

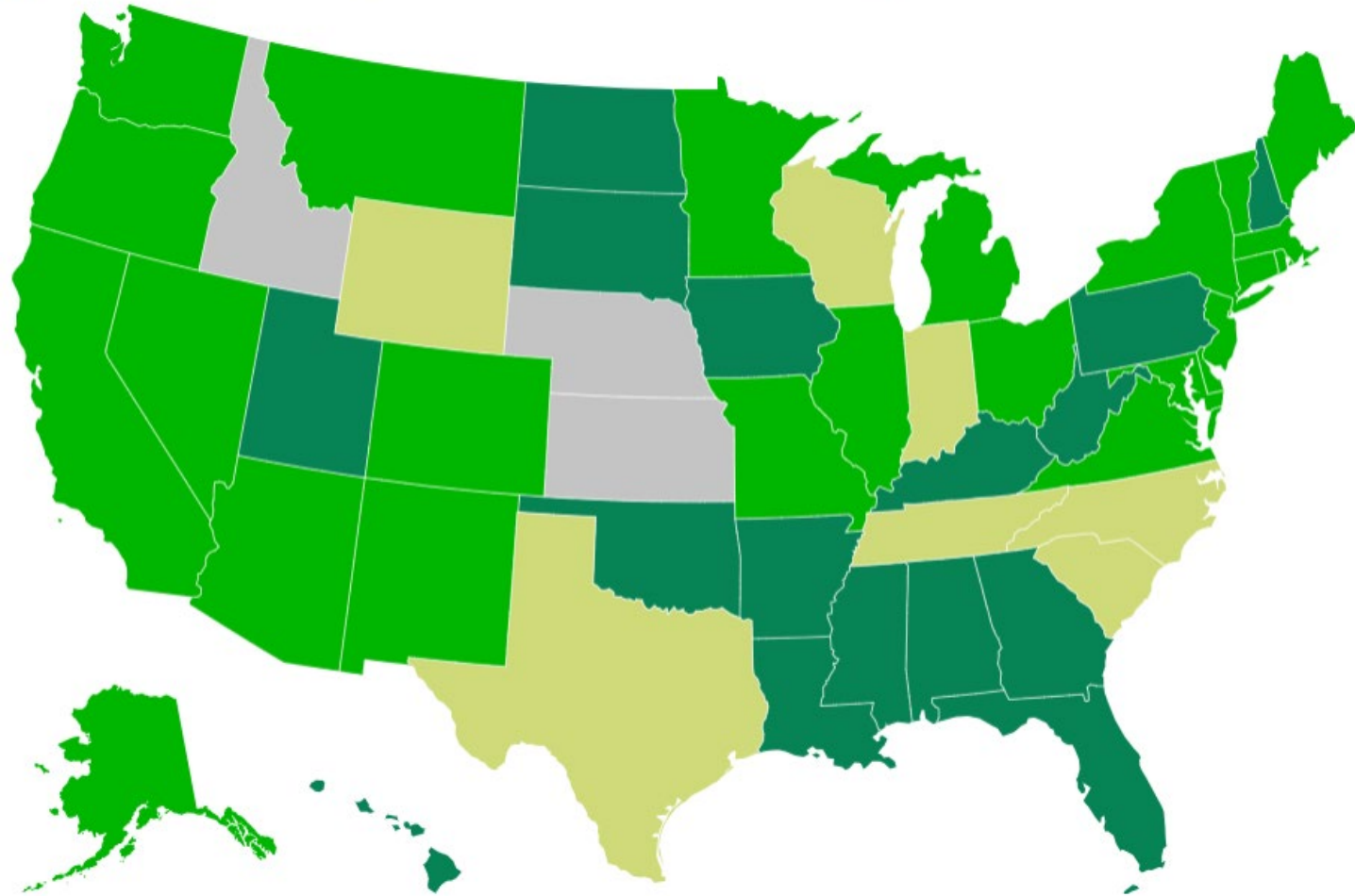


Up In Smoke

Cannabis Legalization's Impact on Traffic Safety

Cannabis on the national stage

■ Recreational & medical ■ CBD/Low THC ■ No public program ■ Some form of medical cannabis



