deterrence is one of its primary objectives. The stated congressional intent behind the Federal Analog Act is to stop clandestine chemists from “tinkering” with molecules in order to evade the law.⁶² Thus, the Federal Analog Act was enacted to improve on the underdeterrence of the rules-based Controlled Substances Act.

⁶⁰ See *Evers v. Dwyer*, 358 U.S. 202, 203 (1958) (“[T]he question in each case is whether the facts alleged, under all the circumstances, show that there is a substantial controversy, between parties having adverse legal interests, of sufficient immediacy and reality to warrant the issuance of a declaratory judgment.” (internal quotation marks omitted) (quoting *Md. Cas. Co. v. Pac. Coal & Oil Co.*, 320 U.S. 270, 273 (1941))). *But see* *N.H. Hemp Council, Inc. v. Marshall*, 203 F.3d 1, 4-5 (1st Cir. 2000) (noting that while “federal courts are disinclined to provide either injunctive or declaratory relief to foreclose federal criminal prosecutions in the absence of a reasonably clear and specific threat of prosecution,” the DEA’s conduct in promulgating agency rules classifying medical marijuana as a controlled substance and threatening prosecution of medical marijuana provided a sufficient threat of federal prosecution).

⁶¹ See, e.g., *Gettman v. DEA*, 290 F.3d 430, 433-36 (D.C. Cir. 2002) (reviewing *Jon Gettman and High Times’* petition to the DEA to remove marijuana from Schedule I and holding that although any interested party could petition the DEA for a hearing, *Gettman and High Times* did not have Article III standing to seek appellate review); *cf.* Rescheduling of the Food and Drug Administration Approved Product Containing Synthetic Dronabionl [(-)- Δ^9 -(trans)-Tetrahydrocannabinol] in Sesame Oil and Encapsulated in Soft Gelatin Caplets From Schedule II to Schedule III, 64 Fed. Reg. 35,928, 35,928-30 (July 2, 1999) (codified at 21 C.F.R. pts. 1308, 1312) (exemplifying a rare instance of the DEA moving *Marinol*, a synthetic marijuana substitute, from Schedule II to Schedule III, possibly motivated by *Gonzales v. Raich*, 545 U.S. 1 (2005), which was pending in the Supreme Court at that time).

⁶² *United States v. Forbes*, 806 F. Supp. 232, 234-36 (D. Colo. 1992).

It is true that rules fail to capture some who act in socially undesirable ways and create perverse incentives for criminals to violate existing rules. As Cass Sunstein observes,

[c]onduct that is harmful, and that would be banned in an optimal system, will be allowed under most imaginable rules, because it is hard to design rules that ban all conduct that ought to be prohibited. Because rules have clear edges, they allow people to “evade” them by engaging in conduct that is technically exempted but that creates the same or analogous harms.⁶³

In the context of controlled substance analog legislation, rules seem to create perverse incentives for clandestine chemists to modify prohibited drugs into entirely legal structural configurations. Conversely, standards appear to be better suited for designer drug legislation, since standards will deter risk-averse actors when there is no information available.⁶⁴ Indeed, the DEA has praised the extraordinary breadth of the Federal Analog Act for suppressing the development of designer drugs—whether the chemicals involved were or were not actually controlled substance analogs.⁶⁵

However, there are several problems lurking beneath this analysis. First, it assumes that it is difficult to predict what kind of drugs will be made. The argument runs like this: if designer drugs cannot be predicted, then rulemakers don’t know which chemicals to prohibit *ex ante*. If rulemakers don’t know which drugs should be prohibited *ex ante*, then they will not prohibit enough chemicals—and clandestine chemists will always find a way around the rules. But this argument ignores what we’ve learned from observing drug trends over the last five years.⁶⁶ Historically, clandestine chemists have copied templates from legitimate pharmaceutical and academic research instead of creating entirely new designer drugs on their own.⁶⁷ Why spend time and

⁶³ Cass R. Sunstein, *Problems with Rules*, 83 CAL. L. REV. 953, 995 (1995).

⁶⁴ See Kaplow, *supra* note 52, at 605 (“Because individuals tend to be less well informed concerning standards, they may bear more risk under standards . . .”).

⁶⁵ See FRANK L. SAPIENZA, DEA, CONTROLLED SUBSTANCE ANALOGUES (1996), available at http://www.erowid.org/psychoactives/law/law_fed_dea_analog_intro1.pdf (attributing the decrease in analogue production and distribution in the United States in part to the Federal Analog Act).

⁶⁶ See *supra* Part I.B (discussing the close relationship between clandestine chemists and legitimate pharmaceutical and academic researchers).

⁶⁷ See Shulgin, *supra* note 38, at 405-07 (cautioning that an attempt to predict drug abuse trends may indirectly provide black market entrepreneurs with “an itemization of potentially interesting avenues of financially profitable drug exploration,” but also noting that “very few who are deeply invested in the preparation of illicit drugs will

money crafting a novel synthetic pathway to a novel modification of a chemical when there is an established synthetic pathway to a known hallucinogen or stimulant?⁶⁸ The vast majority of chemicals behind the designer drug epidemic have already been discussed at length in peer-reviewed journals, and the economic drive to discover new pharmaceuticals has already mapped out the vast majority of variations on the classical structural backbones.⁶⁹ The implication is that

learn much that they do not already know or that could easily be learned from the scientific literature”). Shulgin also noted that

[e]ven more disturbing, and less easily anticipated, are the novel pharmaceutical agents that may spring forth from the imagination and wit of the illicit manufacturer himself. He does not advertise the substances of his inventions, nor does he warn others of his failures. The scientific community discovers these sallies sometimes years after their success or failure

Id. at 406-07. That prediction does not appear to have come to fruition.

⁶⁸ See *id.* at 406 (“[T]echnological extrapolation [may be] valid when considering certain pharmacologic families of drugs, such as the opiates, the amphetamines, the barbiturates, and the hallucinogens.”). Clandestine chemists have proved to be resourceful in the past in adapting to diversion control, but research and development typically requires specialized experience in both theoretical chemistry and laboratory technique, coupled with sophisticated, well-equipped laboratories and expensive reagents. Consider, for example, that the illicit synthesis of LSD—a notoriously fragile molecule requiring expertise to manufacture even on a small scale—fell by ninety-five percent after the DEA arrested two of the only underground chemists capable of producing it. See Ryan Grim, *Who’s Got the Acid?: These Days, Almost Nobody*, SLATE, Apr. 1, 2004, <http://www.slate.com/id/2098109/> (exploring the reasons for the drastic decline in LSD usage); see also Seth Rosenfeld, *William Pickard’s Long, Strange Trip: Suspected LSD Trail Leads from the Bay Area’s Psychedelics Era to a Missile Silo in Kansas*, S.F. CHRON., June 10, 2001, at A1 (describing the unusual and tragic life trajectory of William Leonard Pickard, a Harvard- and Stanford-educated chemist who single-handedly produced the vast majority of the LSD consumed in the United States for both financial and ideological reasons, and funneled the profits back into legitimate research on psychoactive drugs at UCLA).

