

## **CASE STUDY Joseph Hazelwood, Captain of the Exxon Valdez and The Effects of Alcohol on Speech**

**From the Final Report of the Alaska Oil Spill Commission:** *"No one anticipated any unusual problems as the Exxon Valdez left the Alyeska Pipeline Terminal at 9:12 p.m. on March 23, 1989. The 987 foot ship, second newest in Exxon's 20 tanker fleet, was loaded with 53 million gallons of North Slope crude oil bound for [the refinery at] Long Beach, California. Tankers carrying North Slope crude had safely transited Prince William Sound more than 8,700 times in the 12 years since oil began flowing through the trans-Alaska pipeline, with no major disasters and few serious incidents. This experience gave little reason to suspect impending disaster."*

### **However...**

Four minutes after midnight, the Exxon Valdez grounded on Bligh Reef in Prince William Sound, spilling thousands of gallons of oil into the pristine ocean water.

The oil defiled over a thousand miles of coastline. It ravaged the environment and exterminated vast numbers of creatures in the ocean, in the air and on the shore. It devastated the economies of local fishermen and native tribes, as well as the local tourist economy. Media around the world displayed horrific images of oil-slimed wildlife.

About twenty minutes after the grounding, Joseph Hazelwood, the captain of the Exxon Valdez, radioed the Coast Guard. The conversation was recorded.

**To listen to the recording, [click here.](#)**

**HAZELWOOD:** *Eh, Valdez Traffic. Exxon Valdez. Over.*

**VALDEZ TRAFFIC CONTROL:** *Exxon Valdez. Valdez traffic.*

**HAZELWOOD:** *Yeah, uh, it's Valdez back. Uh, we've — uh, should be on your radar there — we've fetched up hard aground north of, uh, Goose Island off Bligh Reef.*

He continued, with what turned out to be a considerable understatement — as well as the notice that ultimately saved him from legal sanction:

**HAZELWOOD:** *And, uh, evidently, uh, leaking some oil, and, uh, we're gonna' be here for a while. And, uh, if you want, uh, so you're so notified. Over.*

I was hired by Hazelwood's attorneys to analyze this recording, as well as other ship-to-shore communications, to determine whether it could be used to prove he was intoxicated.

Even before I had a chance to analyze the recording, and long before the trial, the news media had decided that Hazelwood was the sole cause of the accident, that he was intoxicated, and that he was a villain and a fool. **SKIPPER WAS DRUNK**, shrieked a New York Post headline.

"Tell me a story." Don Hewett, producer of the 60 Minutes television show, famously told his staff. Taking this dictum exuberantly to heart, the news media, well knowing the tastes, intelligence and the attention span of their audience, created a simplistic tale that made Joseph Hazelwood a scape goat.

He was the butt of late night comedy skits. "I was just trying to scrape some ice off the reef for my margarita," snickered comedian David Letterman, as he listed one of Hazelwood's "Top Ten Excuses" for the spill. The media were amusing their audience at Hazelwood's expense.

He was deluged with threatening calls, including threats to kill him and to blow up his house. He could not show his face in public.

Professors of phonetics enthusiastically sought to use the ship-to-shore recording to prove Hazelwood was drunk.

### **Who was Joseph Hazelwood?**

Joseph Hazelwood went to high school in Huntington, a prosperous suburb of New York City on the north shore of Long Island. Joe's mother was a nurse. His father, a Marine Corp veteran and a retired Pan American World Airways pilot, did not allow alcohol in the house. Joe's high school records show that he scored 138 on an IQ test. His sisters are attorneys and his brother is a symphony orchestra conductor.

From an early age, Joe loved sailing and was good at it. During the school year he was a member of the Sea Scouts, a branch of the Boy Scouts that gives merit badges for sailing. On summer break he worked on boats on Long Island Sound.

Following high school, Joe enrolled in the New York Maritime College, which is a highly competitive institution from which more than half of the students fail to graduate. As for those who succeed, the Maritime College web site states "Graduates enjoy a more than 90% career placement rate and earn some of the nation's highest average starting salaries."

In his Maritime College yearbook, Joe enigmatically proclaimed "It will never happen to me."

Although he was notorious for rowdy drinking with his classmates, Joe did brilliantly at the college, which is why he was promptly hired as a Third Mate for Humble Oil, which later became Exxon.

After graduation he took additional classes and rapidly advanced: to Second Mate, to Chief Mate, to Relieving Master, and ultimately to Master. Of those who enter the merchant marine, only a few rise to Master, and only the most talented rise to command a supertanker worth hundreds of millions with cargos worth many additional millions. There is only so much room at the top, and Joe quickly arrived. At the age of 32, he was the youngest captain in Exxon's fleet. Under his command the Exxon Valdez won Exxon Fleet Safety awards in 1987 and 1988.



The Exxon Valdez is big. At 987 feet in length, it is longer than three football fields; at 166 feet in width, it is wider than a twelve lane highway; at 88 feet in depth, it is deeper than a seven story building is high.

In operational complexity, a supertanker is comparable to airliner, albeit with important differences, two of which made all the difference on this voyage. For one, operations are implemented by a chain of command, so responsibility is shared. Second, ships take comparatively longer to react to commands so mistakes may not be detected until it is too late. As the saying goes, ships cannot turn on a dime.

The itinerary of the Exxon Valdez was an unremitting two-week loop: Load North Slope crude oil at Valdez, Alaska. Unload the oil at the refinery in Long Beach, California. Refuel and perform maintenance in San Francisco. Return to Valdez to load with North Slope crude. Repeat. It was hardly the romantic voyage that Joe imagined in his youth.

## **All in a Day's Work**

On the morning before the accident, Hazelwood and two of his fellow officers, Chief Engineer Jerzy Glowacki and Radio Officer Joel Roberson, spent some time ashore on a chilly day, two degrees above freezing, in Valdez, Alaska. They conducted routine ship's business at the onshore business office, where they were told that the ship would leave at ten p.m., an hour later than originally scheduled.

Then they had lunch at **No Name Pizza** *"Eat in, or take out. The best pizza bomb south of Prudhoe Bay"* Following lunch, they each went their own way and ran personal errands. As he did every Easter, Joe sent his wife and daughter flowers.