- 24 states have medicinal/recreational legalization on the books
- 38 states have legalized medicinal use of cannabis
- More than 86% of Americans now live in a state where cannabis is legal on some level

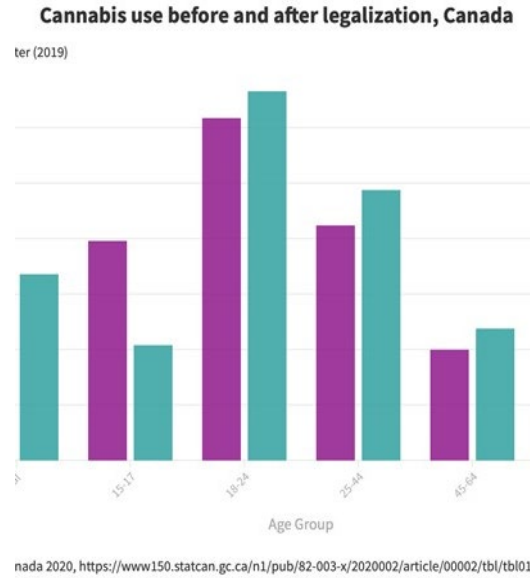
The dispensary boom

2024 Dispensaries by State

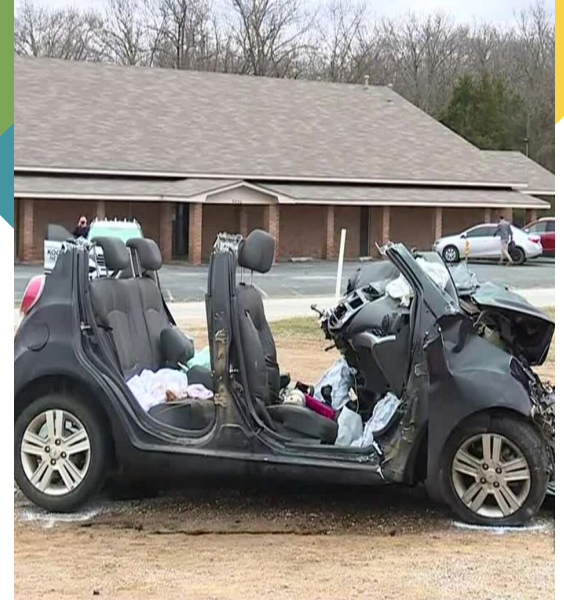
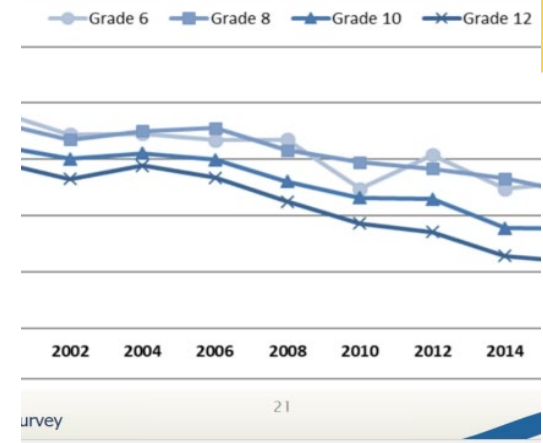
Oklahoma	2,387	Missouri	215	Connecticut	28
California	1,244	Maine	198	Hawaii	24
Colorado	1,023	Mississippi	191	Virginia	22
Michigan	994	Alaska	188	Louisiana	20
Oregon	824	Pennsylvania	177	Minnesota	17
New Mexico	650	Nevada	169	Utah	15
Florida	622	Ohio	118	Delaware	12
Washington	471	Maryland	100	North Dakota	8
Massachusetts	436	New York	99	Washington, D.C.	7
Montana	426	South Dakota	81	New Hampshire	7
Puerto Rico	340	Vermont	79	Rhode Island	7
New Jersey	296	West Virginia	53	Northern Mariana Islands	6
Arizona	292	Arkansas	38	Iowa	5
Illinois	232	Georgia	32	Texas	3

- Most states have started slowly and have taken an average of 9-15 years to go from medical to recreational
- This timespan has decreased as cannabis laws have become more lenient across the nation (CA 1996-2016 v. VA 2020-2021)
- Many people don't fully understand the implications of full legalization
- As of Jan 01, 2024 there are 12,156 total dispensaries in the US (Starbucks - 16,386 McDonalds - ~ 14,300)

Why does this matter?



