



## Graphing Current Drug Data

Curriculum Unit 86.05.01  
by Beverly Stern

### Introduction

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The purpose of this unit is to (1) increase understanding of the drug issue and (2) further develop skill in graphing. Except for this introduction the unit has been written to be used as a text for students.

There are four parts: The Current Scene, 7000 Years of Drug Use, Why is Taking Drugs So Dangerous?, and Graphing Drug Data.

This unit was planned with 10th, 11th and 12th grade students in general math courses in mind. The reason for focusing on this group is that through the years I have found it difficult to find material that was suitable to their level of maturity and yet mathematically uncomplicated. It also could be used in an algebra I or social studies course.

To do the entire unit would probably take between one and two weeks. However, it could be used in independent one day units and the data could be used in many different ways. One plan for how to use this unit is as follows.

Assignment #1: Read sections The Current Scene, 7000 Years of Drug Use, and Why is Drug Taking So Dangerous?

Assignment #2: Discuss the above sections. Start using a time line as part of the discussion.

Assignment #3: Go over ideas in Using Tables. Do exercises.

Assignment #4: Go over ideas in Using Time Lines. Do exercises.

Assignment #5: Go over ideas in Using Bar Graphs. Do exercises.

Assignment #6: Go over ideas in Using Line Graphs. Do exercises.

Assignment #7: Go over ideas in Using Circle Graphs. Do exercises.

The best two of each type goes up on display.

Two things surprised me when I first began to do research on the drug issue. First, the issue of drug use/abuse can be seen as part of the much larger issue of substance abuse. The substance could be illegal (i.e. cocaine and marijuana), legal (i.e. alcohol and nicotine), or even a necessity of life (i.e. food, work and exercise). The common link is a compulsion to repeat a behavior that interferes with optimal functioning. One of the most subtle aspects of substance abuse is that of use/abuse relationship. Use of things such as food is a necessity of life, but taken in excess they begin to deteriorate the quality of life and may result in damage to one's health or ability to function. Alcohol is socially acceptable and through the centuries has helped to make countless social gatherings merry. In excess, however, it becomes a dangerous substance with dire bio-psycho-social consequences.

Second, the use/abuse of drugs is not a new issue; it has been around for at least 7000 years. What is new is the large quantity and variety of drugs that in our technological age can be sent by land, sea and air to all parts of the world. Therefore, what we are looking at is an issue that is causing biological, psychological and social problems around the world.

## The Current Scene

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At the time of this writing, July 1986, the United States army has helicopters and troops in Bolivia trying to find and destroy hidden cocaine factories. Speaker Thomas P. O'Neill has called for a bipartisan House effort to develop a new comprehensive drug law that would include (1) eradication of drug crops, (2) interception of drug shipments and drug traffickers, (3) law enforcement, (4) public education, and (5) treatment of drug users.

Richard M. Smith, editor-in-chief of *Newsweek*, recently called the use of illicit drugs "the plague among us" and wrote,

It has taken lives, wrecked careers, broken homes, invaded schools, incited crimes, tainted businesses, toppled heroes, corrupted policemen and politicians, bled billions from the economy and in some measure infected every corner of our public and private lives. It is a national scandal, and if we seem powerless to stop it, it is because so many of us are willing to spend the money and break the law to sustain what has become, by government estimate, a \$110 billion-a-year drug habit. We have met the enemy, and he is us<sup>2</sup>. But Mr. Smith was talking about illegal drugs, and it seems that these are not the only ones with which to be concerned. Richard Hughes and Robert Brewin, in *The Tranquilizing of America*,<sup>3</sup> discuss such things as (1) roughly 25% of the nation's drug bill goes for prescription tranquilizers (about 2 billion dollars), (2) there are some 300,000 nonprescription over-the-counter drugs many of which if taken in excess or mixed with other substances can cause serious problems or even death, (3) a number of studies are suggesting that many prescription and nonprescription drugs which women take during pregnancy can cross the placental barrier and cause serious problems for the fetus, and (4) drugs are often used to control others—such as to unnecessarily induce labor, to sedate anxiety rather than to find its cause and to quiet hyperactive children who may be hyperactive because of the chemical additives in their food or simply because they are energetic.

If we add to the number of people using illegal, prescribed and nonprescribed drugs, the 10 million alcoholics and an estimated 8 million to 20 million more with moderate to severe drinking problems, 50 million smokers, and all the caffeine users of coffee, tea, cola drinks, diet pills and other stimulant pills, a picture of the extent of our culture's drug usage begins to emerge.

Dr. Ingrid Waldon, a biologist at the University of Pennsylvania, feels that to understand the drug use in America, it must be looked at in the social context. Societal problems such as the Vietnam War, the change in male and female roles, economic uncertainty and an increasingly competitive climate in school and work have caused the rise of social stress. People feel overwhelmed by these issues and, instead of learning to deal with the stresses and problems such issues cause, take drugs to obviate the discomfort and pain. This practice is supported by peer groups, doctors and the culture in general. However, she says, taking drugs not only attacks the wrong problem, but it leaves the individual and society with even greater problems. Besides the physical and psychological problems caused by taking too many drugs, it focuses attention on the individual and treats his symptoms rather than focusing on the social and political context of the issues and developing co-operative efforts for social change. <sup>4</sup>

Whose fault is it that we are so involved in drugs? Is it the fault of the drug companies who promote them? The doctors who prescribe them? The government for not having better laws and enforcement? The individuals who take them? Among the views Hughes and Brewin present is that of Dr. Edward Tocus, a twenty year veteran of the Federal Drug Administration. Dr. Tocus believes that

. . . the answer to the problem lies with each and every individual, who sooner or later must come to the conclusion that life without recourse to drugs is far better than life with drugs. <sup>5</sup> A final viewpoint is that of Howard P. Rome, MD, editorial director of *Psychiatric Annals*, who refers to drug abuse as substance abuse. He feels that though different addictions may require different treatments, it is important not to see addiction to different substances as different phenomena, but to look beyond the differences to underlying similarities.