Later that afternoon they met at the **Pipeline Inn/Club** *"Full service Inn with lounge, cable TV, telephone and wake-up service"* They had some drinks.

On the way back to the ship, they stopped at **Mike's Palace Ristorante**, Trip Advisor review: *"I never teasted [sic] such good pizza and steak since I left new york."* They ordered pizza to take back to the ship with them.

While waiting for the pizza, they stopped in at the **Valdez Club** and ordered some more drinks.

They took a taxi back to the ship, where they learned that the ship got loaded more quickly than expected and was about to leave at approximately nine o'clock, as originally scheduled. The cab driver who drove the threesome back to the ship testified that no one in the party seemed to be intoxicated as far as he could tell.

A ship's agent who met with Hazelwood after he returned to the ship said it appeared he may have been drinking because his eyes were watery, but she did not smell alcohol on his breath.

On leaving the harbor, the Exxon Valdez, like all outgoing vessels, was boarded by a harbor pilot, a specialized mariner who knows the details of a particular harbor – the hidden obstacles, the tides, the weather, the shoals – all the dangers that might imperil a great ocean-going vessel as it leaves the harbor. Ed Murphy, the harbor pilot who conducted the outbound transit, testified that he smelled alcohol on Hazelwood's breath when Hazelwood returned to the ship. However, it was his impression that Hazelwood's behavior and speech were unimpaired.

**To listen to the entire ship-to-shore communication, [click here.](#)**

**Following is a partial transcript, with a time line and commentary.**

**[10:49 p.m., about an hour and a half after leaving the port]**

It was three days before Easter. As happens in the spring, icebergs were calving off from the glaciers that surround Valdez into Prince William Sound. The Exxon Valdez inquired via ship-to-shore radio for a report about possible ice in its path.

**EXXON VALDEZ [NOT HAZELWOOD]:** *Yeah, uh, ice report, please.*

**VALDEZ TRAFFIC CONTROL:** *There are numerous small pieces of ice, uh, from Freemantle all the way down to Glacier Island, and they [prior outgoing ships] had to deviate over into the northbound lane [which is ordinarily the lane used for incoming traffic] uh, for about half an hour. Over.*

**[11:24 p.m., two hours after leaving the port]**

Hazelwood informed Valdez Traffic Control that the Valdez had disembarked the harbor pilot.

**HAZELWOOD:** *Yes. We've, uh, departed the pilot, or disembarked the pilot, excuse me. And this time hooking up to sea speed and ETA Naked Island 0100. Over.*

Harbor pilot Murphy reported that Hazelwood left the bridge after they had gotten under way and remained away until Murphy called him shortly before disembarking. Murphy testified that he again smelled alcohol on Hazelwood's breath. However, again it was his impression that Hazelwood's behavior and speech were unimpaired.

**VALDEZ TRAFFIC CONTROL:** *Roger that, sir. Request an updated ice report when you get down through there. Over.*

Hazelwood then informed Valdez Traffic Control that if there is no conflicting inbound traffic, the Valdez will probably exit via the inbound lane in order to avoid floating ice.

**HAZELWOOD:** *Okay. I was just about to tell you that, uh, judging by our radar, I will probably divert from, ah, the TSS [Traffic Separation Scheme] and end up in the, uh, inbound lane if there's no conflicting traffic. Over.*

Valdez Traffic Control explained that although there were inbound ships, they were far enough out that there would not be a conflict with the Exxon Valdez on the inbound lane.

**VALDEZ TRAFFIC CONTROL:** *Uh, no reported traffic. I've got the Chevron California, uh, uh, one hour out. Then the Arco Alaska is, uh, right behind them, but they're an hour out from Cape Hinchinbrook. Uh, out on that. Over.*

Hazelwood repeated that they might use the inbound lane to exit.

**HAZELWOOD:** *That'd be fine. Yeah. We, we may end up over in the, uh, inbound lane, outbound transit. Uh, we'll notify you when we leave the, uh, TSS and, uh, cross over the separation zone. Ov, Roger that. Be waiting your call. Traffic out.*

**[11:30 p.m.]**

Hazelwood informed Valdez Traffic Control that he had decided to head towards the inbound lane -- which happened to be in the direction of Bligh Reef, on which the Exxon Valdez later became impaled.

**HAZELWOOD:** *Yeah, at the present time, uh, I'm going to alter my course to two, zero, zero and reduce speed to about 12 knots to, uh, wend my way through the ice, and, uh, Naked Island ETA might be a little out of whack but, uh, once we're clear of the ice out of Columbia Gla ... Bay, we'll give you another shout. Over.*

**VALDEZ TRAFFIC CONTROL:** *Roger that, sir. Be awaiting your call. Traffic standing by.*

After Hazelwood informed Valdez Traffic Control of his decision to revise his route, he instructed Third Mate Gregory Cousins on when to turn back into the outgoing shipping lane.

Hazelwood asked Cousins if he was comfortable with the maneuver. Cousins assured him he was.

**[11:50 p.m.]**

Exxon company policy required that two officers be on the bridge whenever the ship was under way. Nonetheless, Hazelwood returned to his cabin, allegedly to do paperwork. Cousins was alone on the bridge.

Cousins was scheduled to be relieved at midnight by Second Mate Lloyd LeCain, who, as Second Mate, was better qualified. Nonetheless, Cousins, knowing LeCain had worked long hours during loading operations during the day, did not call LeCain to awaken him for the midnight-to-4 a.m. watch, instead remaining on duty himself even though he had been on watch for six hours and was tired.

Little did Cousins imagine the hard night he was about to have, though he was soon to find out.

## **The Turn**

**[11:55 p.m.]**

At 11:55 p.m. Cousins called Hazelwood on the intercom to inform him that he was starting the turn. However, the ship's data recorder shows that the Valdez *did not start to turn until seven minutes after the call.*

Turning a great ship, particularly a huge oil tanker like the Exxon Valdez, is no simple process.