⁶⁹ The DEA publishes the *Microgram Bulletin*, a publication that lists Intelligence Alerts about drug seizures and trends. See generally U.S. DEA, *Microgram Bulletins*, http://www.dea.gov/programs/forensicsci/microgram/bulletins_index.html (last visited Feb. 15, 2008) (indexing past issues). Recent issues have issued alerts for drugs like 2C-I, MDDMA, TMA, DOC, DOB, and DOI—each of which was discovered over fifteen years ago by Alexander Shulgin. See, e.g., *2C-I Capsules in Miami Beach, Florida*, 39 MICROGRAM BULL. 3, 3-4 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg0106/mg0106.pdf>; *Ecstasy Combination Tablets (Containing MDMA, Methamphetamine and MDDMA) in Miami, Florida*, 39 MICROGRAM BULL. 148, 148-49 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg1206/mg1206.pdf>; *Large Fentanyl/MDA/TMA Laboratory in Azusa, California—Possibly the “OC-80” Tablet Source*, 39 MICROGRAM BULL. 45, 45-47 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg0406/mg0406.pdf>; *LSD Blotter Acid Mimics (Containing 2,5-Dimethoxy-4-Chloroamphetamine (DOC)) in Boca Raton, Florida*, 39 MICROGRAM BULL. 72, 72 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg0606/mg0606.pdf>; *LSD Blotter Acid Mimics (Contain-*

no “designer drug” in the past five years has come as a surprise.⁷⁰ Even assuming, for the sake of argument, that clandestine chemists somehow discover a novel psychoactive chemical with a completely unique chemical structure—like salvinorin A—even a standards-based approach like the current Federal Analog Act would *not* prohibit this compound. Indeed, this may be the correct outcome; there may be vastly diminishing psychoactive returns as the original molecule is modified beyond recognition.⁷¹ This type of discovery would be so rare and valuable that it ought to be encouraged, not deterred, because of the opportunities for future research.⁷² The new chemical should be given the full range of review given to all chemicals before it is officially prohibited. Thus, rules are unlikely to be underinclusive, because likely targets for synthesis can be easily identified.

Furthermore, there are information exchange problems with standards—especially the standards implemented in the Federal Analog Act. For example, reasonable minds could differ on whether a

ing 4-Bromo-2,5-Dimethoxyamphetamine (DOB) in Ames, Iowa, 39 MICROGRAM BULL. 145, 145 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg1206/mg1206.pdf>; *LSD Blotter Acid Mimics (Containing 4-Iodo-2,5-Dimethoxyamphetamine (DOI))* in Orlando and Winter Springs, Florida, 39 MICROGRAM BULL. 55, 55 (2006), available at <http://www.dea.gov/programs/forensicsci/microgram/mg0506/mg0506.pdf>. Other alerts have been published for a large number of known psychoactive drugs, including 2,5-dimethoxy-4-ethylphenethylamine (2C-E), 4-chloro-2,5-dimethoxyphenethylamine (2C-C), 4-methylaminorex, 5-methoxy-alpha-methyltryptamine (5-MeO-AMT), 5-MeO-MiPT, *N,N*-dipropyltryptamine (DPT), 2C-T-21, 2,5-dimethoxy-4-ethylthiophenethylamine (2C-T-2), 4-bromo-2,5-dimethoxyphenethylamine (2C-B), 4-methoxymethamphetamine, 5-methoxy-*N,N*-dimethyltryptamine (5-MeO-DMT), *N*-methylpyrrolidone (NMP), phenylpropylmethylamine, and scopolamine. See generally 2005 Subject Index, 38 MICROGRAM BULL. 188, 188 (2005), available at <http://www.dea.gov/programs/forensicsci/microgram/mg1205/05dec-mb.pdf> (listing issues that contained alerts for the first six of these compounds); 2004 Subject Index, 37 MICROGRAM BULL. 218, 218, 222 (2004), available at <http://www.dea.gov/programs/forensicsci/microgram/mg1204/mg1204.pdf> (listing issues that contained alerts for the last eight of these compounds).

⁷⁰ It is entirely possible that designer drugs—even before the last five years—would have come as no surprise, especially given that nearly all of the 1980s- and 1990s-era Federal Analog Act cases litigated previously known compounds. However, since the DEA *Microgram Bulletins* published before 2003 are classified and beyond the reach of a Freedom of Information Act (FOIA) request, there is no way to know if the DEA considered any pre-2003 designer drugs to be completely novel.

⁷¹ Consider, for example, that the *N*-terminal alkylation of MDMA decreases its psychoactive value, to the point where the addition of two carbon atoms makes MDMA completely inactive. See ALEXANDER SHULGIN & ANNE SHULGIN, PIHKAL: A CHEMICAL LOVE STORY 721 (2006) (discussing the pharmacological impact of modifying the phenylethylamine backbone).

⁷² See HOFMANN, *supra* note 31, at 31 (explaining that the discovery of a novel backbone would be both rare and fortunate).

particular chemical is “substantially similar” to the structure of a listed chemical under the Federal Analog Act.⁷³ Unless more criminals than not are risk-averse rational actors, this uncertainty makes it unlikely that a vague definition will truly deter more people than a more concrete definition.⁷⁴ Recent history suggests that gray market entrepreneurs are *not* deterred by uncertainty. Instead, because of self-serving bias, they may attempt to exploit uncertainty to their advantage.⁷⁵ For example, in 2004 the DEA broke up a ring of gray market drug entrepreneurs who flourished on the Internet by brazenly setting up websites selling “research chemicals.”⁷⁶ Some of these entrepreneurs operated on the theory that the chemicals did not fall under the Federal Analog Act because they were not “substantially similar” in structure to controlled substances.⁷⁷ If the “research chemicals” were in fact controlled substance analogs, it would have been far better if these entrepreneurs had prior warning, from a rules-based system, that their actions were illegal, presumably deterring them from selling millions of dollars of hallucinogens that ended up killing two people.⁷⁸ Likewise, rules may be better than standards at deterring potential drug consumers. Because criminal drug statutes express information about a particular chemical’s danger, explicit prohibitions may be more ef-

⁷³ See Anacker & Imwinkelried, *supra* note 32, at 13 (noting that “[i]t seems evident that upon viewing these diagrams [of GHB and GBL], most laypersons would say these diagrams do not appear ‘substantially similar’” despite legal precedent to the contrary).

⁷⁴ Consider, for example, that “Research Companies” operating on the Internet openly sold psychoactive phenylethylamines and tryptamines under the theory that these chemicals did not fall under the Federal Analog Act. See Press Release, DEA, DEA Announces Arrests of Website Operators Selling Illegal Designer Drugs (July 22, 2004), available at <http://www.dea.gov/pubs/pressrel/pr072204.html> (“The formulation of analogues is like a drug dealer’s magic trick meant to fool law enforcement. They didn’t fool us . . .”).

⁷⁵ See Korobkin, *supra* note 54, at 46 (suggesting that since individuals are inclined to interpret provisions in a manner that benefits them most, uncertainty is more likely to capture individuals who unknowingly violate the law rather than overdetering individuals).

⁷⁶ See Press Release, DEA, *supra* note 74.

⁷⁷ See David McCandless, Bad Trip for Online Drug Peddlers, WIRED MAG., July 6, 2005, available at <http://www.wired.com/medtech/health/news/2005/07/68049?currentPage=all> (“Thanks to their novelty, most research chemicals are not specifically listed as controlled substances under U.S. drug laws. Many site operators and customers believed, erroneously, that this made the drugs legal, or at least left them in a gray area that would protect them from prosecution.”).

⁷⁸ See Korobkin, *supra* note 54, at 46 (“The self-serving bias is less problematic in a rules regime where there is, by definition, little or no *ex ante* ambiguity about legal boundaries.”).

fective than hazy standards at conveying warnings about a chemical's health hazards to potential drug consumers.

Even if rules underdeter criminals, standards are also imperfect because they overdeter. By employing a vague definition of "controlled substance analog,"⁷⁹ the Federal Analog Act chills legitimate pharmaceutical and academic research. As discussed below, researchers in these fields are always interested in exploring variations on chemicals—including chemicals that are "substantially similar" in structure and effect to controlled substances.⁸⁰ For example, exploration of the phenylethylamine family of chemicals alone has yielded anorectics,⁸¹ bronchodilators,⁸² and antidepressants,⁸³ among other drugs. Many researchers have also proposed the use of phenylethylamine and tryptamine derivatives and analogs for psychotherapy, and these previously controversial proposals are now gaining traction as the backlash from the designer drug epidemic from the 1960s and 1980s begins to subside.⁸⁴

Since industry chemists and pharmacologists are ultimately interested in distributing these chemicals for human consumption,⁸⁵ and

⁷⁹ See *infra* Part II.B.3 (discussing why the Federal Analog Act's definition of "controlled substance analog" is vague).