Perception of Great Risk for Marijuana Smoking, 2002-2014



Who is using

Medical / Recreational

Increased use

Elderly, youth, cannabis = the new alcohol

Perception of risk

Concept of risk of use (even daily use) is decreasing yearly.

Traffic safety

Crash risks - consumers are unclear about consequences and detection

Not just on weekends and evenings...



[REDACTED]
GreenTheory anyone?

LOL

MANAGING YOUR CAREER

Bosses' New Task Is Figuring Out Who's High at Work

Companies change how they police use of the drug at work

By *Te-Ping Chen* [Follow](#)

June 21, 2023 9:00 pm ET

The Science Behind A Wake And Bake

Why do so many people like to consume marijuana in the morning? What's really going on in a wake and bake?

Almost Half of the World's MMA Fighters Use Cannabis: Here's Why

Rocky Mountain High Intensity Drug Trafficking Area Report

- ❖ The Rocky Mountain HIDTA has published annual reports every year since 2013 tracking the impact of legalizing recreational marijuana in Colorado.
- ❖ Among the focus areas are the impact on society, public health and traffic safety.
- ❖ Marijuana tax revenue represents approximately 0.98% of Colorado's FY 2020 budget.
- ❖ Nearly 66% of local jurisdictions in Colorado have banned medical and recreational marijuana businesses