The officer on the bridge gives orders to the man at the helm (the steering wheel of the ship), who executes the orders and reports back to the officer, who may in turn order corrections. Turning is governed by the rate of current flow, the angle of the ship with respect to the current, the depth of the ship in the water, the wind, and other factors including the ship's geometry. (For more than you probably want to know about the physics of turning a ship, follow this link: <https://www.youtube.com/watch?v=k1YxpOg3r6U>.)

The helmsman's function is to hold the course steady in the face of shifting currents, rough seas, wind gusts, and so on, and to provide feedback to the officer on the bridge. Moreover, in view of all those conditions, the helmsman has to anticipate the delay between rudder movement and the ship's reaction to it, thereby avoiding both over-steering and over-correction. The job requires judgment and skill.

The helmsman on duty was "able seaman" Robert Kagan, who had been promoted to that rank a year earlier from his job as room steward and food server. An able seaman is a rank above "ordinary seaman" in that an able seaman is empowered to be helmsman in harbors, whereas an ordinary seaman is permitted to be helmsman only on open waters. Kagan was not well regarded as a helmsman. An officer told Government investigators "Kagan does the best he can, but you have to watch him."

A counter-rudder maneuver is registered in the ship's data recorder. Initially, Kagan acknowledged making a counter-rudder maneuver, but he subsequently denied it.

Cousins had initially failed to check that the ship was turning correctly. Instead, during the minutes that determined the ship's destiny, he charted the ship's position. When he realized something was amiss, he repeated the initial order and then followed it with another command for a hard-right rudder.

Maureen Jones, who was on lookout duty, saw that the red buoy that was supposed to appear on the port (left) side of the ship was actually on the starboard, an apprehension that has been compared to discovering that you are driving down the wrong side of the freeway. She came running to the bridge.

The Coast Guard lookout who was supposed to be monitoring the ship's progress on radar had gone out for coffee.

**"A Bumpy Ride"**

**[12:04 a.m.]**

Kagan called the jolt of the grounding “a bumpy ride”.

On the intercom to Hazelwood, Cousins said “*I think we’re in serious trouble.*”

Hazelwood came running to the bridge.

The Exxon Valdez had not turned sharply enough and not at the right moment to return correctly to the outbound shipping lane. It was grounded on Bligh reef.

**[12:26 a.m.]**

Valdez Traffic Control received the following call.

**HAZELWOOD:** *Yeah. Valdez traffic. Exxon Valdez. Over.*

**VALDEZ TRAFFIC CONTROL:** *Exxon Valdez. Valdez traffic.*

**HAZELWOOD:** *Yeah. Uh, it’s Valdez back. Uh, we’ve – uh, should be on your radar there. We’ve fetched up, uh, hard aground north of, uh, Goose Island off Bligh Reef. And, uh, evidently, uh, leaking some oil, and, uh, we’re gonna’ be here for a while. And, uh, if you want, uh, so you’re notified. Over.*

**COTP:** [Captain of the Port, Coast Guard Cmdr. Steve McCall]: *Exxon Valdez. This is, the Captain of the Port, Commander McCall. Good evening. Uh, do you have uh, uh, uh, anymore of an estimate as to your situation at this time? Over.*

**HAZELWOOD:** *Uh, not at the present, uh, Steve. Uh, ... or uh, a little problem with the third mate, but, uh, we are working our way off the reef.*

(Was Hazelwood attempting to deflect blame onto Third Mate Cousins?)

**HAZELWOOD:** *We’ve uh, the vessel’s been holed, and, uh, we’re ascertaining – right now we’re trying to just to get her off the reef and, uh, we’ll get back to you as soon as we can. Over.*

**COTP:** *Uh, roger, yeah. Uh, and let me know – again, uh, before you make any drastic attempt to get underway, you make sure you don’t, you know, start, start doing any ripping. You got a rising tide. You got about another – about an hour and a half worth of tide in your favor. Uh, once you hit the max, uh, I wouldn’t recommend, uh, uh, doing much wiggling. Uh, Over.*

No matter how intoxicated he may have been, in the moment of crisis Joe stepped up and took command. He kept the tanker on the reef, which was all the more difficult because the outflow of oil was changing the balance of the ship. Neither Hazelwood nor the Valdez wiggled too much. Coast Guard analyses found no fault with Hazelwood’s performance at this point.

In the following days, other ships siphoned off much the oil (liftered it, in nautical terminology) that remained on the Valdez.



It was crucial that the oil be contained immediately. However, equipment that was supposed to be maintained by the Alyeska Pipeline Corporation was in disrepair and buried under the snow. Exxon took three days to assemble a crew to begin containment and cleanup. During those three days the oil had already spread beyond easy containment.

A spill that could have been contained had turned into a disaster.

The media made the most of the situation. As the oil spread, it provided enthralling photo ops – birds struggling, fish flopping helplessly about, svelte sea otters with big brown eyes coated in oily slime, miles of seashore blackened. The dramatic pictures provided high ratings and big advertising revenue for the media.

### **Joe' Blood Alcohol Level**

Approximately ten hours after the grounding, blood samples were taken from Hazelwood in order to assess his level of intoxication. According to the law of Alaska, blood samples must be taken within three hours of the incident, from which time blood alcohol content (BAC) can be calculated backwards with some, albeit arguable, degree of accuracy. After more than three hours, the accuracy of the backward extrapolation is not considered valid.

The law requires that samples be kept in a temperature-controlled refrigerator. Instead, they were left overnight on a windowsill – an Alaska windowsill, to be sure, but hardly a controlled environment, and for more than three hours.

Besides that, no preservative was put into the blood samples, so additional fermentation might have occurred between the time the samples were taken and the time they were analyzed the next day, at which time the BAC was found to be .061 percent.

In post-trial interviews, jury members said that as a result of these and other issues, they discounted the blood sample evidence.

Be that as it may, it is interesting to put the BAC of .061 in context. The legal limit for driving a motor vehicle under the influence (DUI) of alcohol in Alaska, as in most states, is .08. Similarly, the legal limit for boating under the influence (BUI) is .08. However the legal limit for piloting commercial vessels is .04, which is also the limit for ambulance drivers and airline pilots.