In the tangled skein of the history of these drugs, if one looks carefully, one finds the generic problem to be that of substance abuse. <sup>6</sup>

There is an important project being done at the University of Michigan's Institute for Social Research. Each year since 1975 they take a national survey of high school seniors. It is sometimes called the High School Senior Survey, and it is part of a larger program entitled Monitoring the Future: A Continuing Study of the Lifestyles and Values of Youth. Many important findings have come from this study. Three of these findings are as follows.

Probably the most important finding in 1985 is that the rather steady decline of the past four years in overall illicit drug use among high school seniors appears to have halted. The proportions of seniors using *any illicit drug* in their lifetime, the past year, and the past month remained virtually unchanged in 1985, compared to 1984, as did the proportions of seniors using *any illicit drug other than marijuana*. This halt in a longer term decline was replicated in trend data derived from the nation's college students and young adults generally.

Concurrent with this halt in the decline in overall involvement with illicit drugs came the equally disturbing finding that *cocaine* use increased among seniors in 1985. Current use (i.e., use in the prior 30 days) rose from 4.9% in 1983 to 5.8% in 1984 to 6.7% in 1985. Some 17% of all seniors in 1985 have tried it.

Clearly this nation's high school students and other young adults still show a level of involvement with illicit drugs which is greater than can be found in any other industrialized nation in the world. Even by historical standards in this country, these rates still remain extremely high. <sup>7</sup>

## 7000 Years of Drug Use

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The oldest record of drug use comes from the cuneiform writing of the Sumarian people of Asia Minor in about 5000 B.C. Their records tell of a “joy plant”, opium.

About 3000 B.C. Chinese records tell of the substance ephedrine which was used as an inhalant and a plant cannabis sativa, marijuana, which was brewed into a tea and used for medicinal purposes. About 2000 B.C. Indian records show cannabis had been introduced into India where the people dried and smoked it. Thus, as early as 2000 B.C. drugs were being inhaled, brewed into teas and smoked.

We do not have a record of the earliest uses of alcohol, but it is assumed to have originated by accidental fermentation during primitive times. The earliest recorded reference to alcohol was found in the Code of Hammurabi which was inscribed in Babylon about 1700 B.C. The Code warned against drunkenness.

About 1500 B.C. Egyptian papyri expressed fear of opium elixirs because of the hallucinogenic delusions they produced. The Egyptians used opium elixirs as a kind of anesthetic when performing primitive skull surgery.

The discovery of drug properties varied in different parts of the world according to the local vegetation. By 1000 B.C. the Incas, in what is now Bolivia and Peru, were chewing coca leaves because they had a stimulating effect, increased energy, suppressed appetite and produced euphoria. This drug was also part of their religious ceremonies and was considered more valuable than silver or gold. The active ingredient in coca leaves is cocaine.

About 100 B.C. the Aztec Indians of Mexico had a culture built around the magic properties of the peyote cactus, the psilocybin (sacred) mushroom and the seeds of a certain type of morning glory all of which have hallucinogenic properties. In North America it was common for the Indians to inhale the smoke from burning tobacco leaves.

The ancient Greeks extensively used alcohol and other drugs, and classical literature has many references to them. In Homer’s the Iliad and the Odyssey, which dates from about 800 B.C., it is suggested that some of the heros overindulged in wine. This included Achilles, the hero of the Trojan War. When Helen went to Troy, she is said to have brought a drug-like substance, nepenthe. Some people believe nepenthe to be marijuana and others opium.

About 400 B.C. the Greek historian Herodotus wrote about the Scythians, nomads who lived in part of what is now Russia. He told how they cultivated a hemp plant which they burned like incense in closed rooms. The Scythians inhaled the fumes of the burning hemp and became as intoxicated as Greeks who were drunk on wine. About the same time, Hippocrates, sometimes called the father of medicine, was experimenting with medical preparations using opium.

By 100 A.D. the Romans were enjoying wine so much that they had to develop anti-drunkenness laws. Because the Romans were conquerors of other lands, they came into contact with other drug cultures. In the first century A.D. Dioscorides, a Greek surgeon who traveled with the Roman army, described how to make liquid opium by crushing the pod of the poppy plant. During the second century A.D., Galen, court physician to Marcus Aurelius, was a proponent of the benefits of opium eating and other vegetable therapies. Because of his authority, such preparations were known for centuries as Galenicals.

During the first millennium A.D., the cultivation of cannabis spread and well-defined patterns of use developed. In India in the first century A.D., the *Susruta* describes specific grades of cannabis. Bhang, the least potent, was brewed into tea by the lowest classes. Ganja, a stronger grade, was usually smoked by the middle classes. Charas, the most potent grade, comparable to hashish, was mixed with nuts and honey and eaten by the most affluent classes.

The word hashish dates back to 11<sup>th</sup> century A.D. in Persia where drugs first became associated with criminal activities. A group of Muslims called “Hashish”, henchmen, allegedly would use hashish in preparation to launch violent attacks against rivals.

Throughout the 11th and 12th centuries A.D. “drug-poor” Europe learned about drug cultivation and preparation, including knowledge of hashish and distilled alcohol, from “drug-rich” Asia. When Marco Polo returned from expeditions to the Orient, he brought not only the spices and silks that history books usually tell about, but also detailed knowledge on opium cultivation and drug cults.

In reporting the history of caffeine, Robert O’Brien and Sidney Cohen wrote the following.

It was through the travels of early explorers that the familiar stimulant, caffeine, came into widespread use. The coffee tree is an evergreen native to Ethiopia. It was cultivated in early times in Arabia and its berries were mixed with liquid to make a stimulating drink. European explorers in the Middle East recorded seeing Mohammedans drinking coffee for energy during long religious pilgrimages and vigils in the 14th century. <sup>8</sup>

Coffee was introduced into Europe during the 16th and 17th centuries. In 1625 the first London coffeehouse was established. Coffeehouses were favorite places for writers and other creative people, and they became the rage in late 17th and 18th century London. Because of England’s global sea trade, coffee cultivation and use spread throughout the world, most notably to South America which now produces most of the world’s supply.

The European explorers found new drugs when they traveled East and new drugs when they traveled West.