⁸⁰ See *supra* Part I.B (discussing the pharmaceutical search for molecular variations that might uncover promising potential drugs).

⁸¹ See Robert F. Kushner & Hazel Manzano, *Obesity Pharmacology: Past, Present, and Future*, 18 CURRENT OPINION GASTROENTEROLOGY 213, 213 (2002) (describing fenfluramine as an appetite suppressant).

⁸² See SAEID RAOFI & SUSAN M. SCHAPPERT, U.S. DEP'T OF HEALTH & HUMAN SERVS., MEDICATION THERAPY IN AMBULATORY MEDICAL CARE: UNITED STATES, 2003-04, 6-7 (2006) (describing the use of Albuterol, a bronchodilator, in emergency health care).

⁸³ See Linda P. Dvoskin et al., *Review of the Pharmacology and Clinical Profile of Bupropion, an Antidepressant and Tobacco Use Cessation Agent*, 12 CNS DRUG REVS. 178, 192-93 (2006) (describing the promising use of the antidepressant Bupropion to stop nicotine addiction).

⁸⁴ See *supra* note 16 (discussing these new studies).

⁸⁵ Some of the most remarkable developments in psychoactive drugs emerged when pharmacologists and chemists bioassayed the drug themselves. See, e.g., HOFMANN, *supra* note 31, at 14-20 (describing his initial discovery of LSD as a combination of intuition and serendipity, and the resulting distribution of the new compound to other chemists in the lab to prove its astonishing potency and unique psychedelic effects); SHULGIN & SHULGIN, *supra* note 71, at 736-37 (describing the author's rediscovery of MDMA and his self-bioassay as the pivotal experiment that alerted him to the phenomenal entheogenic properties of the drug). Although the era of this laissez-faire attitude toward pharmaceutical development seems to have faded, it is possible that an especially daring pharmacologist or chemist could be ensnared in the course of legitimate research, despite the third prong of the Federal Analog Act.

the new drugs may have effects “substantially similar” to controlled substances, there is a compelling policy interest both in protecting innocent actors from capture and in allowing for the liberation of a potential controlled substance analog from its legal shackles if it has a legitimate medical use.

Thus, while rules may appear at first glance to underdeter, a closer analysis reveals that this underdeterrence may be overstated, while the overdeterrence of a standard—especially the standard employed by the Federal Analog Act—may be understated.

3. Fairness Concerns

The Federal Analog Act’s greatest vulnerabilities lie in due process concerns that come with its *ex post* standards approach. Regardless of whether an individual is developing a pharmaceutical product in good faith or planning on releasing a designer drug on the black market, the law ought to give clear notice of whether a particular chemical is prohibited. Since the Federal Analog Act treats controlled substance analogs as equivalent to Schedule I drugs—the most stringently controlled category of drugs—the potential penalties are very high. When the stakes involve possible lifetime imprisonment, it is absolutely imperative to give fair notice to individuals—even if the due process concerns fall short of violating the Constitution.⁸⁶

Simple rules generally give better notice than do standards.⁸⁷ This is especially true in the context of designer drugs. Under a rules-based regime like the Controlled Substances Act, it is clear which chemicals are prohibited and which chemicals are not. MDMA is prohibited; MDBU is not (directly).⁸⁸ Under the standards-based Federal Analog Act, however, it is unclear—without further research into

⁸⁶ See generally Clayton L. Smith, Note, *The Controlled Substance Analogue Enforcement Act of 1986: The Compromising of Criminalization*, 16 AM. J. CRIM. L. 107, 128-33 (1988) (analyzing the Federal Analog Act and concluding that it does not present a viable void-for-vagueness constitutional challenge).

⁸⁷ See Kaplow, *supra* note 52, at 608 (“[E]ven when rules will be less accurate in providing results that are appropriate to actual circumstances—which they often will not be—they will tend to provide clearer notice than standards to individuals at the time they decide how to act.” (footnote omitted)).

⁸⁸ MDBU probably induces only very weak, if any, psychoactive activity. See SHULGIN & SHULGIN, *supra* note 71, at 721 (“Straight chain homologues on the nitrogen atom of MDA longer than two carbons are probably not active. . . . All mouse assays that compared this homologous series showed a consistent decrease in action (anesthetic potency and motor activity) as the alkyl chain on the nitrogen atoms was lengthened.”).

the case law—whether MDMA would have been illegal before it was officially prohibited. It is still unclear even today if a compound like MDBU would be prohibited under the Federal Analog Act.

Part of the confusion stems from the regulatory nature of the Federal Analog Act. Standards rely heavily on social norms for guidance. A typical standard might say, “Do not use your stereo in an unreasonable way in this apartment.” Most people would understand this standard to signal an underlying social norm—unreasonableness—which captures many familiar situations⁸⁹ where it would be socially unacceptable to annoy other people.⁹⁰ For example, most individuals would understand that this command meant: no playing the stereo loudly at night, or in the early morning, etc.⁹¹ However, in the context of controlled substance analogs, there are no social norms about what chemical structures are “substantially similar” to others, or whether the pharmacological effect of a particular chemical is similar to the pharmacological effect of another. Without an underlying social norm, it is wishful thinking to believe that individuals will have fair notice of a subject that is as complex as organic chemistry.⁹² The unholy union of legalese and chemistry jargon is probably enough to bewilder even the most studious individuals.⁹³ In fact, many chemistry

⁸⁹ Legality concerns over criminal statutes have typically arisen in the context of loitering. *See, e.g.,* *City of Chicago v. Morales*, 527 U.S. 41 (1999) (plurality opinion) (striking down a municipal statute that defined “loiter[ing]” as “remain[ing] in any one place with no apparent purpose” as unconstitutionally vague under the due process clause); *Kolender v. Lawson*, 461 U.S. 352 (1983) (holding California’s loitering statute unconstitutional and providing the landmark two-prong test for penal statutes to pass due process muster).

⁹⁰ *See* Korobkin, *supra* note 54, at 54-55 (“As long as a body of law is viewed as embodying a community’s norms, law can be used to signal a particular community norm.”).

⁹¹ Technically, this standard would not be a pure standard, but a rule-standard hybrid. *See* Kaplow, *supra* note 52, at 560-62 (drawing a distinction between a pure standard, which has no reference point, and a rule-standard hybrid, which has reference points).

⁹² *See generally* DEA, Drug Scheduling, <http://www.dea.gov/pubs/scheduling.pdf> (last visited Feb. 15, 2008) (“This document is a general reference and not a comprehensive list. This list describes the basic or parent chemical and does not describe the salts, isomers and salts of isomers, esters, ethers and derivatives which may also be controlled substances.”). This does not even describe an analog but instead serves as a basic extension of the core Controlled Substances Act. The distinction between a “derivative” and an “analog” makes the situation even more complicated. *See* ALEXANDER T. SHULGIN, *CONTROLLED SUBSTANCES: A CHEMICAL AND LEGAL GUIDE TO FEDERAL DRUG LAWS* 9 (2d ed. 1992) (describing the imprecision of federal drug scheduling).