Three hours after the grounding, Coast Guard investigator Mark Delozier boarded the ship. He found a "very intense" smell of alcohol on Hazelwood's breath. Nonetheless, he reported that Hazelwood "didn't appear to be at a loss of any capabilities. He was very professional."

### **The Trial Results**

The jury did not find that Hazelwood was intoxicated at the time of the grounding or that alcohol played any part in the accident. In an interview

after the trial, one of the jurors said "They were assuming we found him drunk. I would like to tell somebody we didn't." Another said "Alcohol really had nothing to do with our decision."

Hazelwood was fired by Exxon for failing to be on the bridge.

The Coast Guard suspended his master's license for nine months.

Hazelwood was convicted of misdemeanor negligent discharge of oil.

He was fined fifty thousand dollars and sentenced to one thousand hours of community service to be served at two hundred hours per year for five years. His first assignment was to pick up trash by the side of the road but crowds of onlookers snarled traffic, so that assignment had to be scuttled. His next assignment was working in a community soup kitchen. He put on an apron, worked hard and everybody liked him.

On appeal, Hazelwood's misdemeanor conviction for negligent discharge of oil was overturned on the basis of the Federal Clean Water Act, which grants immunity from prosecution to those who report spills. According to the reasoning of the act, it is in the public interest to encourage mariners to report spills promptly, regardless of their individual culpability. Hazelwood had promptly radioed the Coast Guard *"Evidently we're leaking some oil and going to be here a while. And, ah, if you want, ah, so you're notified. Over."* Consequently, Hazelwood's fine and community service requirement were revoked.

Alaska Attorney General Charles Cole reacted "It's highly unfortunate that Captain Hazelwood, who was responsible for one of the century's great environmental disasters, is excused from criminal prosecution simply because he reported the grounding to the Coast Guard. The policy," he said "is akin to a fellow murdering his wife, then calling the police and by saying 'I've just murdered my wife.' is immune from prosecution."

An Alaska State Supreme Court judge compared damage from the spill to the bombing of Hiroshima.

At this moment in history, Valdez is as beautiful as ever was, although oil still lurks beneath the sands. To see idyllic images of Prince William Sound follow this link.

<https://www.alaska.org/destination/prince-william-sound>

**The Alaska Oil Spill Commission Final Report summarized the causes and consequences of the accident:** *"A captain who may have been intoxicated in some degree, and who cavalierly left the bridge in abrogation of company regulations. A crew that was overworked and in a rush. A third mate who stepped in to cover for someone else, even though he, himself was tired. A helmsman who was relatively unskilled. The failure of the Coast Guard to monitor the ship's position, or at least to inform the crew that they were not being monitored. The failure of Exxon to maintain guidance equipment on the ship. Lack of containment and cleanup equipment at a site where its potential need ought to have been*

*obvious. Failure for three days of Exxon management to assemble a crew for containment and cleanup."*

## **AFTERMATH**

In 2008, less than ten years after the disaster, Exxon made history by reporting the highest quarterly and annual profits ever for a U.S. company. Exxon was the highest-earning company in the S&P 500 index. It has since given way to others but remains high. Initially, an Alaska jury fined Exxon \$5 billion dollars in punitive damages. Exxon appealed to the Ninth Circuit Court of Appeals, which reduced the punitive damages to \$2.5 billion. Exxon then appealed to the U.S. Supreme Court, which reduced the punitive damages to \$507.5 million, about ten cents on the dollar of the original jury award.

Because Exxon's potential liabilities were so great that they might overwhelm even a large Wall Street bank, Exxon's bankers, JP Morgan, invented a new kind of financial instrument called a **credit default swap** so they could share the risk with other banks. This was the birth of the financial instruments now called **derivatives**, which were instrumental in causing the financial crisis of 2008 - 2009.

Exxon distanced itself from the ship that caused them notoriety. They renamed their shipping business *SeaRiver Maritime*, and renamed the ship *SeaRiver Mediterranean*, then *S/R Mediterranean*, then *Mediterranean*. In 2008, *SeaRiver Maritime* sold it to a Hong Kong-based company, which converted it to an ore carrier under Panama registry and renamed it *Dong Fang Ocean*.

## **Joe's Alcoholism**

In time-honored tradition, sailors drink alcohol. As the years at sea went by, Joe Hazelwood increasingly honored that tradition both on land and at sea.

On the witness stand, Joe testified that as he drank more and more he eventually reached a state in which he could drink four or five "doubles," before dinner, wine with dinner, then one or two more "doubles" after the meal and still not feel "blotto." In the terms used by the medical community, Joe had become habituated to the effects of alcohol. In the language of men at sea, he could hold his liquor.

Here we must emphasize the difference between *intoxication*, which refers to the percentage of alcohol in bodily fluids, and *impairment*, which refers to the lack of ability to do certain tasks. Impairment is usually measured by tasks such as the ability to touch your nose or walk heel-to-toe in a straight line or count backwards. Whether these tasks are appropriate substitutes for the ability to drive a car or a supertanker is arguable, but in any case they are hard to put an objective number to. So intoxication is commonly taken as the legal criterion for drunkenness.

Joe testified that at some point he realized that he was drinking too much so Joe took a leave of absence from work and admitted himself to the South Oaks Alcoholism Clinic on Long Island.

It was Exxon's policy that if you reported yourself for alcohol problems you would not be penalized. The reasoning behind this rule was that it is in the company's interest to encourage sailors to report themselves, thus providing the company with notification of alcohol abuse they might not have otherwise been aware of.

At South Oaks, Joe was diagnosed with dysthymia, a chronic low-grade depression that commonly involves social withdrawal and periodic bouts with alcohol. According to some sources, dysthymia is related to chemical imbalances in the brain.

For the next nine months, Joe didn't drink. However, he then gradually rejoined his seafaring drinking buddies. His lapse began with a couple glasses of wine at a Florida port. In Philadelphia he had drinks with some other crew members. Then he drank some more. And some more.

Between 1984 and the time of the accident, Hazelwood's driver's license had been suspended or revoked three times by the state of New York for alcohol violations. At the time of the accident, his New York state driving privileges were suspended as a result of a conviction for DUI.