The meeting of the Old World with the New stands as the most crucial drug exchange in recorded history. The explorations begun by Columbus discovered, among other resources, cocaine from South America, hallucinogens from Central America and tobacco from North America. These drugs were brought back to European courts and received with as much relish as parrots, gold and furs. The drug exchange became complete when the Europeans introduced into the Americas distilled alcoholic beverages and, in Chile in 1545, cannabis from Asia.

The tobacco revolution was especially remarkable. Indians introduced European sailors to smoking and with its alternating stimulating and tranquilizing effects, it became immediately popular. Ships traveled throughout the world with tobacco leaves and seeds. Magellan brought it with him to Africa, the Dutch to the Hottentots and the Portuguese to Polynesia. In 1560 Jacques Nicot introduced tobacco smoking to France and claimed it had great medicinal potential. The active ingredient nicotine is named after him. Sir Walter Raleigh brought pipe smoking to England. By 1614 in England, even the poor were smoking.

The addictive nature of nicotine became quickly apparent. In 1623 Sir Frances Bacon described smoking as

A certain secret pleasure. Those who have once become accustomed thereto can later hardly be restrained therefrom. <sup>10</sup>

In 1603 Japan acted to prohibit smoking, in 1604 James I of England wrote against smoking and in 1642 and 1650 Papal encyclicals against smoking were published. All these efforts failed. Most countries soon replaced prohibitions on smoking with high and very profitable taxes. In every culture into which it was introduced, tobacco became common. The last culture being the tribes of the Arctic region during this century.

No social practice matches the virtually universal appeal of smoking, a fact which can only be accounted for by the addictive quality of nicotine and the conditioning established after thousands of nicotine “hits” to the brain. <sup>11</sup>

The struggle to control smoking continues today. One interesting recent event has been action taken by the army. As the New York Times reported it, smoking and soldiering have gone together for a long time. It seemed to offer an interval of relief from fear or boredom.

But today the service turned about face and deserted that tradition. Citing the health of smokers and nonsmokers alike, the Army adopted a new policy meant to make the habit an exception rather than a rule among the troops. Around the world today, smoking was prohibited in Army facilities, vehicles and aircraft, with the exceptions of specially established smoking areas.

The Army’s new policy is part of a campaign against tobacco throughout the military. The Navy and Air Force are expected to announce their own new rules shortly.

Going back to the 1600s while the use of tobacco was becoming widespread, the use of opium was also increasing. By 1650 it was recognized that the use of opium caused serious health problems, but by then there was organized commerce in it. In 1776 the English East Indian Company began shipping opium from its colony India to China. Chinese rulers made it a capital offence to smoke opium, but this first effort to control opium use failed.

In 1839 the Chinese government again prohibited the importation of opium and seriously tried to enforce the law. The result was the Opium War between China and England from 1839 to 1842. England won. A second opium war was fought 1856 to 1858. China still had to permit importation of opium subject to high tariffs. In a pattern that would be repeated in other nations, attempts to curb drug traffic by high tariffs only succeeded in encouraging smuggling and criminal conspiracies.

England justified its position in the Opium Wars by saying it encouraged shipment of opium to its own shores—which it did. Opium was commonly used throughout England, the rest of Europe and America. The most widespread use was in childrens’ medicines.

The most popular household guide of the time, *Beeton’s Book of Household Management*, felt compelled in its 1869 edition to warn that certain “preparations, which are constantly given to children by their nurses and mothers, for the purpose of making them sleep, often prove fatal.” <sup>13</sup>

There seemed to be no choice for the poor, especially the women who did textile work in their homes. The German Frederick Engels in *The Condition of the Working Class in England in 1844* described the effects of increasing dosages as the young bodies developed tolerance to the drug. He wrote,

They become pale, stunted and weak, generally dying before they are two years old. The use of this medicine is widespread in all the great cities and industrial towns of the country. <sup>14</sup>

Meanwhile advances in chemistry and pharmacology were making new and more potent drugs available.

In 1803 the active ingredient in opium was isolated. It was called morphine after the Greek god of dreams and sleep, Morpheus. It became commonly used as a pain killer and hundreds of thousands of people became addicted to it. In 1853 the hypodermic needle was introduced. It was mistakenly believed that if morphine was injected it would not be addictive because it did not go through the digestive system.

American medicine relied on morphine. It is estimated that the Civil War, 1861-1865, produced about 400,000 morphine addicts in the army alone.

In 1886 a Dr. Horatio Day wrote that “Maimed and shattered survivors from a hundred battlefields, diseased and disabled soldiers released from hostile prisons, anguished and hopeless wives and mothers, made so by the slaughter of those who were dearest to them, have found, many of them, temporary relief from their sufferings in opium.” Day’s comments were published in a book called *The Opium Habit* which is significant for its recognition of the danger of addiction and resignation to the necessary use of the drug in desperate circumstances. <sup>15</sup>

In Europe more morphine addicts were created during the Franco-Prussian War, 1870-1871.

Although the use of “modern “ drugs kept increasing, alcohol was the most abused drug during the 18th and 19th centuries. While fermented alcohol was used since ancient times, it was the improved methods of distilling spirits, discovered in the late 1600s, that made it become a widespread problem. During the 1700s gin became available at low cost and many impoverished people, especially women, were found in the streets drunk on gin. Gin was nicknamed “mother’s ruin”. Some pointed out that abuse of alcohol led to poverty and misery while others pointed out that poverty and misery led to abuse of alcohol.

In 1878 cocaine became readily available as a treatment of morphine addiction. It was also used as a regional anesthetic for surgery in 1886. In 1889, Styth Pemberton, a marketer from Atlanta, Georgia, who sold opiate liver pills and a mixture of coca leaves and wine which he called French wine cola, mixed coca leaves with caffeine from the kola nut and called the product coca-cola. Because of government insistence, coca-cola had to be “decocainized” in 1906. In the 1880s the use of cocaine spread throughout Europe and America through the use of soft drinks and misguided medical preparations. Sigmund Freud used cocaine. Sir Arthur Conan Doyle’s detective Sherlock Homes used cocaine to counter depression. The first Sherlock Homes’ mysteries published in 1880s were open about his habit, “Quick, Watson, the needle!” In later stories he was cured of this habit to reflect the changing public attitude on drugs.