⁹³ At least one court has commented, somewhat counterintuitively, on the due process concerns of defining a chemical structure too specifically. *See* *One Thousand*

experts disagree on whether a chemical is “substantially similar” in structure to another chemical—so much so that Federal Analog Act litigation often degenerates into a “battle of experts,” which is founded more on opinion than on actual scientific evidence.⁹⁴ One survey of Federal Analog Act jurisprudence discovered that courts sometimes considered a chemical’s two-dimensional structure rather than the three-dimensional structure as a factor; that courts sometimes ignored the difference in the number of atoms as a meaningful factor; and that courts even ignored quantitative “similarity analysis” results that pharmaceutical companies use to determine whether a chemical is structurally similar to another.⁹⁵

Another problem with the Federal Analog Act’s implementation of a standard is the standard’s stunted growth through the last twenty years. In theory, standards evolve into a set of rules as the courts lay down precedent.⁹⁶ Although judicial precedent does not provide the same clarity of notice as a promulgated rule,⁹⁷ it provides fair notice after the courts accumulate a critical mass of data points. However, the Federal Analog Act’s evolution into a mature statute has been sluggish. The vagueness of the definition of a controlled substance analog under the Federal Analog Act is a double-edged sword. Prosecutors are often unsure if they have a colorable claim and are reluctant to bring Federal Analog Act cases unless they are almost certain to succeed.⁹⁸ Consequently, there have been only about seventy cases

Four Hundred Sixty-Two Dollars in U.S. Currency and One 1982 Buick v. State, 774 S.W.2d 17, 21 (Tex. App. 1989) (holding that an ordinary person would not be able to discern structural similarity from molecular weights, and therefore that such weights are unnecessary to give “a person of ordinary intelligence fair notice of the substances which are to be treated as controlled substances”); see also *infra* notes 124-125 and accompanying text (arguing that standards may provide better notice than rules in certain cases).

⁹⁴ See Anacker & Imwinkelried, *supra* note 32, at 768-70 (noting that litigation under the Federal Analog Act presents *Daubert* problems because the standard of “substantially similar” is a matter of opinion, not fact).

⁹⁵ See *id.* at 759-62 (discussing the wide variation in methods used to produce expert testimony on whether a chemical is “substantially similar” in structure to another).

⁹⁶ See Korobkin, *supra* note 54, at 29 (“Just as a pure rule can become standard-like through unpredictable exceptions, a pure standard can become rule-like through the judicial reliance on precedent.”).

⁹⁷ See Kaplow, *supra* note 52, at 610 (“[T]he difficulty of learning about laws promulgated by legislatures may differ from those promulgated by courts . . . because of the manner in which legislative enactments and judicial opinions are written, published, and indexed.”).

⁹⁸ See *United States v. Forbes*, 806 F. Supp. 232, 233 (D. Colo. 1992) (taking note of internal dissent among the U.S. Prosecutor’s office on whether alphaethyltrypt-

brought under the Federal Analog Act over the span of more than two decades and even fewer data points giving clues as to the courts' definition of a "substantially similar" structure.⁹⁹

What chemicals currently fall under the Federal Analog Act as "controlled substances analogs"? The *ex post* determination of whether a chemical is "substantially similar" to a scheduled drug has been subject to an enormous amount of interpretative leeway by federal courts. The answer seems to be that everything that the courts have examined so far qualifies as a controlled substance analog. This does not mean, however, that every potential analog is in fact an analog. While the courts have found nearly every litigated chemical to be a controlled substance analog, they have not examined every type of potential analog.

Instead, the courts have created legal precedent on several heavily litigated challenges for a narrow spectrum of chemicals. The Federal Courts of Appeals have consistently determined that gamma butyrolactone (GBL) is an analog of gamma hydroxybutyric acid (GHB),¹⁰⁰ MDMA is an analog of MDA,¹⁰¹ *N*-hydroxy-MDMA is an analog of MDMA,¹⁰² methcathinone and methylcathinone are analogs of cathinone and methamphetamine,¹⁰³ aminorex and phenylethylamine

tamine (AET) has a chemical structure that is substantially similar to dimethyltryptamine (DMT) or diethyltryptamine (DET) and quoting a DEA memorandum as conceding that "there is a great diversity of opinion whether [AET] is controlled as an analogue under the 1986 Act").

⁹⁹ See *United States v. Roberts*, 363 F.3d 118, 124 (2d Cir. 2004) (recognizing that the Federal Analog Act leaves the determination of whether a chemical qualifies as a controlled substance analog to the courts and "as a result, in the absence of prior court decisions the statutory and regulatory pronouncements provide no real notice").

¹⁰⁰ See, e.g., *United States v. Brown*, 415 F.3d 1257, 1271 (11th Cir. 2005); *United States v. Turcotte*, 405 F.3d 515, 529 (7th Cir. 2005); *United States v. Ansaldi*, 372 F.3d 118, 123 (2d Cir. 2004); *United States v. Fisher*, 289 F.3d 1329, 1335-36 (11th Cir. 2002) (citing Placement of Gamma-Butyrolactone in List I of the Controlled Substances Act (21 U.S.C. § 802(34)), 65 Fed. Reg. 21,645-47 (Apr. 24, 2000) (codified at 21 C.F.R. § 1310.02) and Hillory J. Farias and Samantha Reid Date-Rape Drug Prohibition Act of 2000, Pub. L. No. 106-172, § 2(4), 5(a), 114 Stat. 7, 7, 10).

¹⁰¹ See, e.g., *United States v. Carlson*, 87 F.3d 440, 445-46 (11th Cir. 1996); *United States v. Raymer*, 941 F.2d 1031, 1046 (10th Cir. 1991); *United States v. Desurra*, 865 F.2d 651, 653 (5th Cir. 1989) (relying on the legislative history of the Federal Analog Act).

¹⁰² See, e.g., *United States v. Granberry*, 916 F.2d 1008, 1009 (5th Cir. 1990).

¹⁰³ See, e.g., *Hooper v. United States*, No. 99-1287, 2000 WL 658037, at *1 (6th Cir. May 8, 2000) (methcathinone and cathinone); *United States v. Colberg*, No. 94-2173, 1995 WL 641303, at *3 n.1 (6th Cir. Oct. 31, 1995) (methcathinone and methamphetamine); *United States v. Pavlik*, No. 93-2494, 1995 WL 59227, at *1 (6th Cir. Feb. 13, 1995) (same); *United States v. Hofstatter*, 8 F.3d 316, 320 (6th Cir. 1993) (methylcathinone and methamphetamine).

are analogs of 4-methylaminorex and methamphetamine,¹⁰⁴ 1-(3-oxy-3-phenyl-propyl)-4-phenyl-4-propionoxypiperidine (OPP/PPP) is an analog of MPPP,¹⁰⁵ and MeO-DiPT is an analog of DET,¹⁰⁶ without considering other combinations. Thus, while these particular chemicals surely qualify as controlled substance analogs, we cannot tell with certainty whether a novel and previously unlitigated chemical is also a controlled substance analog.

We can glean some information from the case law. We can infer that the addition of one methyl group (MDMA to MDA, methylcathinone to methcathinone), the cleavage of one methyl group (4-methylaminorex to aminorex), the cleavage of two methyl groups (methamphetamine to phenylethylamine), and the addition of a hydroxyl group (MDMA to *N*-hydroxy-MDMA) are each sufficient to qualify a substance as a controlled substance analog. Most interestingly, the addition of two alkanes and the addition of a methoxyl group do not prevent a chemical from being “substantially similar” to a parent compound.¹⁰⁷ Thus, roughly speaking, the courts seem to imply that addition or cleavage of up to three first-degree functional groups without alteration of the core molecule results in a controlled substance analog.

However, far fewer courts have answered a much more important question: what is not a controlled substance analog?¹⁰⁸ Is the Federal Analog Act’s reach limited to first-order substitutions? Or are second-order substitutions, such as the addition or cleavage of aliphatic chains or rings that themselves contain substitutions, also prohibited? What about third-degree substitutions? What about minor modifica-

¹⁰⁴ See, e.g., *United States v. Nunez*, 57 F. App’x 776, 776 (9th Cir. 2003) (asserting that phenylethylamine is an analog, although the court does not specify its parent chemical); *McKinney v. United States*, No. 99-1814, 2000 WL 1010581, at *2 (8th Cir. July 24, 2000) (aminorex and 4-methylaminorex).