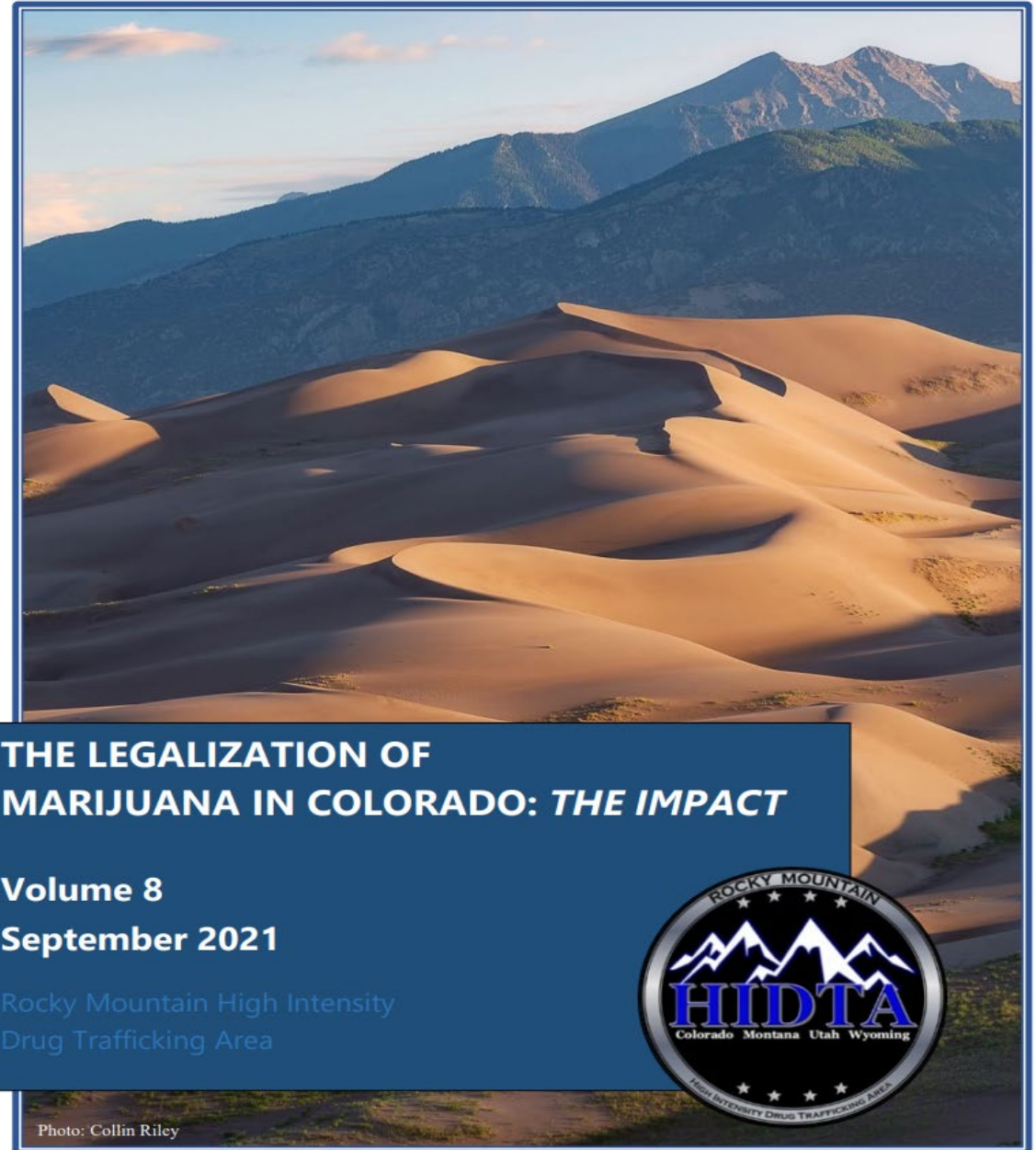


Photo: Collin Riley

Traffic Safety Impact

**Traffic Deaths Related to Marijuana
When a DRIVER Tested Positive for Marijuana**

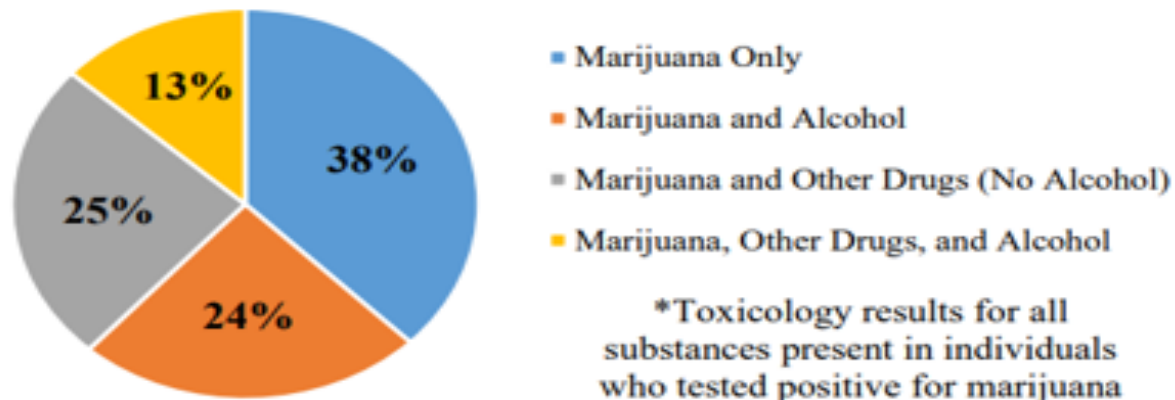
Crash Year	Total Statewide Fatalities	Fatalities with <u>Drivers</u> Testing Positive for Marijuana	Percentage Total Fatalities
2013	481	55	11.4%
2014	488	75	15.4%
2015	547	98	17.9%
2016	608	125	20.6%
2017	648	138	21.3%
2018	632	115	18.2%
2019	596	127	21.3%
2020	622	131	20.1%

❖ Since recreational marijuana became legalized, traffic deaths where drivers tested positive for marijuana increased by **138%**, while all traffic fatalities increased by **29%**

❖ Traffic deaths involving drivers who tested positive for marijuana nearly doubled from **2013 to 2020**

❖ Since recreational marijuana was legalized, the percentage of all Colorado traffic deaths involving drivers who tested positive for marijuana increased from **11% in 2013 to 20% in 2020**.