Though much of this report has been exculpatory with regard to Hazelwood's intoxication and its implications for the accident, it would be remiss not to point out that the CDC estimates that alcohol causes **more than 95,000 deaths** in the United States each year, or **261 deaths per day**. Yet the question is also raised as to whether the ability to touch your nose or walk heel-to-toe are valid substitute tasks for driving a vehicle.

### **SCIENCE Intoxication and Speech**

It is said that in the vicinity of Leith, Scotland they have a ready-made sobriety test. If you are suspected of driving while intoxicated, you have to say "*The Leith police dismisseth us.*" (Try it.) If you can say it, they do indeed dismiss you — but if you can't say it, you are remanded to the custody of the sheriff. If this legend is true, we had all better drive cautiously around Leith, for even the soberest among us might make speech errors while trying to say it, all the more so if our freedom were hanging in the balance. Indeed, we all make occasional speech errors or hesitations, especially when we are nervous or under pressure. They are not necessarily the consequence of intoxication.

Questions then arise: What exactly are the characteristics of intoxicated speech? Are they different from errors of sober speech? Are they similar to the errors of other conditions such as fatigue, Parkinsonism and dysarthria? Are clichés about drunken speech accurate? Besides, why should we care?

Listening to someone's speech is relatively unintrusive as compared with analyzing their bodily fluids or other tests such as requiring the suspect (e.g., one of your party guests) to walk heel-to-toe in a straight line. Speech arises naturally from social communication so it is widely available to assess for evidence of intoxication.

In this context, a speaker's normal speech patterns must be taken into account. Describing his demeanor on the witness stand, the Anchorage Daily News referred to Hazelwood's "slow, deliberate speech."

Airline cockpit speech, airplane-to-tower communications, and ship-to-shore communications are recorded so analysis of recordings may have the potential to furnish evidence regarding the causes of accidents.

Actors may want to know how to accurately portray drunkenness.

Police officers, bartenders, waiters, flight attendants, social hosts who serve alcohol to their guests, workplace supervisors – anyone who is responsible for determining who is intoxicated – should know the signs of intoxication in speech and may be required to describe them objectively.

## **GENERALIZATIONS ABOUT INTOXICATION AND SPEECH**

Based on a review of the literature that follows, here are generalizations about the effects of alcohol on speech.

People vary in their reaction to alcohol intoxication, due in part to their level of habituation to alcohol, the stage of intoxication and other factors. Some people can hold their liquor. Some are happy drunks. Others get aggressive, possibly varying with how much alcohol they have consumed.

People usually talk slower when they are intoxicated.

As opposed to slow sober speech, in which the lengthening occurs in the vowels, in intoxicated speech lengthening occurs in the consonants.

People make errors involving impaired fine control of movements, which are required for speech.

People make more errors with consonants when they are intoxicated, especially for consonants that require precise control articulators. For example, "church" is pronounced as "shursh."

In intoxicated speech, "l" and "r" sounds are often mispronounced or confused.

People make more errors involving control of the vocal folds as they correlate with other sounds, especially at the ends of words. For example "dog" is pronounced as "dok"; "bread" is pronounced as "bret".

For most speakers, (80% in one experiment) pitch goes higher with intoxication, but may go lower for others, possibly depending on degree of intoxication, and possibly other factors such as the fact that alcohol can irritate the vocal folds. Why pitch often goes higher is unclear because higher pitch is usually associated with greater tension.

Pitch is more varied when intoxicated, presumably because of decreased control of the vocal folds.

Patients with Parkinson's disease have reduced speech volume, reduced pitch range, and difficulty with the articulation (dysarthria).

Patients with Alzheimer's disease have false start errors, phonological paraphasias (production of unintended syllables, words, or phrases), and/or articulatory difficulty.

Some speakers sound drunk whether or not they are intoxicated. Others always sound sober.

## **LITERATURE REVIEW**

### The phonology of drunkenness

Lester L Skousen R 1974 In A. Bruck, R. Fox, & M.W. LaGaly (eds.), Papers from the parasession on natural phonology pp. 233-239. Chicago, IL: Chicago Linguistic Society.

Method: Subjects (unknown number) were recorded when sober reading a list of 50 words and also producing spontaneous speech, either by delivering an impromptu monologue or by talking with the person administering the experiment. Then the subjects became intoxicated by drinking an ounce of (in the authors' words) "the finest 86 proof bourbon our pocketbooks could afford" every twenty minutes for a period of five to seven hours. Just before each succeeding drink, the subjects read the list of 50 words and produced spontaneous speech. The experiment proceeded with the subject reading and talking, drinking, and then waiting twenty minutes before repeating the sequence.

#### Results:

1. Intoxicated speech was slower than sober speech.
2. In contrast to sober slow speech, (in which most of the lengthening occurs in the vowels; Chistovich and Koznikov, 1983), most of the lengthening for intoxicated speech occurs in the consonants, especially the consonants in unstressed syllables.
3. Final devoicing (occurred after the 10<sup>th</sup> drink)

Word	Mispronunciation	Recordings in which error occurred
Tease	tis	10, 11, 14
Bed	bet	11, 13
Dog	dok	11, 14
Locomotive	lokomotif	10, 14
Sing	sink	10, 14
Bread	bret	13
Garage	garash	13, 14
Judge	juch	14
Hand	hant	14
And	ant	(in conversation)

4. They observed the "commonly recognized merger of /s/ with /sh/".
5. "Sounds that are normally composed of a complete closure followed by a narrowly restricted opening (affricate sounds) are simplified in that the closure phase is omitted. Thus 'church' was pronounced as 'shursh' [shxrsh] <14> and 'judge' was pronounced [zhuj] <10>". The impairment is not consistent in the sense that a word may be pronounced in an impaired way on one reading, a correct way on the next reading, and an impaired reading on the one thereafter.

### **Effects of alcohol on the speech of alcoholics**

Sobell LC Sobell MB J Speech Hear Res. 1972 Dec;15(4):861-8. doi: 10.1044/jshr.1504.861.