¹⁰⁵ See *United States v. Ono*, 918 F.2d 1462, 1467 (9th Cir. 1990).

¹⁰⁶ See, e.g., *United States v. Linder*, 200 F. App’x 186, 187 (4th Cir. 2006) (per curiam); *United States v. Klecker*, 348 F.3d 69, 73 (4th Cir. 2003).

¹⁰⁷ *Klecker*, 348 F.3d at 73.

¹⁰⁸ See SAPIENZA, *supra* note 65 (“[M]ost, if not all, of the substances described in ‘PIHKAL’ [sic] could meet the definition of controlled substance analogue.”). *PiHKAL* is a book authored by Alexander Shulgin and Ann Shulgin that describes a compilation of 179 permutations of the phenylethylamine backbone. SHULGIN & SHULGIN, *supra* note 71. Of these permutations, only fourteen are currently listed as scheduled drugs by the DEA. See Erowid.org, PiHKAL: Legal Status, http://www.erowid.org/library/books_online/pihkal/pihkal_law.shtml (last modified Nov. 7, 2006) (listing the fourteen phenylethylamine variations present both in *PiHKAL* and on the DEA’s schedule).

tions to the core backbone itself? What about the addition of extremely polar functional groups, or large inhibitory chains or rings that render the compound pharmacologically inactive?¹⁰⁹ There are no good answers to these questions. In order to map this territory, courts must either (1) strike down the application of the Federal Analog Act to certain chemicals or (2) create a justification for their factual finding that goes beyond relying on the “superiority” of governmental expert testimony in a battle of experts.¹¹⁰

Courts are reluctant to squarely address this question either way. Instead, federal courts have found that every chemical examined has been a controlled substance analog.¹¹¹ Thus, it is impossible to determine the reach of the Federal Analog Act, other than to assume that it casts such a wide net that virtually every variation of every fundamental backbone is controlled. Indeed, at least one court has supported this proposition.¹¹²

¹⁰⁹ While the Federal Analog Act also requires “representation” or “intent” as to a substantially similar pharmacological effect, this raises the interesting scenario of a person synthesizing or distributing a chemical that is substantially similar in structure to MDMA—perhaps to fool the testing device of a purchaser—and advertising the chemical’s pharmacological properties as “similar to MDMA,” despite the fact that the chemical may have no pharmacological effect whatsoever.

¹¹⁰ See *supra* text accompanying note 94 (discussing the problems with expert witnesses in Federal Analog Act litigation).

¹¹¹ The sole possible exception appears to be AET before it was scheduled. In *Forbes*, a district court struck down the application of the Federal Analog Act to AET, but this was not because AET was not an analog. See *United States v. Forbes*, 806 F. Supp. 232 (D. Colo. 1992). Rather, the district court found that even though AET *might* be a potential analog, there was enough disagreement among experts to strike the application of the Federal Analog Act because of vague due process concerns. *Id.* at 236-39. It appears that although *Forbes*’s central holding is still good law, if the case were decided today, AET would almost certainly be found to be an analog.

¹¹² At least one court has implied that as long as the core of the chemical is intact and identical to a core in a listed chemical, and the remaining elements are “substantially similar,” a substance qualifies as an analog. See *Klecker*, 348 F.3d at 73 (“‘Foxy’ and DET share the same core arrangement of atoms, known as tryptamine. Tryptamine is the core element of a number of hallucinogenic drugs. . . . The Court finds that the substitutions to Foxy and DET, while not identical, are substantially similar. The tryptamine core is intact and therefore identical in the two compounds, and the remaining elements are substantially similar.” (internal quotation marks omitted) (quoting *United States v. Klecker*, 228 F. Supp. 2d 720, 728 (E.D. Va. 2002))). This is an extremely broad rule, since the “core” of the chemical will generally remain intact even after heavy substitution has obliterated any pharmacological activity that the original molecule possessed. For example, this rule effectively covers all tryptamines—including serotonin, which is a major neurotransmitter naturally produced by the body. However, serotonin is completely inactive when ingested.

There are only a few courts that are willing to carve out a more limited definition. Just one court has elaborated on what rules should govern the definition of a “substantially similar” structure.¹¹³ State courts are similarly reticent in interpreting their own analog statutes.¹¹⁴ Most courts prefer simply to fall back on a battle between ex-

¹¹³ In *United States v. Roberts*, the government argued that a two-atom difference, standing alone, would be enough to establish substantial similarity in chemical structure. 363 F.3d 118, 124 (2d Cir. 2004). The Second Circuit rejected that theory, noting that “[i]n another case, it might well be that a one- or two-atom difference in a molecule made such a radical difference in the substance’s relevant characteristics that any similarity in two-dimensional charts would not be ‘substantial’ enough to satisfy the definition of ‘controlled substance analogue.’” *Id.* The circuit court nevertheless reversed the district court’s dismissal of the indictments:

Where there is only a two-atom difference between the relatively complex molecules of a suspect substance and of a controlled substance and where, upon ingestion, the suspect substance is metabolized into the controlled substance, we believe that the chemical structure of the suspect substance is manifestly “substantially similar to the chemical structure of [the] controlled substance [analog].”

Id. at 125 (first alteration in original).

¹¹⁴ See *People v. Rudakowski*, No. D040822, 2003 WL 21490044, at *3 (Cal. Ct. App. June 30, 2003) (upholding a conviction when the prosecution’s expert witness testified that MDMA was “substantially similar” to the controlled methamphetamine and the defendant did not call his own expert witness); *People v. Kim*, No. B145073, 2002 WL 864505, at *6 (Cal. Ct. App. May 7, 2002) (“[T]hat MDMA or Ecstasy is an analog of MDA was an objective fact the defense did not and, no doubt, could not contest.”); *People v. Silver*, 281 Cal. Rptr. 354, 355-56 (Cal. Ct. App. 1991) (upholding a lower court’s decision that MDMA is an analog of methamphetamine in a classic battle of the experts, despite defense expert testimony that “only 50 percent of the molecules were the same or similar; that it was impossible to create a molecule of MDMA from a molecule of methamphetamine”); *People v. Frantz*, 114 P.3d 34, 40 (Colo. Ct. App. 2004) (upholding a trial court’s determination that the unlisted precursor pseudoephedrine was “substantially similar” to ephedrine); *Mohamed v. State*, 843 N.E.2d 553, 556 (Ind. Ct. App. 2006) (accepting the trial court’s factual determination that cathinone’s chemical structure is substantially similar to that of the controlled drug methcathinone); *State v. Cathcart*, 589 A.2d 193, 195 (N.J. Super. Ct. App. Div. 1991) (upholding a trial court’s determination that L-cocaine is substantially similar to its prohibited isomer D-cocaine); *Porter v. State*, 806 S.W.2d 316, 321-22 (Tex. App. 1991) (upholding a trial court’s finding that *N*-Hydroxy-3,4-methylenedioxyamphetamine (*N*-Hydroxy MDA) is substantially similar to MDA); *Robinson v. State*, 783 S.W.2d 648, 653-54 (Tex. App. 1990) (upholding a trial court’s determination that 3,4-methylenedioxymethamphetamine (MDEA or “Eve”) is an analogue of both controlled drugs MDMA and MDA); *One Thousand Four Hundred Sixty-Two Dollars in U.S. Currency and One 1982 Buick v. State*, 774 S.W.2d 17, 21 (Tex. App. 1989) (defining “substantially similar” to be equivalent to the Oxford English Dictionary’s definition of “analog” as “an organic compound with a molecular structure closely similar to another (typically differing in one atom or group)” and rejecting the use of molecular properties like valence, atomic weights, mirror images and absolute or relative atomic weights because of due process concerns).

perts, which raises the fundamental question again: what does it mean for a chemical to be “substantially similar” to another chemical? Current judicial precedent does not adequately answer this question.