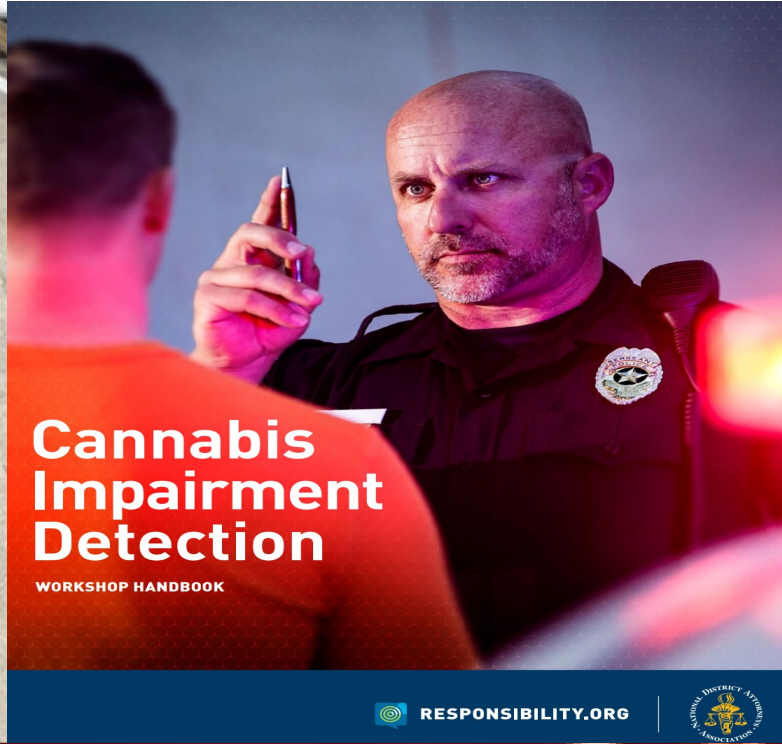
Drug Combinations for DRIVERS Involved in Fatal Crashes who Tested Positive for Marijuana* (2020)



What all of this means for law enforcement...



- Very difficult to observe extreme impairment, especially as it relates to frequent users
- LE will most likely interact with these individuals after a crash occurs
- Cannabis impacts the higher cognitive aspects of driving
 - Rules of priority, lane changing, complex intersections
- Not just more DREs are needed, but better training for non-DREs



Cannabis Impairment Detection

WORKSHOP HANDBOOK

 RESPONSIBILITY.ORG



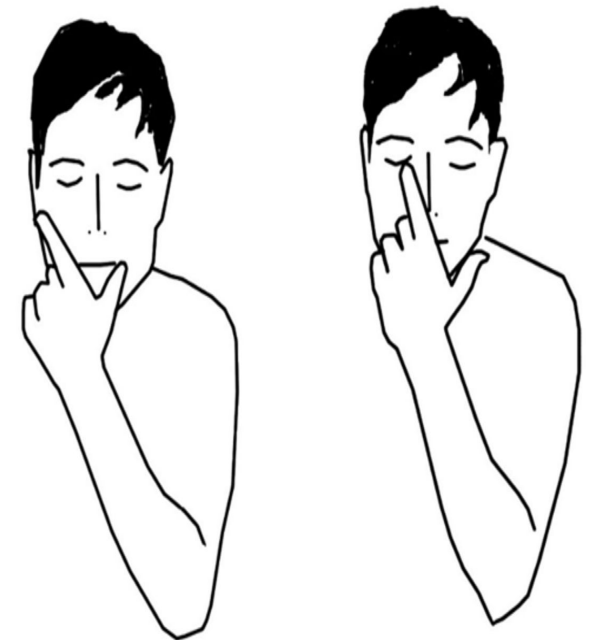
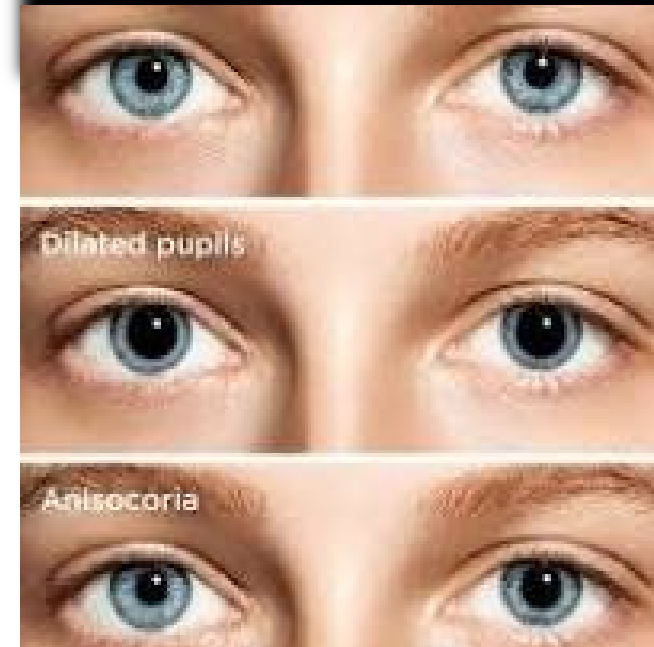
Officer Training