Cocaine did not gain much popularity in the United States until the 1960s. Since then supplies have been increasing and prices dropping. With the help of these conditions, the use of cocaine has continued to grow. The number of seniors in high school having tried cocaine has almost doubled in the last ten years. It now is a drug of major national concern .

Although marijuana is illegal throughout most of the world, it is the fourth most popular mind-affecting substance used. The first three are caffeine, nicotine and alcohol. As mentioned above, its cultivation and use is documented throughout recorded history. It was brought to the new world in 1500s A.D. by the Spanish who brought it to Chile. It was a major crop in Virginia and New England during colonial times. In 1937 it became illegal in the United States. Despite its illegality, however, marijuana use continued to spread.

Heroin was introduced in 1898, and it was thought to be the cure for opium and morphine addiction. It has been used extensively in the U.S. since the early 1900s. With American involvement in Southeast Asia, our



use and supply of heroin increased. In recent years, however, its use has decreased some, and it is currently estimated that we have about 500,000 heroin dependent people in the country.

Since the time of Hammurabi, almost 4000 years ago, people have been trying to find ways to control drug abuse. The first U.S. law aimed at drug control was made in San Francisco in 1875 against “opium houses” which had developed on the west coast to accommodate the Chinese workers who had come from China to work on the railroads. It proved unsatisfactory. Prohibiting the use of a drug or demanding too high a taxation repeatedly seemed only to encourage criminal control. Our nation’s first law regulating narcotics (opium, morphine, heroin) was the Harrison Narcotics Act of 1914. This law even cut off legal supply of opium to addicts and therefore forced them to seek illegal supplies. This set a precedent of punishment-without treatment. It is worth noting that the new law that House Speaker O’Neil is asking for would include help for addicts.

In 1970 the U.S. passed the Controlled Substance Act which is a law to prevent drug abuse and establish drug control. It brought up to date and consolidated all federal drug laws since the Harrison Narcotics Act. The Controlled Substance Act (CSA) established criteria for determining whether or not a drug should be controlled. Controlled drugs, such as cocaine, are not the same as regulated drugs, such as alcohol. One of the basic differences is that every ounce of a controlled substance, manufactured or imported, must be accounted for. Regulated substances are only “regulated” by federal and state laws that govern their sales and purchase. The CSA classifies controlled drugs according to five schedules.

Throughout this century countries from around the world have been meeting and are continuing to meet, to discuss the drug problem. The World Health Organization (WHO) under the United Nations is the agency that today collects the most reliable worldwide data on drug abuse.

Why is taking drugs so dangerous? The next section might be helpful in answering this question.

### ***Why Is Taking Drugs So Dangerous?***

The passages that follow sketch an overall picture of the drug issue. It covers many important points. It was written , however, in 1977. To update it mention should be made of the increased use of marijuana and cocaine. (See the tables in Figures 11-14 in the last section.) Also, dependence is now recognized to have two forms, psychological and physical, not just physical.

The term “drug abuse” or more broadly, “substance abuse,” was coined to replace emotionally loaded language such as “dope fiend” or “drug addict.” . . . Current thinking is moving away from the overly simplistic descriptions toward an attempt to better understand the problem through consideration of its cultural context. The results are:

- \* less panic
- \* less condemning
- \* more communication
- \* greater understanding

The following classifications are being used with greater frequency . . .

(a) *Experimental Users* -These users may try out various drugs on one or two occasions out of curiosity about their



effects on themselves.

(b) *Recreational Users* -These users participate with friends, at parties or on other social occasions to be sociable or to get into the mood of things.

(c) *Regular Users* These individuals use drugs constantly to attain or maintain a certain desired state, but continue to attempt normal activity, work, school, home, etc.

(d) *Dependent Users* These users find that they can no longer relate to anything other than drug seeking and drug taking. They experience extreme mental or physical symptoms when they are in need of drugs and will do whatever is necessary to obtain them.

. . . The dangers of drug use increase with the amount and frequency of use. However, there are dangers in some drugs at any phase of non-medical use. Overdose is always possible in the case of alcohol, heroin, amphetamines and barbiturates. Injecting drugs increases the possibility of overdose and infection from unsterile syringes. Risks are also increased by using drugs in combination.

The effects of drugs on behavior pose another danger. Impairment of perception, of judgement and of memory can be caused by any drug and are related to minor and major accidents. Behavior changes associated with mood alteration are highly variable from one individual to another and from one setting to another. It is not possible to state accurately that any given behavior will always result from use of a certain drug. Extreme aggressiveness and extreme passivity are most likely to result from alcohol, heroin, amphetamines or barbiturates.

The most obvious, and perhaps the most serious threat to the use of any drug is the possibility of increased use and, ultimately, dependency.

. . . Drug dependency is characterized by craving and by withdrawal symptoms. The latter are physical in nature and can include muscle cramps, vomiting, chills and the like. The drug-dependent person also develops tolerance, which means he requires larger and larger doses to achieve the same effect. <sup>16</sup>

What follows next is a closer look at five drugs. alcohol, caffeine, cocaine, marijuana and nicotine. I chose caffeine, nicotine, alcohol and marijuana because these are the four most popular mood altering drugs in the world. I included cocaine because it has become a serious problem in our country.

It may seem trivial to include caffeine in this list, but I included it because it is one of the world's most popular drugs and because I wanted information on a drug that was not "hard core" so that we might move toward a better understanding that substance abuse can refer to excess of any substance.

## **Alcohol**

*Effects on body* . Alcohol is a mind-altering drug that works as a sedative, changes the way a person thinks and acts, and affects judgement and coordination. Alcohol is a depressant of the central nervous system. It acts on the primitive part of the brain releasing it from the control of the cortex or higher brain functions. Even though alcohol is basically a depressant, it can have a pseudo-stimulating effect caused by hyperactive activity of the primitive parts of the brain when they are suddenly released from the inhibitory control of the higher functions. The stimulating effect is short-lived, however, and it soon gives way to the depressant effect.

Since alcohol is a primary and continuous depressant to the central nervous system, its effect is similar to a

general anesthetic though less profound and longer lasting.