Finally, the Federal Analog Act’s use of an *ex post* standard collides with the Controlled Substances Act’s legal framework because the Federal Analog Act is incompatible with scienter requirements.¹¹⁵ Unlike crimes involving explicitly listed chemicals, the Federal Analog Act imposes no scienter requirement on the defendant. If a controlled substance analog is defined through an *ex post* adjudication, there is surely no way that a defendant could know that a previously unlitigated chemical falls within the purview of the Federal Analog Act. Indeed, since there is no way for a defendant to truly know *ex ante* whether an unlitigated chemical is an analog, a scienter requirement would be largely meaningless. Thus, the Federal Analog Act creates the possibility for strict liability across the entire spectrum of drug legislation by bootstrapping the definition of a Schedule I drug onto a substance carried by an unknowing actor, and exposing her to full liability under the Controlled Substances Act.¹¹⁶

Some courts have attempted to remedy the intrinsic problems with standards by imposing scienter requirements and patching together a quilt of legal devices such as permissive inferences to remedy the problem.¹¹⁷ While these devices present a virtuosic display of practical judicial ingenuity, these legal sleights-of-hand only recognize, rather than resolve, the fundamental problems created by the Federal Analog Act’s use of a standard. At best, they provide a limited practical workaround; at worst, they conflict with the language of the statute and usurp the generally accepted principle that the Federal Analog Act should be read under a conjunctive interpretation.¹¹⁸ Other

¹¹⁵ See, e.g., 21 U.S.C. § 844(a) (2000) (requiring that the accused person knowingly or intentionally possess a controlled substance).

¹¹⁶ See *United States v. Turcotte*, 405 F.3d 515, 528 (7th Cir. 2005) (“One could represent to others (earnestly or not) that a substance has physiological effects similar to a controlled substance despite being totally ignorant of its actual chemical properties.”).

¹¹⁷ See *id.* at 527 (providing a “provisional remedy” for the paradox by imposing a scienter requirement on the Federal Analog Act but also allowing a permissive inference that the defendant satisfies the scienter requirement for the first prong if the defendant satisfies the second prong of the Federal Analog Act).

¹¹⁸ See *supra* note 49 and accompanying text (discussing the debate over the conjunctive and disjunctive interpretations of the Federal Analog Act).

courts inexplicably decline to find any scienter requirement at all.¹¹⁹ Neither approach appears to solve the intrinsic problems posed by an ex post determination.

Thus, fair-notice concerns strongly favor the use of simple rules in controlled substance legislation—or alternatively, the use of standards that have the potential to blossom into a clear set of rules through judicial precedent.

III. PROPOSED CHANGES

A. *Mixing Rules and Standards in the Federal Analog Act: Putting It All in the Cauldron*

The discussion above¹²⁰ reveals that neither standards nor rules alone provide a satisfactory solution to controlled substance legislation. Costs favor standards, deterrence favors standards in some situations and rules in other situations, and due process concerns favor rules. The Federal Analog Act, which uses a standards approach, only partially fulfills these objectives. However, there is a ready solution at hand. By mixing rules and standards, a law can be designed to (1) minimize costs, (2) selectively maximize criminal deterrence and minimize legitimate research deterrence, and (3) maximize fair notice. Since laws exist on a spectrum between standards and rules, there are a variety of ways to achieve this objective.¹²¹

The Federal Analog Act should use translucent standards—standards that are more easily defined than the Federal Analog Act's current opaque standard.¹²² For example, if the Federal Analog Act prohibited chemicals that differed from scheduled drugs only by “functional groups,” this standard would reduce the cost of promulgating many heterogeneous rules, selectively deter criminals, and sat-

¹¹⁹ See, e.g., *United States v. Desurra*, 865 F.2d 651, 653 (5th Cir. 1989) (upholding a conviction under the Controlled Substances Act because there is no requirement that the defendant know that the substance in her possession qualifies as a controlled substance analog).

¹²⁰ See *supra* Part II (discussing the characteristics of rules versus those of standards in the context of controlled substance analog legislation).

¹²¹ See Korobkin, *supra* note 54, at 30 (“The legal forms of rules and standards, then, are better understood as spanning a spectrum rather than as being dichotomous variables.”); see also *id.* at 29 fig. (providing a diagram describing the spectrum between rules and standards).

¹²² See generally Colin S. Diver, *The Optimal Precision of Administrative Rules*, 93 YALE L.J. 65, 67 (1983) (contrasting the objectives for rulemaking, which are transparency, accessibility, and congruence).

isfy due process concerns. First, this translucent standard would be more efficient than the promulgation of rules, because even a translucent standard would have much greater breadth than a simple rule. There are surely some chemicals that are different only by “functional groups” from drugs prohibited by the Controlled Substances Act. For example, a halo-substituted analog is one of the least aggressive variations of a molecule that could be made without the molecule remaining completely identical to a listed chemical.¹²³

Second, a translucent standard would selectively deter criminals because it would only prohibit chemicals within a certain “radius” of a currently controlled substance. This implementation provides an effective filter to target clandestine chemists selectively, since legitimate pharmaceutical and academic researchers are more likely to experiment with more complex deviations from core structural backbones, whereas clandestine chemists are more likely to adhere to simple permutations of a known psychoactive core. As the potential analog becomes less “substantially similar” in structure to a listed chemical, the more likely it is to implicate due process concerns and the less likely it is to serve as a reliable proxy for the pharmacological effect of the listed drug.

Third, a translucent standard would fulfill fair notice requirements, because it would provide a map by employing simple rules as guideposts. Although simple rules are generally better at providing fair notice, complex rules do not necessarily provide fair notice as well as simple standards do.¹²⁴ A simple but concrete elementary standard can allow an ex post adjudication to cover great breadth without threatening due process.¹²⁵

However, in more complex cases—where the chemical in question is arguably very different in structure than a controlled substance—the Federal Analog Act should rely on transparent, predefined rules, rather than “facts” tied to so-called scientific reality, which are likely to be manipulated by spurious expert opinion.¹²⁶ For example, relating

¹²³ Technically, isomers and different enantiomers may be variations on a molecule, but they still fall within the purview of the Controlled Substances Act. See 21 U.S.C. § 812(c) sched. I (2000) (prohibiting “isomers, esters, ethers, salts, and salts of isomers, esters, and ethers”).

¹²⁴ For example, consider the United Kingdom’s extraordinarily complex controlled substance legislation. See, e.g., The Misuse of Drugs Regulations 2001, S.I. 2001/3998 sched. 1 (U.K.), available at http://www.opsi.gov.uk/si/si2001/uksi_20013998_en.pdf.

¹²⁵ This is discussed further in Part III.C, *infra*.

¹²⁶ See Anacker & Imwinkelried, *supra* note 32, at 749-50 (“[D]efense critics point out that some prosecution witnesses have frankly conceded that their conclusion

heavily modified chemicals to controlled chemicals would increase the opacity of a standard to the point where it is virtually impenetrable.¹²⁷ For these cases, it is better to provide rules as guideposts to illuminate the standard. In such complex cases, rules would help to minimize overall costs by offsetting promulgation costs with decreased litigation and information costs. Rules would also selectively deter criminals in complex cases, since pharmacists—not criminals—are interested in studying unexplored pharmacological terrain. Finally, rules would provide fair notice to all. Although standards that could properly cover complex cases would need to incorporate exemptions and factor tests to satisfy policy goals like deterrence, a simple rule banning the problem compound would, at a minimum, provide adequate notice to the interested party.

B. Practical Implementation: Changes to the Federal Analog Act

If Congress decides to amend the Federal Analog Act, there are several ways that rules and standards could be mixed. First, Congress might specify the scope of “substantially similar” in order to encompass preferred policy objectives. As discussed above in Part III.A, the optimal range of policy goals seems to be captured by a translucent standard combined with strategically placed rules.