Subjects: 16 male patients who had voluntarily admitted themselves to Patton State Hospital in California for treatment for alcoholism. [It might seem peculiar to provide liquor to alcoholics who had voluntarily admitted themselves to an alcohol treatment program. However, the Sobells had gained notoriety for proposing that alcoholics could be taught to drink in a controlled manner; see Schaefer, Sobell and Mills 1971.]

Method: Under two different conditions of intoxication), as well as when they were sober, the patients read a standard passage that contains a wide variety of English sounds (McDavid and Muri 1967). The intoxication conditions were produced by letting the patients drink up to 16 oz. of 86 proof liquor or its equivalent in alcohol content.

One of the reading tests was administered immediately after the subject had consumed 5 oz. of liquor, and--on a different occasion--another test was administered after the patient had consumed 10 oz. of liquor.

Results:

1. Subjects took longer to read the passage when intoxicated than when sober.
2. Subjects made more interjections of sounds and syllables, of words, and of phrases, when intoxicated than when sober.
3. Subjects made more revisions when intoxicated than when sober.
4. Subjects made fewer repetitions when intoxicated than when sober. This is interesting in that it is a sense in which there are fewer speech errors when intoxicated than when sober.

### **The Decay of Articulation under the Influence of Alcohol and Paraldehyde**

Trojan F Kryspin-Exner K Folia Phoniat 1968 (20):217-238. . PMID: 5671974; DOI: 10.1159/000263201.<https://pubmed.ncbi.nlm.nih.gov> > ...

Method: "The diction of three volunteer subjects was recorded thrice on tape: a) in a state of soberness, b) after consumption of a part of the total quantity of a heavy Austrian wine (alcoholic content, ca. 13 %) and c) after consumption of the total amount which determined the limit of the individual tolerance." In German, the subjects told a story and named some objects pictured on cards.

Results:

1. "The most striking changes in voice and mood were observed in S1: a higher pitch with increasing of the headvoice component of the mixed voice, gradually ascending bursts of laughter, and a euphoric-trophotropic intonation; in addition thereto, extensive

relaxation of inhibitions, flatulence, and homosexual tendencies; further, a strong singultus (hiccup).

2. In contrast to S1, S2 showed an increase in depth of pitch and the impression of good humor and peaceableness grew stronger. In contrast to both,

3. S3 showed heightened aggression and symptoms of 'vox ergotropica (potent voice)'.  
[As nearly I can make out, this means he talked loud.]

(Long story short: One subject raised the pitch of his voice, laughed a lot, became flatulent, relaxed inhibitions and hiccupped. Another subject got happy and lowered the pitch of his voice. One subject got excited. Another became peaceable.)

4. The phonemes /r/ // /s/ /sh/ /ts/ /pf/ were most often affected by alcoholic intoxication. (Paraldehyde, a central nervous system depressant, was studied separately.)

### **Recognition of low-level alcohol intoxication from the speech signal**

Klingholz, F Penning, R Liebhardt E. (1988). *J Acoust Soc Am* 84(3), 929–935. <https://doi.org/10.1121/1.396661>

Subjects: Eleven German-speaking males (aged 25–35 yrs)

Method: Subjects read a text when sober and when intoxicated.

Results:

1. Frequency distributions of fundamental frequency ( $F_0$ ), signal-to-noise ratio (SNR), ratio of first- to second-formant frequencies ( $F_1/F_2$ ), variation speed of the frequencies  $F_0$ ,  $F_1$ ,  $F_2$ , and the long-term average spectrum (LTAS) were determined.
2. The SNR and  $F_0$  distributions as well as the LTAS discriminated with an error rate less than 5%. Combination of SNR and  $F_0$  profiles enabled correct discrimination in all cases.
3. Long-term voice effort was found to produce similar effects to alcohol intoxication.

### **Perceiving the Effects of Ethanol Intoxication on Voice**

Hollein, H Harnsberger J.D. Martin C. Hill R Allan Alderman, G. *J Voice* 2009 Sep; vol. 23(5):552-9. doi: 10.1016/j.jvoice.2007.11.005. Epub 2009 Jun 16. <https://doi.org/10.1016/j.jvoice.2007.11.005>

Method: Speakers, selected based on rigorous criteria, provided orally read and extemporaneous utterances when sober and at three highly controlled levels of intoxication. Listener groups of university students and professionals attempted to identify both the existence and specific level of intoxication present.

Results:

1. Listeners were proficient in recognizing the presence of, and increases in, intoxication but were less accurate in gauging the specific levels.
2. Statistically significant differences were not found between male and female listeners or between professionals and lay listeners;
3. however, they were found for different classes of speech. That is, it was shown that text difficulty correlated with severity of effect.



### **Effects of alcohol on the acoustic-phonetic properties of speech: perceptual and acoustic analyses**

Pisoni DB Martin CS Alcohol Clin Exp Res 1989 Aug;13(4):577-87.

Male subjects were recorded as they “shadowed” the speech of a model speaker who read lists of sentences. That is to say that they listened on headphones to a recording of the model speaker and had to repeat what he was saying as simultaneously as possible. Recordings were made in which the subjects were sober and when they were intoxicated at .10% BAC.

Experiment 1. Listeners (21 undergraduate psychology students) heard matched pairs of sentences from four talkers and were required to identify the sentence that was produced while the talker was intoxicated. [Note: listeners knew that in each pair there was one sober and one intoxicated sentence.]

Result: On average, the students were able to discriminate the sober from the intoxicated recordings.

Results: Groups of listeners can significantly discriminate between speech samples produced under sober and intoxicated conditions.

### **Experiment 2.**

Method:

30 introductory psychology student listeners vs. 4 Indiana State Troopers listeners. For each sentence, decide if sober or intoxicated and rate your confidence in your decision on a five point scale.

Results:

1. Mean accuracy across all of the sentences was 61.5% for the college students, and 64.7% for the State Troopers. When confidence ratings are taken into account, Troopers are statistically significantly better than students.

2. The speech of some talkers was consistently labeled sober or consistently labeled intoxicated regardless of their actual intoxication.

3. The pitch level of all speakers was much more variable in the intoxicated condition, suggesting less precise control of the rate of vocal cord vibration.