Its effects are long lasting because alcohol is slowly metabolized by the liver. It's the liver's job to filter wastes, contaminants or toxins which might damage the cells throughout the body or interfere with their functioning. On the average it takes an adult about five or six hours to metabolize the alcohol in 4 ounces of whiskey or 1.25 quarts of beer or 5.5 ounces of a martini. Liver damage represents the main health hazard of alcohol, and cirrhosis of the liver is a leading cause of death. Prolonged use of alcohol is also associated with lowered resistance to disease, stomach trouble and heart disease.

*Dependence and tolerance* . Physical dependence definitely occurs and withdrawal symptoms may include hangover, confusion, disorientation, convulsions, visual hallucinations and delirium tremens (DTs). There is about an 8% fatality rate for those who experience DTs without help. A person may develop a mild, moderate or strong psychological dependence on alcohol.

Tolerance to it develops, but imperfectly. With sustained drinking the body may need to increase the amount an alcoholic's performance while intoxicated may be slightly less impaired than a nonalcoholic.

A person's level of intoxication can be fairly accurately measured by a "breathalyzer" test. The criteria used is based on the percentage concentration of grams of alcohol in proportion to grams of blood. In Connecticut legal presumption of intoxication is 0.10%.

*Miscellaneous* . Because of its action in releasing aggressive drives from inhibitory controls, alcohol is a significant factor in over half the crimes of violence in this country and over half the automobile fatalities. And because of its ability to potentiate many drugs, alcohol is often an important factor in drug fatalities, especially when large doses are not involved.

It is estimated that there are 10 million alcoholics and between 8 million and 20 million other people with moderate to serious alcohol problems.

Alcohol is considered a "regulated" substance. States regulate it by controlling outlets, age restrictions, pricing and taxation, and various laws such as on public drunkenness and driving while intoxicated.

## **Caffeine**

*Effects on body*. Caffeine is the most popular drug in the world. It is a stimulant of the central nervous system, and, if taken in moderation, can increase alertness and talkativeness and decrease fatigue.

It affects the body by increasing the heart rate and rhythm, affecting the circulatory system, acting as a diuretic, and stimulating gastric acid secretions. It may elevate blood pressure and inhibit glucose metabolism which would cause a rise in blood sugar levels.

Caffeine may postpone fatigue, interfere with sleep and if taken at bedtime,

usually delays the onset of sleep, shortens sleeptime and reduces the average "depth of sleep". It also increases the amount of dream sleep (REM) early in the night while reducing it overall.

Taken as a beverage caffeine takes five minutes to reach all body tissues, and peak blood levels are reached in 30 minutes. It has a half-life of three and a half hours. Caffeine is usually rapidly and completely absorbed from the gastrointestinal track, and there is no day-to-day accumulation.

Regular use of over 600 mg a day (approximately 5 cups) may cause chronic insomnia, breathlessness, persistent anxiety and depression, mild delirium, stomach upset, and heart disease. Though evidence is so far inconclusive, caffeine has been suspected as a factor in cancer of the bladder and renal pelvis, fibrocystic disease in women, and increased incidence of spontaneous abortions and stillbirths, breech deliveries and cyanosis at birth.

*Dependence and tolerance* . There is caffeine dependence. Some people feel dependence on coffee is primarily psychological but regular use of 350 mg (about 3 cups) or more a day can result in a physical dependence. The most prominent withdrawal symptom is often a quite severe headache which can be relieved by taking caffeine. Other withdrawal symptoms are irritability and fatigue. With regular use of caffeine partial tolerance develops to some or all of its effects.

*Miscellaneous* . Caffeine is primarily consumed in tea and coffee but is also found in cola drinks, cocoa, certain headache pills, diet pills and patent stimulants. Some common sources and the amount of caffeine in each are listed below.

#### Common Sources of Caffeine<sup>18</sup>

| Product                            | Caffeine (mgs) |
|------------------------------------|----------------|
| Coffee (5oz)                       |                |
| percolated                         | 110            |
| dripolator                         | 150            |
| instant                            | 66             |
| decaf brewed                       | 4.5            |
| instant brewed decaf               | 2              |
| Soft Drinks                        |                |
| Dr Pepper                          | 61             |
| Tab                                | 45             |
| Coca-Cola                          | 42             |
| Pepsi-cola                         | 35             |
| Instant/brewed tea (5 min<br>brew) |                |
|                                    | 45             |
| Cocoa                              | 13             |
| Milk chocolate (1 oz)              | 6              |
| Drugs                              |                |
| Vivarin Tablet                     | 200            |
| Nodoz                              | 100            |
| Excedrin                           | 65             |
| Empirin/Anacin                     | 32             |
| Dristan                            | 16.2           |

I have read no estimate of the number of people in the U.S. who have more than 350 mg caffeine daily.

#### **Cocaine**

*Effects on body* . Cocaine is a stimulant of the central nervous system and can cause feelings of extreme euphoria, illusions of increased mental and physical strength and sensory awareness, decrease in hunger, pain

and the need for sleep, intensified heart beat, sweating, dilation of pupils and a rise in body temperature. The euphoria may be followed by irritability, depression, insomnia and extreme paranoia. Formication is common. This is the belief and feeling that ants or other insects are running up and down the skin. In some cases delirium, hallucinations, muscle spasms and pain in the chest may occur. Male users may become impotent. The loss of appetite may cause malnutrition and anemia. Many of these symptoms may be reversed simply by stopping the drug.

The effects of the drug usually last from 2 to 4 hours. Both heavy and light users eventually develop a runny nose, eczema around the nostrils and gradual deterioration of the nasal cartilage.

Death from cocaine overdose is rare, although such instances are on the increase. An overdose usually results in respiratory arrest. Death may also be caused by heart rhythm disturbance, high fever or convulsions. <sup>19</sup>

*Dependence and tolerance* . Physical dependence is rare except for heavy users. When this does occur the withdrawal symptoms are reported to be great hunger, irritability, extreme fatigue, serious depression, prolonged periods of restless sleep, apathy and disorientation. Psychological dependence is more common because users get “hooked” on the feeling of euphoria, and their entire existence begins to revolve around the next dose. If this dependence is severe, the user will experience a deep depression when the effects of the drug wears off.