One approach might be to provide more *ex ante* guidance on what constitutes a “controlled substance analog.” For instance, Congress could statutorily define a “controlled substance analog” as a chemical that is “substantially similar” to (1) a currently scheduled chemical, or (2) a chemical that has previously been considered a controlled substance analog, with the stipulation that a chemical is “substantially similar” to another chemical if it differs only by an “unsubstituted functional group.”

[about substantial similarity] is ‘a “gut level thing” . . . based on intuition . . .’ (quoting *United States v. Brown*, 415 F.3d 1257, 1267 (11th Cir. 2005)).

¹²⁷ For example, if two highly unrelated chemicals like salvinorin A and THC were regarded as “substantially similar” in structure under a particular standard, it would be exceedingly difficult to extract information as to *why* the chemicals were “substantially similar.” Are they “substantially similar” because they both contain cyclical ether groups? Or is it because they both contain hydroxyl groups? Or perhaps because they both contain three signature aromatic rings? Would we infer that the large number of carboxylate groups in salvinorin A do not impact the analysis? The speculation could go on and on. The problem is that salvinorin A and THC are structurally different in so many ways that this standard would be largely meaningless for any future determination.

Although the DEA considered a similar proposal when formulating its recommendation to Congress, it ultimately dismissed this proposal because it believed that there were too many different groups available to provide an all-encompassing and coherent model.¹²⁸ While this would certainly be problematic in a pure rules-based model,¹²⁹ it would not raise the same problems in a rules-standards hybrid. In a hybrid model, it would not even be necessary to define “unsubstituted functional group,” since this terminology is simple enough for most laypersons to understand and could remain an issue for ex post adjudication. This proposed definition would both contract and expand the scope of the analog statute. It would expand the scope because the definition itself would be recursive: if a court found that a chemical was an analog, the definition would expand to encompass all immediate permutations of that analog, which would allow the law to provide both clear notice and also to keep pace with black market entrepreneurs.¹³⁰ On the other hand, this hybrid model would also appropriately contract the definition of an analog: it would limit the reach of the statute to permutations of groups and their subsequent spin-offs, instead of potentially barring enormous swathes of unrelated chemicals. Presumably, the definition could also be enhanced by adding a discrete list of exceptions, since only a finite number of permutations would be prohibited, compared to the infinite number potentially prohibited under the current incarnation of the Federal Analog Act.

¹²⁸ See SAPIENZA, *supra* note 65 (“[One approach involves] chemical structural parameters for different classes of substances subject to abuse and control. All substances which fell within these parameters would be considered controlled. Defining these parameters was rather difficult for the many classes of controlled substances. Additionally, this method would impose regulatory controls on thousands of substances and could negatively impact legitimate drug development.”). However, history has shown that these problems arise even under the DEA-endorsed incarnation of the Federal Analog Act. See *supra* Part II.B.3 (discussing the broad and vague interpretations of “substantially similar” structure that appellate courts have upheld).

¹²⁹ See note 124, *supra*, for an example of the United Kingdom’s extremely convoluted analog statute using a purely rules-based, ex ante model.

¹³⁰ By recognizing that “substantially similar” is essentially a proxy for policy decisions, instead of a fact-based inquiry, Congress could adjust the definition accordingly. The proposed definition assumes that a chemical is “substantially similar” to chemicals with substituted groups on the same backbone, and dissimilar to chemicals with second-degree substitutions—an assumption that appears to be compatible with the case law reviewed in notes 100-106, *supra*. However, Congress could also further expand or contract the scope of the case law as needed by either eliminating or strengthening the recursion, and by providing guidelines delineating which functional groups would fall within the definition.

Second, Congress could create an exemption for legitimate medical research. When the Federal Analog Act was first proposed, the American Chemical Society lobbied Congress to create an exception to facilitate legitimate industrial and academic research.¹³¹ The original draft of the Federal Analog Act included a small exemption for research scientists who obtained a license from the DEA, but exemption quickly became the focus of controversy from legislators who derided it as the “Timothy Leary” loophole.¹³² However, this provision operated on the important insight that exemptions make rules act more like standards, and can therefore solve some of the overdeterrence problems that might hamper legitimate research efforts without sacrificing criminal deterrence.¹³³ Thus, the exemption provision should be reconsidered, subject to careful scrutiny and better-developed licensing requirements.

C. Institutional Responses

The federal government could also implement a hybrid rules-standards approach at an institutional level, without directly amending the Federal Analog Act. There are different ways to mix rules and standards at this level. For example, Congress could improve the efficiency of the rulemaking process. Jurisdictions that rely on rules often streamline the process of officially prohibiting a particular drug much more efficiently than a jurisdiction that mixes rules and standards.¹³⁴ However, while this approach grants much-needed flexibility to drug enforcement agencies and legislators, it also sacrifices an op-

¹³¹ See Smith, *supra* note 86, at 122.

¹³² *Id.* at 120-21 (describing Representative Lundgren’s opposition to the proposed exemption).

¹³³ See Korobkin, *supra* note 54, at 29 (“[A] pure rule can become standard-like through unpredictable exceptions . . .”).

¹³⁴ See EUROPEAN MONITORING CTR. FOR DRUGS AND DRUG ADDICTION, LEGAL RESPONSES TO NEW SYNTHETIC DRUGS: 2000–2004, at 6 tbl.1 (2004), available at http://eldd.emcdda.europa.eu/attachements.cfm/att_9942_EN_New%20Synthetic%20Drugs%20report.pdf (describing Denmark’s unusually fast official scheduling system as being capable of permanently prohibiting a new drug within ten days). Most other European countries schedule drugs for permanent prohibition within one to two months. See *id.* Emergency scheduling is similarly speedy, usually taking place within two months. See *id.* Compare this to the United States’ slower response: it took four years to permanently prohibit MDMA, and a full month to complete the emergency scheduling procedure. See Kay, *supra* note 43, at 2163-66.

portunity to carefully consider possible medical uses of the chemical in dispute.¹³⁵

Conversely, in jurisdictions that employ standards—as in the United States—courts could play an instrumental role in carving out the contours of controlled substance analog jurisprudence.¹³⁶ The Federal Analog Act relies on judicial determination of whether a particular chemical is “substantially similar” to another chemical to give content to its standard. If courts were to define the outer limits of the Act’s reach, most of the problems might be solved over time. However, the conversion of standards to rules through judicial precedents has proved to be unworkable in practice, partly because of the peculiar complexity of chemicals, and partly because few cases are actually brought to trial and/or reviewed on appeal.

Perhaps the simplest solution is for the DEA to strengthen the use of rules by petitioning for the official listing of potential chemical analogs on each appropriate schedule instead of simply waiting for each chemical to become a problem. As discussed above,¹³⁷ the chemicals developed by legitimate academic and industry researchers are the same chemicals that are created by clandestine chemists. Therefore, constructing a database of potential analogs should be as simple as searching the scientific literature for the appropriate structural backbone, along with pharmacological search terms such as “hallucinogen,” “stimulant,” or “depressant.”¹³⁸ Granted, this must be done in combination with a clearer and more limited definition of “substantially similar” structures, or else the tree of potential analogs will simply grow exponentially and cloud the issue once more.

In conjunction with the creation of a more comprehensive list of chemicals, there is also a need to facilitate the listing of a chemical beyond an emergency basis. One solution might be to extend the emergency basis indefinitely, but subject it to effective rebuttal hearings.

¹³⁵ A pure standards-based approach like the Federal Analog Act also suffers from this problem, to an even greater degree. One possible remedy might be to provide a less onerous mechanism for challenging the permanent scheduling of drugs, or to loosen the reins around medical research on scheduled drugs (this is unlikely to happen, however, because in the United States a Schedule I drug is by definition one that has no medical use).