### **Effects of ethanol intoxication on speech suprasegmentals**

Hollien H DeJong, G Martin, CA, Schwartz R Liljegren, K J Acoust Soc Am. 2001

Dec;110(6):3198-206,

Method: Young, healthy adults became intoxicated at three levels.

Results: 80% of subjects, pitch raised. 20% pitch not changed or lowered.

### **Perceiving the effects of ethanol intoxication on voice**

Hollein H Harnsberger J D Martin C A Hill R Alderman G A J Voice 17 June 2009 (23) 5. 552-559.

Method: Young, healthy adults provided orally read and extemporaneous utterances when sober and at three highly controlled levels of intoxication.

Results: Statistically significant differences were not found between male and female listeners or between professionals and lay listeners in ability to detect intoxication.

### **Do voice recordings reveal whether a person is intoxicated? A case study**

Johnson K, Pisoni DB, Bernacki RH. *Phonetica*. 1990;47(3-4):215-37.

#### **Abstract**

In this report we consider the possibility that speech analysis techniques may be used to determine whether an individual was intoxicated at the time that a voice recording was made, and discuss an analysis of the speech produced by the captain of the Exxon Valdez recorded at several points around the time of the accident at Prince William Sound, Alaska. A review of previous research on the effects of alcohol and other effects on speech production suggests that it may be possible to attribute a certain, unique pattern of changes in speech to the influence of alcohol. However, the rate of occurrence of this pattern or the reliability of a decision based on observations such as these is not known. Acoustic-phonetic analysis of a small number of tokens of Captain Hazelwood's speech recorded before, during and after the accident revealed a number of changes in speech behavior which are similar to the pattern of changes observed in previous laboratory-based research on the effects of alcohol on speech production. We conclude with a discussion of the limitations in making inferences concerning the state of the speaker upon the basis of phonetic data and then discuss several possible explanations of the pattern of change found in the recordings of Captain Hazelwood.

They ask "whether there are properties of speech which occur when a speaker (any speaker) is intoxicated and which do not occur in any other circumstance."

Speech production is a complex motor activity which requires a high degree of coordination, and it is likely that it may also be affected by alcohol consumption. Two types of motor complexity in speech production can be distinguished. First, speech production requires very precise intergestural coordination. For example, the main difference between /d/ and /t/ in English is the timing of a gesture of the vocal folds relative to a gesture performed by the tip of the tongue. The relative timing of these two gestures (voice onset time) is measured in milliseconds (ms) [[Lisker and Abramson, 1964](#)]. The onset of voicing (vocal fold vibration) for /d/ in word-initial position occurs approximately simultaneously with the release of oral stop closure, while the onset of voicing for /t/ occurs 40–60 ms after the release of oral stop closure. Mistiming the two gestures by as little as 20 ms results in a perceptually different consonant. Second, speech involves fine motor control in moving the articulators to the target positions for different speech sounds. For example, the fricative /s/ is produced by pressing the sides of the tongue against the upper molars and depressing the center of the tongue, creating a narrow groove with the tip of the tongue. The articulatory difference between /s/ and /ʃ/ is very subtle even though the acoustic difference is quite large.

"There is evidently no simple explanation of the pattern of changes observed in these recordings. Considering the data as a whole, intoxication seems to be the simplest explanation, but these data are, in the final analysis, inconclusive. "

### **Speech analysis as an index of alcohol intoxication-- the Exxon Valdez accident.**

Brenner M Cash JR *Aviat Space Environ Med*. 1991 Sep; 62(9 Pt 1):893-8. National Transportation Safety Board, Washington, D.C. 20594.

#### **Abstract**

As part of its investigation of the EXXON VALDEZ tankship accident and oil spill, the National Transportation Safety Board (NTSB) examined the master's speech for alcohol-related effects. Recorded speech samples were obtained from marine radio communications tapes. The samples were tested for four effects associated with alcohol consumption is available scientific literature: slowed speech, speech errors, misarticulation of difficult sounds ("slurring"), and audible changes in speech quality. It was found that speech immediately before and after the accident displayed large changes of the sort associated with alcohol consumption. These changes were not readily explained by fatigue, psychological stress, drug effects, or medical problems. Speech analysis appears to be a useful technique to provide secondary evidence of alcohol impairment.

PMID: 1930083 [PubMed - indexed for MEDLINE]

### **Parkinsonism: Michael J. Fox Foundation**

<https://www.michaeljfox.org/news/speech-swallowing-problems>

Many people with PD speak quietly and in one tone; they don't convey much emotion. Sometimes speech sounds breathy or hoarse. People with Parkinson's might **slur words, mumble or trail off** at the end of a sentence. Most people talk slowly, but some speak rapidly, even stuttering or stammering.

### **Parkinsonism: Cleveland Clinic**

<https://my.clevelandclinic.org/health/diseases/9392-speech-therapy-for-parkinsons-disease>

Some difficulties include:

- Softened voice.
- Reduced volume to your voice.
- Speaking in an unchanging pitch (monotone).
- Having a hoarse or strained quality to your voice.
- Having a breathiness to your voice. Breathiness in the quality of your voice that is easily heard by your listeners. It takes more effort and energy to speak. You "run out of gas" as you speak.
- Trouble clearly and easily pronouncing letters and words.
- Tremor in your voice.
- Slurring of your speech.
- Using short rushes of speech.
- Loss of your facial expression.

### **Parkinsonism: Very Well Health** <https://www.verywellhealth.com/parkinsons-disease-related-speech-and-language-problems-2612189>

The most common speech problems experienced by people with PD involve reduced volume (hypophonia), reduced pitch range (monotone), and difficulty with the articulation of sounds or syllables (dysarthria).

### **Phonological and Articulatory Impairment in Alzheimer's Disease**

Croot, K. Hodges, J.R., Xuereb, J., Patterson, K. [Brain and Language](#) [Volume 75, Issue 2](#), November 2000, Pages 277-309

Subjects: Six patients with pathologically confirmed Alzheimer's disease (AD) and four patients with clinically diagnosed dementia of the Alzheimer's type (DAT) presented with one of five different clinical profiles: nonfluent progressive aphasia, mixed progressive aphasia, progressive aphasia diagnosed as DAT from neuropsychological assessment, initial amnesic syndrome with prominent phonological errors, and biparietal syndrome.