Although tolerance to cocaine has not been firmly established, there is evidence that the same dose frequently repeated will not produce similar symptoms over a period of time.

*Miscellaneous* . Cocaine is usually sniffed or injected. In its usual street form it is not effective when smoked. However, in the 1970s, a process was developed to convert regular street cocaine into “freebase” cocaine. Freebase has a lower vaporizing temperature than regular cocaine and therefore smoking does not destroy it. This cocaine distillate is called “crack” or “rock”.

It (freebase) is rapidly absorbed by the lungs and carried to the brain in a few seconds. The brief euphoria that results is quickly replaced by a feeling of restless irritability. The posthigh after freebase can be so uncomfortable, that in order to maintain the high, users often continue smoking until they either run out of cocaine or are completely exhausted. <sup>20</sup>

It is estimated that there are about 30 million cocaine users in the U.S.

Cocaine is a controlled substance. It is classified as a Schedule II drug which means (1) it has a high potential for abuse, (2) it has currently accepted medical use in treatment in the U.S., and (3) abuse of this drug may lead to severe psychological or physical dependence.

## ***Marijuana***

*Effects on the body* . Marijuana is absorbed slowly and incompletely by the stomach and is much more effective when smoked. It is almost completely metabolized by the liver, is distributed to all the organs, forms deposits in fatty tissue and crosses the placental barrier.

When smoked it takes effect in a few minutes, peaks in 10-30 minutes and last 2-4 hours depending on the potency. When eaten it takes effect in 30-60 minutes, peaks in 2-3 hours and last three to five hours. Marijuana has a halflife of 28-56 hours.

The effects of marijuana are affected by a number of variables such as (1) the quality of the drug, (2) the dosage, (3) the experience and expectations of the user and (4) the environment.

If the dose is very high it can produce hypnotic and psychedelic effects including distortions of time and space, enhanced sensory perceptions, euphoria and free-flowing thoughts. Sometimes anxiety and paranoia can occur, but this is usually with novice users. Some chronic smokers become lethargic and lose their ambition and interest in everything except smoking marijuana.

The most common physical effects reported with moderate use are dryness of mouth and throat, increase pulse rate and heart action, increase in appetite especially for sweets, red eyes, slight impairment of reflexes and psychomotor coordinated tasks such as driving, and sometimes nausea due to dizziness or anxiety. These symptoms disappear after a few hours except for impaired driving skills which can last up to 10 hours.

*Dependence and tolerance* . A user can develop a moderate psychological dependence on its euphoric and sedative effects. The degree of physical dependency is unknown. Reported withdrawal symptoms are insomnia, hyperactivity and decreased appetite. The body can develop tolerance for it.

According to the National Commission on Marijuana and Drug Abuse, alcohol and tobacco are the two substances most commonly used by regular marijuana smokers. When alcohol is taken with marijuana there is greater impairment of motor and mental skills than with either drug alone. <sup>21</sup>

*Miscellaneous* . After caffeine, nicotine and alcohol, marijuana is the fourth most popular abused substance in the world. Despite its illegal status it is estimated that there are about 30 million users in the U.S. Its use continually increased until 1978-1979. Since then it has somewhat declined. See data in Figures 11-14 in the last section.

Marijuana is considered a controlled substance and is classified as a Schedule I drug. This means (1) it has a high potential for abuse, (2) it has no currently accepted medical use in treatment in the U.S. and (3) there is a lack of accepted safety for use of the drug under medical supervision. Possession is considered a misdemeanor and sale of it a felony.

## **Nicotine**

*Effects on the body* . Ingesting nicotine causes a temporary stimulation or “kick” because nicotine causes the discharge of epinephrine from the adrenal cortex. The epinephrine stimulates the central nervous system and other endocrine glands which cause a sudden release of glycogen—a simple sugar. Stimulation is followed by depression and fatigue which causes the user to seek another cigarette to restimulate the adrenals. At the same time there is a rise in the acidity level of urine to enhance the elimination rate of nicotine and further need for more nicotine.

Many people who try to break the vicious cycle and are not able to, become further depressed. Perhaps the most devastating social effects of nicotine is that it leaves countless addicts feeling guilty and/or powerless. <sup>22</sup>

When taken in smoke nicotine takes 60 seconds to reach the brain, but has a direct effect on the body for up to 30 minutes. That is why smokers who are dependent on nicotine need at least one cigarette every half hour. This adds up to a pack and a half a day.

Cigarette smoke has more than just nicotine in it. It is comprised of a dozen gases (particularly carbon monoxide), particulate matter, nicotine and tar. The tar predisposes the user to lung cancer, emphysema and

bronchial disorders. The carbon monoxide increases vulnerability to cardiovascular disease. Nicotine plays a significant role in many serious diseases, most of which have a high fatality rate. Some of these are chronic bronchitis, emphysema, Buerger's disease (a disease which can lead to gangrenous conditions), and coronary and cerebral occlusions-heart attacks and strokes.

The most common and serious of all long-term effects of smoking is lung cancer, which proves to be fatal in over 90% of cases. Relatively rare in the early 1900s, today lung cancer is a leading cause of death from cancer. An average male smoker runs a 10-times greater risk of death from lung cancer than a nonsmoker: women smokers run a 5-times greater risk. The tar in a cigarette contains many constituents known to cause cancer in experimental animals. The hair-like cilia on the membranes of the lungs (which work to keep the lungs clean) can become damaged or paralyzed by the tar. When the cilia are not working properly the lungs become vulnerable to pneumonia and chronic obstructive pulmonary disease. Cancer of the esophagus, mouth, lips, and larynx are also associated with cigarette smoking.<sup>23</sup>

Women who smoke when they are pregnant run two times the risk of having a stillborn infant. Most babies born of smoking women are smaller than normal and are often premature.

Some possible less severe short-term effects of nicotine are sweating, vomiting, and throat irritation. Other effects which typically lead to more serious long term conditions are increased heart rate and blood pressure-leading to myocardial dysfunction and arteriosclerosis, a drop in skin temperature and increased respiration which may cause chronic hyperventilation and dimness or blurring of vision which can lead to blindness.