¹³⁶ See Kaplow, *supra* note 52, at 610 (“Precedents could be established in a more rule-like fashion than is usually done.”).

¹³⁷ See *supra* Part I.B (discussing the link between legitimate pharmaceutical research and black market “designer drugs”).

¹³⁸ See Shulgin, *supra* note 38, at 406 (suggesting that illicit chemists use this method to draw upon research to acquire targets for synthesis).

Once the DEA has officially listed a chemical, the agency has effectively “captured” the chemical and will rarely remove it from the list. Thus, rebuttal hearings ought to be conducted with procedural safeguards to avoid agency capture, perhaps by federal courts.

Another effective method of satisfying due process concerns is through blunt force. If the DEA provides notification on what it considers to be a potential controlled substance analog, this will soften the blow against law-abiding citizens, who tend to trust governmental agencies’ assessments.¹³⁹ A declaration from the DEA that the federal government will treat certain chemicals as analogs provides both fair notice and sufficient deterrence to all but the most foolhardy individuals. Even though the DEA cannot issue legally binding interpretations of the Federal Analog Act, the mere threat of enforcement, coupled with the virtually unlimited legal resources of the federal government, ensures that few individuals will run the risk of losing an expensive legal battle against the federal government.¹⁴⁰ Any attorney could give a similar—and perhaps more objective—legal analysis, but such analysis carries significantly more weight when issued by an agency with the power of *acting* upon its analysis. Indeed, some courts

¹³⁹ As Kaplow describes it,

[G]overnment action outside the formal lawmaking processes can provide important guidance for future behavior. For example, the government’s undertaking and publishing the results of comprehensive studies of the hazards posed by various chemicals may have a substantial effect on their use even if the results are not embodied in a regulation or formally binding in a negligence suit or other legal proceeding. If a regulatory agency undertook such an investigation, individuals might expect the agency to act on the results in setting its enforcement priorities and in adjudicating even if no rule was promulgated declaring the result to be binding.

Kaplow, *supra* note 52, at 615 (footnote omitted).

¹⁴⁰ See, e.g., Walter R. Rodriguez & Russell A. Allred, *Synthesis of trans-4-Methylaminorex from Norephedrine and Potassium Cyanate*, 3 MICROGRAM J. 154, 155-56 (2005), available at <http://www.dea.gov/programs/forensicsci/microgram/journal071203/mj071203.pdf> (noting that the DEA believes that *trans*-4-methylaminorex is a potential analog of *cis*-4-methylaminorex under the Federal Analog Act, and that “it is virtually certain that Federal prosecution of *trans*-4-methylaminorex as a controlled substance analogue would be successful”). It is curious that this opinion is buried within an obscure DEA in-house technical publication instead of being easily accessible on the DEA’s frontpage. In a recent case, a chemical engineer was convicted of synthesizing and distributing *trans*-4-methylaminorex by a novel synthetic method that he developed himself. *4 Methylaminorex/MDMA/Methamphetamine Laboratory in Fort Lauderdale*, 38 MICROGRAM BULL. 31 (2005), available at <http://www.usdoj.gov/dea/programs/forensicsci/microgram/mg0205/mg0205.pdf>. If the defendant in that case had been aware that the DEA regarded *trans*-4-methylaminorex as a controlled substance analog, perhaps he would have been deterred from his conduct.

have indicated that they will give special weight to an agency's non-binding opinion in deciding whether a defendant knew that he was distributing a controlled substance analog.¹⁴¹ One disadvantage, however, is the possibility that the DEA might overextend its authority and capture as many chemicals as possible, whether or not the chemical properly falls under the Federal Analog Act. For example, in 2002, the DEA issued an opinion that *Salvia divinorum* fell within the orbit of the Federal Analog Act.¹⁴² However, this is demonstrably untrue, as the chemical structure of *Salvia divinorum* does not bear any resemblance to any of the twenty-three categories of drugs listed on Schedule I or II.¹⁴³ Thus, to provide checks and balances, a refined definition of what constitutes a "substantially similar" structure is needed to provide a counter to the federal government's ability to issue non-binding legal opinions at will.

Finally, the DEA should hold nonbinding preliminary hearings and allow citizens to challenge potential controlled substance analogs. Although this approach concededly adds to transaction costs, there are twin benefits to treating potential analogs procedurally as if they were officially listed drugs. First, this provides ample notice as to whether the DEA considers the drug to be a potential analog. Second, it also provides an important opportunity to set the stage for possible medical and psychotherapeutic uses of the drug. A scientist is much more likely to proceed with research if he has obtained the equivalent of a "no-action" letter from the DEA.

¹⁴¹ See, e.g., *United States v. Turcotte*, 405 F.3d 515, 528-29 (7th Cir. 2005) (finding on appeal that the lack of a jury instruction concerning the defendant's scienter as to whether a chemical was a controlled substance analog would ordinarily constitute reversible error but for "DEA regulations [that] also specify that 'GBL and 1,4-butanediol are structurally and pharmacologically similar to GHB and are often substituted for GHB. Under certain circumstances they may satisfy the definition of a controlled substance analogue.'" (quoting Placement of Gamma-Butyrolactone in List I of the Controlled Substances Act (21 U.S.C. § 802(34)), 65 Fed. Reg. 21,645 (Apr. 24, 2000) (codified at 21 C.F.R. § 1310.02)).

¹⁴² See U.S. Dep't of Justice, Diversion Control Program, *Salvia Divinorum*, aka. Maria Pastora, *Salvia* (Salvinorin A, Divinorin A) (last visited Feb. 15, 2008) (search <http://www.archive.org/> for http://www.deadiversion.usdoj.gov/drugs_concern/salvia_d/summary.htm, select result from Nov. 18, 2001) (describing salvinorin A's legal status as possibly subject to control under the Federal Analog Act "because of its functional pharmacological similarities to other CI hallucinogens like THC").

¹⁴³ Cf. SHULGIN, *supra* note 92, at 256-58 (breaking down all of the scheduled drugs into categories based on their fundamental chemical structure). Salvorin A, the psychoactive component in *Salvia divinorum*, does not belong to any of the classical backbones. Cf. Imanshahidi & Hosseinzadeh, *supra* note 50, at 428.

CONCLUSION

The alphabet soup of designer drugs that exploded onto the drug scene in the 1980s presented an amorphous and fluid threat that provoked a shock and awe campaign from Congress in response. However, the twenty years since the passage of the Federal Analog Act have shown us three important insights.

First, the threat is not as amorphous and unpredictable as it may have appeared at first glance. Rather, the name “designer drug” is something of a misnomer—“designed and copied drug” is probably a more accurate description. If there is a copy, there is a source; if there is a source, we know where the next copy will arise.

Second, the standards of the Federal Analog Act have failed to blossom into a satisfactory set of precedents that maximize proper notice and deterrence of criminal activity, minimize deterrence of legitimate research, and minimize information costs. In addition, the Federal Analog Act’s implementation of a pure standards-based model presents several unresolved and perplexing problems. A comparison of the use of rules versus standards in the controlled substances area suggests that a mixture of rules and standards provides a compelling solution that addresses many of the current problems found in the Federal Analog Act.

Third, the backlash from the widespread recreational use of phenylethylamines has begun to subside, sparking new interest in the potential of well-known psychoactive agents like MDMA and psilocybin, as well as other undiscovered agents that may hold great potential for medical and psychotherapeutic applications.

The power to predict designer drug trends comes with the power to define the contours of the Federal Analog Act and make it into a cost-effective and precise weapon that selectively targets criminal activity while minimizing collateral damage to medical research and innocent actors. The current standards-based model of the Federal Analog Act—which suffers from both theoretical and practical problems—is long overdue for a dose of change. Adding rules into the brew to cook up a rules-standards hybrid may be the best remedy available.