Results: Analysis of their conversational speech, single-word production, and performance of highly familiar series speech tasks such as counting revealed false start errors, phonological paraphasias (production of unintended syllables, words, or phrases), and/or articulatory difficulty.

The Captain has full responsibility for whatever happens, whether or not it is his fault directly. Moreover, he was not on the bridge when he should have been.

Ironically, he and the lawyers he works with thrive on disasters.

maritime consultant and claims adjustor

Sidebar: Valdez, Alaska:

From the Valdez Convention and Visitor's Bureau Web Site: **Visit Valdez - Alaska's perfect year round vacation destination!** A land of unmatched scenic beauty of alpine and marine landscapes.

Situated at the head of a deep, stillwater fjord in the northeast section of Prince William Sound, Valdez is surrounded by the Chugach Mountains. They are the most heavily glaciated mountains in the Northwest. Valdez is the northernmost ice-free -port in North America.

Important dates in their history:

1898 | Gold Rush Stampede

1964 | 5 minute, 9.2 measured earthquake (Good Friday Quake)

1970's | Construction of Trans-Alaska Oil Pipeline & Marine Terminal

1989 | Exxon Valdez Oil Spill and Cleanup

1989/90 | 47 feet of snow (1989/1990).

They especially urge you to visit for the **May – Sept Valdez Halibut Derby**

And, of course, they report accommodations, particularly including **Pipeline Inn/ Club and No Name Pizza.**



3 days after [Exxon Valdez](#) ran aground

**VALDEZ TRAFFIC CONTROL:** *Valdez Traffic. Go ahead.*

**HAZELWOOD:** Yes. We've, uh, departed the pilot, or disembarked the pilot, excuse me. And this time hooking up to sea speed and ETA Naked Island 0100. Over.

**HAZELWOOD:** Okay. I was just about to tell you that, uh, judging by our radar, I will probably divert from, uh, the TSS [Traffic Separation Scheme] and end up in the, uh, inbound lane if there's no conflicting traffic. Over.

**HAZELWOOD:** That'd be fine. Yeah. We, we may end up over in the, uh, inbound lane, outbound transit. Uh, we'll notify you when we leave the, uh, TSS and, uh, cross over the separation zone. Over.

**HAZELWOOD:** Okay. Exxon Valdez over. Standing by 13 and 16.

**HAZELWOOD:** Uh, Valdez Traffic. Exxon Valdez. W-H-C-B. Over.

**HAZELWOOD:** Yeah, at the present time, uh, I'm going to alter my course to two, zero, zero [Note: That is to the southwest, which is towards the inbound land, and also happens to be in the direction of Bligh Reef] and reduce speed to about 12 knots to, uh, wend my way through the ice, and, uh, Naked Island ETA might be a little out of whack but, uh, once we're clear of the ice out of Columbia Gla .. Bay, we'll give you another shout. Over.

**HAZELWOOD:** Yeah., Valdez Traffic. EXXON VALDEZ. Over.

**HAZELWOOD:** Yeah. Uh, it's VALDEZ back. Uh, we've – uh, should be on your radar there. We've fetched up, uh, hard aground north of, uh, Goose Island off Bligh Reef. And, uh, evidently, uh, leaking some oil, and, uh, we're gonna' be here for a while. And, uh, if you want, uh, so you're notified. Over.

**HAZELWOOD:** Yeah. That's correct. Over.

**HAZELWOOD:** Okay. I'll give you a status report, uh, ascertain the situation. Over.  
[Communications among others skipped here.]

**HAZELWOOD:** EXXON VALDEZ back. Over.

**HAZELWOOD:** Uh, it's blowing uh, northerly a little bit, uh, drizzle, visibility, uh, two miles. Over.

**HAZELWOOD:** Uh, ten knots right now. Over.

**HAZELWOOD:** Yeah, it's kinda' indeterminate, uh, right now. It's ... slight sea. Over.

**The conclusion:** Hazelwood's speech is consistent with the hypothesis that he may have been intoxicated. The problem is that it is consistent with other hypotheses as well. He may have been nervous or even actually frightened. He may have been under stress. He was surely distracted. The other problem is that the subjects in the experiments react differently to alcohol intoxication. For all we know, they may react differently at different times and under different circumstances. Unless we know how Hazelwood would react under these circumstances, we cannot say more than his speech is consistent with the hypothesis that he is intoxicated.

Captain Joe Hazelwood was responsible for everything that happened on the Exxon Valdez.

his "Describing his demeanor on the witness stand, the Anchorage Daily News referred to slow, deliberate speech."

Pariah, ridicule

the purgatory of infamy in the so-called news media.

Are media bound to pander to a public that craves titillation rather than understanding? Journalists claim that they interpret events. That is the basis on which they have obtained shield laws that allow them to keep their sources secret, as well as the basis on which they have privileged access to the public airwaves. They are required to operate in the public interest, convenience or necessity. In the case of the story of the Exxon Valdez disaster, the media provided a simplistic and misleading story rather than an understanding of the issues. Then again, the media know the tastes, attention span and intelligence of their audience.

inaccurate clichés, his actions cannot be justified.

"The courts have frequently essayed to define the terms 'intoxication' and drunkenness,' but as has been said, the terms are scarcely susceptible of accurate definition for practical purposes, and are so familiar that they define themselves. "Intoxication" is a word synonymous with "inebriety," "inebriation," or "drunkenness," and is expressive of that state or condition which inevitably follows from taking excessive quantities of an intoxicant. To some men, it means being under the influence of an intoxicant to such an extent as to render one helpless, while others speak of a person as intoxicated when he is only slightly under such an influence...As far as the infliction of physical injuries upon a third party is concerned, it has been said that a person may be deemed intoxicated within the meaning of a civil damage act when his excessive use of intoxicants has produced such a material change in his normal mental state that his behavior becomes unpredictable and uncontrolled, and when, as a result, slight irritations, real or imaginary, cause outbursts of anger which find expression in acts of physical violence against others." **45 Am Jur. 2d, Sec. 21**