*Dependence and tolerance* . Casual use of even three or four cigarettes can develop into a definite physical and psychological dependence. Because smoking is sometimes used as a tranquilizer during times of stress or as a pleasure enhancer after meals or at social gatherings, the psychological dependence is often more difficult to break than the physical dependence. The withdrawal symptoms include irritability, weight gain, depression and preoccupation with the lack of smoking. It usually takes a full year to completely break the habit. Withdrawal symptoms that usually subside quickly are fatigue, dizziness, headache and shortness of breath.

Nonsmokers can be affected by the toxic substances of cigarette smoke in the air around them. They may get eye and nasal irritation, headache and cough from cigarette smoke.

*Miscellaneous* . By government estimate over 50 million Americans smoke tobacco. This makes it the most addictive drug in the U.S.

As cigarette smoking increased, so did the anti-smoking forces. Their effort to educate and force legislation probably has contributed significantly to the recent decline in cigarette consumption in the U.S. The following data published by the U.S. Department of Agriculture in the June 1986 issue of *Tobacco Situation and Outlook Report* is quite interesting. Hopefully we are looking at a maximum, 1982, and experiencing a decline that will continue.

#### Cigarette Consumption

Year Amount Consumed (*in billions*)

1977 616.5

1978 618.0

1979 616.0

1980 622.0  
1981 637.0  
1982 635.7  
1983 620.0  
1984 600.0  
1985 598.0  
1986 587.5 (estimated)

### **Graphing Drug Data**

Having looked at some current views of the drug scene, a brief history, and some more detailed aspects of the drug issue, let's take a closer look at the results of the latest High School Senior Survey. To look at it really isn't good enough. We want to graph it. The purpose of this section is to both work with current drug data and further develop graphing skills.

Figure 1 shows a table giving the number of public and private schools and the number of students who participated in these surveys 1975-1985.

(figure available in print form)

Before we start working three things need to be said. (1) we want to be comfortable in using the given data to make tables and graphs Key in this is to find a balance between wanting to be precise and not wanting to go crazy with precision that is neither necessary nor possible for this type of work. Therefore, let's agree to round all numbers to either whole numbers or to the nearest tenth, whichever makes sense for the particular use.

(2) Don't panic at the terms "scale", "rate", or "ratio". All three terms mean a comparison of two measurements, and, when you have to use them, you will be given an example. (3) Use graph paper. It will make your work a lot easier, and, therefore, more enjoyable.

### Using Tables

(figure available in print form)

The object here is to take a fresh look at using tables. Tables generally give a lot of information in a compact, easy to read form. Some examples of commonly used tables are: tables of contents, time schedules for buses and trains, nutritional information on cereal boxes, register receipts at the super market, comparisons of equivalent metric and standard units of measure, addition and multiplication tables, and calendars.

A good table needs:

1. A title that clearly states what information is given.
2. An arrangement that is easy to read.
3. Labels for all columns and rows.
4. Source credit for information.
5. To be neat and attractive.



Figure 3

(figure available in print form)

## Exercises

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1. Consider each of the above points for the table in Figure
2. Comment on whether or not you think it meets each of the six points. Use complete sentences.
2. Make a table like the one in Figure 2 only use data for just marijuana/hashish, cocaine, alcohol and cigarettes.
3. Repeat exercise 2 only now instead of a vertical table, present data in horizontal form—putting the drug types across the top and the prevalences vertically at the side.
4. Make a table like Figure 3 only use data for just marijuana, cocaine, alcohol and cigarettes.
5. Using the following headings and the alcohol example, complete the following table for caffeine, cocaine, marijuana and nicotine.

(figure available in print form)

6. Keep data on yourself for a week. Choose something like the number of cigarettes you smoke, number of calories you eat, how much you spend, or how many phone calls you make each day. Record your data in table form. We will use this data later to make bar and line graphs from it.

## Graphs

A graph can be thought of as a drawn illustration that represents relationships between two or more things. Graphs may use dots, bars, lines, and/or other symbols to represent data. We will use a one dimensional graph—the time line, and several two dimensional graphs—the bar, line and circle graphs.

### Using Time Lines

A time line is a graph that shows (1) when things happen, (2) the order in which they happen and (3) the length of time between these events.

In developing any graph it is important to understand what is meant by the graph's scale. It basically tells how much (years, percent, etc.) each unit represents. A scale is a comparison of two measurements. Let's take an example. I want to make a time line that will roughly illustrate 7000 years of drug use. Figure 4. The line I want is to be 21 centimeters—so it will be as long as possible and still fit the required margins of the page. I'll compare the two measures, 7000 years of drug history and 21 cm, then divide the top and bottom (numerator and denominator) by the same number until I get a scale or comparison that is easy to use.

$$\begin{array}{l} 7000 \text{ yr} = (\text{dividing top and } 333.3 \text{ yr} \\ 21 \text{ cm} \quad \text{bottom by } 21) \quad 1 \text{ cm} \end{array}$$

That's too hard to use. Dividing top and bottom by 7 I get

$$\begin{array}{l} 7000 \text{ yr} = 100 \text{ yr} \\ 21 \text{ cm} \quad 3 \text{ cm} \end{array}$$

That gives a scale I can easily use—every 3 cm represents 1000 yr.

To make a time line.

1. Decide what dates you want to show.
2. Decide about how long you want the line.
3. Decide the scale you will use. So many units will represent so many years.  
(figure available in print form)
4. Draw line. Mark units.
5. Label years and events.
6. Title graph.
7. Is it easy to read?
8. Is it neat and attractive?
9. Do I need a credit source for the data?

## Exercises

---

From the material in this unit and material you may get elsewhere, draw a time line showing:

1. Some of the main drug events over the last 500 years.
2. Some of the main drug events over the last 200 years.
3. Some of the main drug events over the last 100 years.
4. Draw a timeline of your life so far and list the 5 most important things that have happened to you.
5. Draw a time line beginning with your birth and projecting into the future. It is to represent your life from birth to death. Give yourself 90 years and label 6-10 major events either as they have happened or you think (or hope) might happen. At least 3 events must be in the future.

### ***Using Bar Graphs***

(figure available in print form)

A bar graph shows a direct comparison of several different things. The bars are used to present information; the length of a bar shows the amount of what is being measured—a numerical fact or piece of data.

Things to check when making a bar graph.

1. All bars are the same width and go the same way either horizontally or vertically.
2. On the number line side, all units are the same width and each unit represents the same quantity.
3. If possible, begin number scale with zero and keep numbers unbroken. If not, indicate that the numbers are not consecutive from zero.
4. Arrangement of items to be compared may be done however seems best for the purpose: smallest to largest, largest to smallest, alphabetically, etc.
5. Graph has a title that can be understood and sides that are clearly labeled.
6. Is it easy to read?
7. Is it neat and attractive?
8. Do I need to credit source for the data?

## Exercises

---

1. Check Figure 5 for each of the 8 items mentioned above. Does it meet all requirements? What amount does each unit represent?

Use data from Figure 2 for exercises 2 through 4.

2. For marijuana/hashish, cocaine, alcohol and cigarettes, draw a bar graph that shows the percent of seniors who ever used each of them.

3. Make another bar graph showing for the same four drugs the percent of seniors who used each drug in the past year.

4. Make another bar graph showing for the same four drugs the percent of seniors who used each drug in the past month.

Using the data in Figure 6, make a bar graph that shows the comparison of marijuana, alcohol and cigarettes (both one or more daily and half-pack or more) for each of the following.

5. females and males

6. college plans—none or under 4 yrs. and complete 4 yrs.

7. the four regions

8. population density. Large SMSA means large cities, other SMSA means not large cities, and non-SMSa means rural.

(figure available in print form)

9. Make a bar graph showing the data you collected from exercise 6 in the section on Using Tables.

10. Make a bar graph that uses the data in Figure 7 only for each year make two separate, adjacent bars to represent the data instead of using just one.

(figure available in print form)

(figure available in print form)

Information about change over a period of time is often best shown in a line graph. As shown in Figure 8, in one graph you can combine more than one kind of information. Notice that a point is used to represent each numerical fact, and line segments connect the points. A key is also necessary to tell the reader what each line represents.

Things to check when making a line graph.

1. On the vertical axis, the left side, all units are the same width and each unit represents the same quantity.
2. On the horizontal axis, line across bottom, arrange years or other items in an order that makes sense to you. Spacing must be equal.
3. Plot points to represent each number fact. Connect points.
4. Be sure graph has a title that can be easily understood and sides that are clearly labeled.
5. Is it easy to read?
6. Is it neat and attractive?
7. Is a data source needed?

## Exercises

---

1. Does Figure 8 meet the 7 points listed above?
2. Make two statements about each of the three graphs in Figure 9. Use complete sentences.

Let the graphs in Figure 10 be an example and use the information in Figures 11,12 and 13 to make line graphs that show the lifetime, annual and thirty-day prevalence trends from 1975-1985 for:

3. marijuana
4. cocaine
5. Use information in Figure 14. One graph show the trend from 1975 through 1985 for daily use

of marijuana, cocaine, alcohol and cigarettes.

Using the data in Figure 15 make four line graphs showing the grade of first use for:

6. marijuana

7. cocaine

8. alcohol

9. cigarettes

10. Make a line graph illustrating the data you collected in exercise 6 of the section Using Tables.

Is the bar graph or line graph better for showing this data?

(figure 9 available in print form)

(figure 10 available in print form)

(figure 11 available in print form)

(figure 12 available in print form)

(figure 13 available in print form)

(figure 14 available in print form)

(figure 15 available in print form)

Using Circle Graphs

(figure available in print form)

A circle graph is used to represent a whole quantity such as a budget or the total number of people interviewed in a statistical study. In Figure 16 the whole quantity is 132 schools, the number that participated in the study.

To show how the whole is divided into parts, we divide the circle into sectors. For the circle graph in Figure 16 we used the data from the table in Figure 1. The 1985 senior class had a total of 132 schools, 115 public and 17 private.

Since a circle has  $360^\circ$  and from Figure 1 information we can determine  $(115/132 \times 100)$  that about 87% of the schools were public, we take 87% of  $360^\circ$  to know how large a sector we need to represent the number of

public schools,  $87\%$  of  $360 = .87 \times 360 =$  about  $313^\circ$ . For private schools we do similarly.  $17/132 \times 100 =$  about  $13\%$ .  $13\%$  of  $360 = .13 \times 360 =$  about  $47^\circ$ .

With a protractor we measure the degrees needed and label the graph.

In making a circle graph check the following.

1. Since we are dividing a whole into parts, determine what percent of the whole is each part.
2. Take the percent of each part times  $360^\circ$  to find how many degrees should be allowed for each sector.
3. Draw a circle and divide it into sectors.
4. Label sectors with name and percent
5. Title graph.
6. Is it easy to read?
7. Is it neat and attractive?
8. Do you need a source credit?

#### Exercises

1. Using the data from Figure 1 to make a circle graph showing the percent of students who did and did not respond to the High School Senior Survey for 1985.
2. The New York Times, 7-27-86, reported that the probable sources of cocaine for 1984 were as follows.

|          |     |
|----------|-----|
| Colombia | 75% |
| Bolivia  | 15% |
| Peru     | 5%  |
| Other    | 5%  |

The source was the National Narcotics Intelligence Consumers Committee.

Make a circle graph illustrating this data.

3. Make a circle graph illustrating the percent of smokers and nonsmokers in your class.
4. For the number of smokers in your class, make a circle graph illustrating the percent of male and female smokers.



## Footnotes

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1. N.Y.T. 7-24-86 2. *Newsweek* 6-16-86 3,4,5. The Tranquilizing of America. See bibliography. 6. Rome, H. "Implications of Substance Abuse". *Psychiatric Annals*. April 1986. p 203. 7. *Drug Use Among American High School Students* . See bibliography. 8 through 23 except 12 and 16 are from *The Encyclopedia of Drug Abuse* . 16. *Can Drug Abuse Be Prevented in the Black Community ?* U.S. Dept. of Health, Education and Welfare. U.S. Government Printing Office. Washington, D.C. 1977. 12. N.Y.T. 7-8-86.

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