- Offer more in-depth training about enforcement tactics to focus on research identified impairment indicators
- Offer more ARIDE classes to better outfit patrol
- Continue/add wet labs in/to DUI training
- Have officers attend Green Labs
- Get involved with research side of things (if possible)

ARIDE

An Important Introduction to Drug-Impaired Driving Detection

- Trains officers to observe, identify, and articulate the signs of impairment related to drugs, alcohol, or a combination of both, in order to reduce the number of impaired drivers.
- Very pertinent to cannabis intoxication:
 - Additional eye indicators
 - Modified Romberg Balance Test
 - Finger to Nose



Why Learn Additional Tests?

Validity Indicators of SFSTs for Drugs

	Sensitivity	Specificity	Accuracy
All Drugs	0.607	0.867	0.634
Depressants	0.961	0.867	0.913
Stimulants	0.629	0.867	0.724
Narcotics	0.698	0.867	0.793
Cannabis	0.414	0.867	0.513

Other Indicators of THC

Test	Sensitivity	Specificity	Accuracy
LOC	0.63	0.61	0.62
Romberg 2+	0.52	0.79	0.58
Eyelid Trem.	0.78	0.69	0.77
FTN 3+	0.83	0.52	0.76

SFST + FTN + Eyelid Tremors

	Sensitivity	Specificity	Accuracy
All Drugs	0.949	0.681	0.915
Depressants	0.992	0.681	0.842
Stimulants	0.943	0.681	0.783
Narcotics	0.949	0.681	0.792
Cannabis	0.937	0.681	0.879

Green Labs



Green Labs



WHO:

10-12 certified medical cannabis patients (initially), approximately 25 officers (mostly patrol and/or specialized street-based units). Auditors: legislators, judges, prosecutors, lab personnel, traffic safety experts

WHAT:

1 lab per quarter- evening hours

WHEN:

6 hours of classroom, 2 hours of lab, working dinner

WHERE:

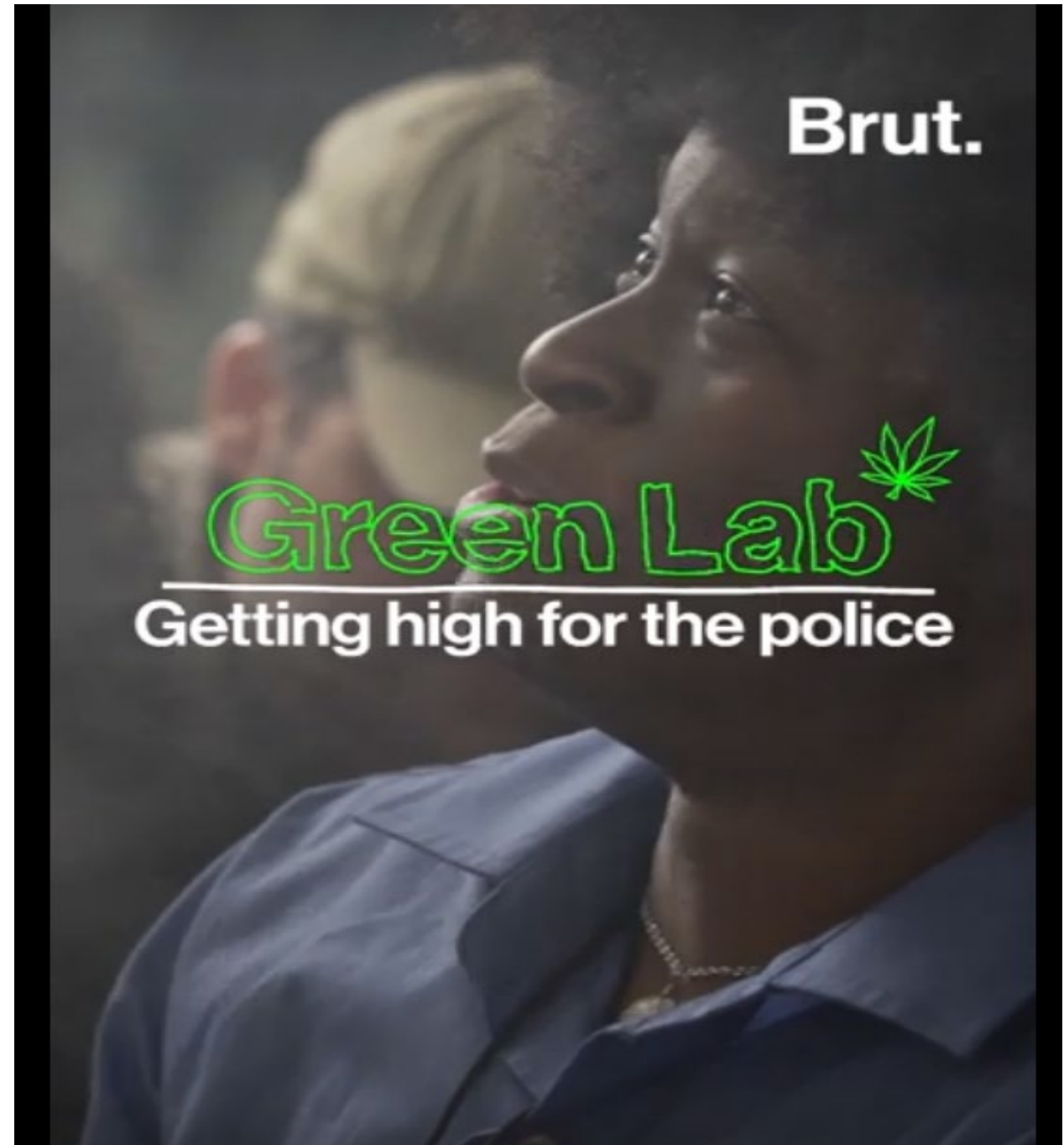
Predetermined venue with classroom and consumption area

HOW:

Consumers dose twice throughout the evening – edibles, alcohol, inhalation

The Concept

- Enhance officer understanding on the patrol level
- Provide DREs with a stronger case
- Provide stronger cases in court for the prosecutors
- Promote good arrest decisions
- Test new technology/concepts
- Community engagement
- Get the traffic safety message out to multiple communities (media included)



Venue Format



Classroom Portion

- SFST Refresher
- Legal Update
- ARIDE Tests
- Methods of Ingestion



Consumption Portion

- Initial Screening
 - 30 Minute Consumption Period
 - Dialogue Regarding Effects
 - Review of Accessories
- Enforcement Portion (Optional)**

Things to consider:

Classroom



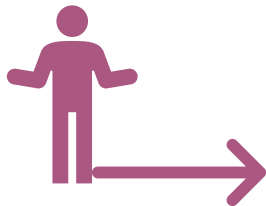
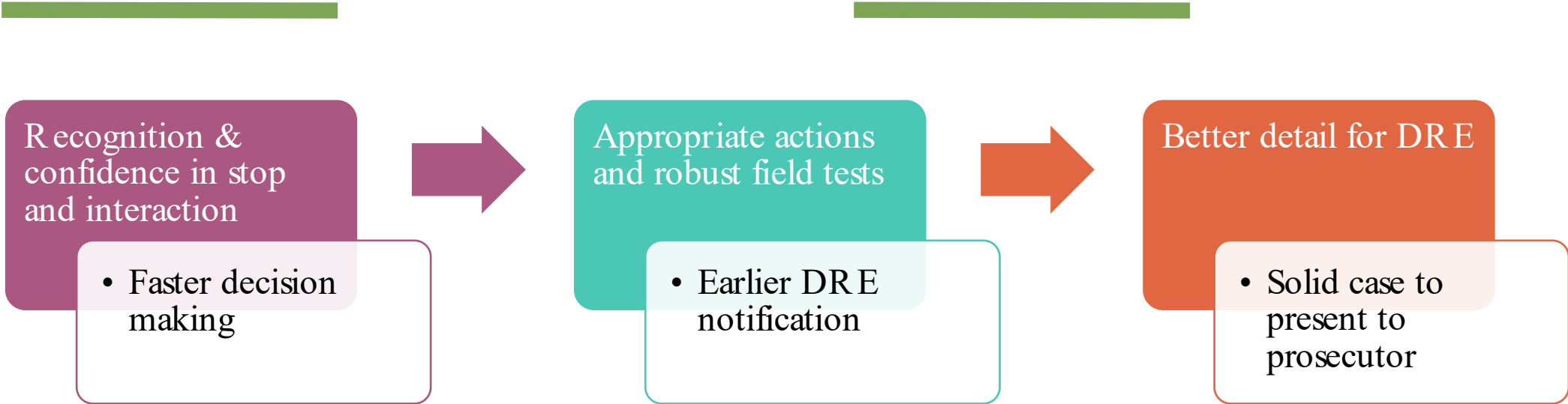
Lab/Workshop



Consumption Area



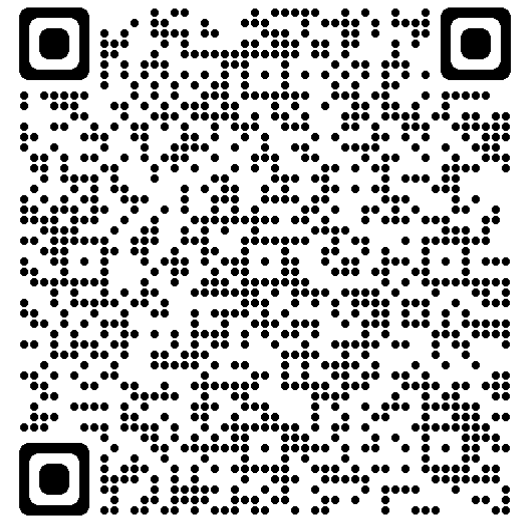
The why....a little training goes a long way

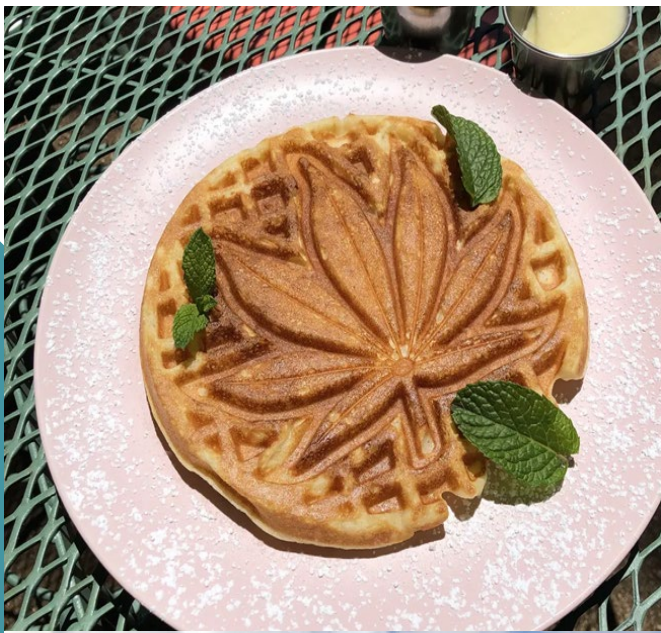


Can you do a Green Lab?

Yes! These are easy....

- Impairment is impairment
- Many legal hemp-based products cause impairment
- Other states are considering conducting labs with hemp-based products and low levels of alcohol
- Even tolerant users will show impairment with Delta-8 and Delta-10 products





Why is cannabis impairment so difficult?



Green Lab lessons learned and why it isn't enough to just have DREs?

Green Lab Lessons

Product matters



Ingestion method matters



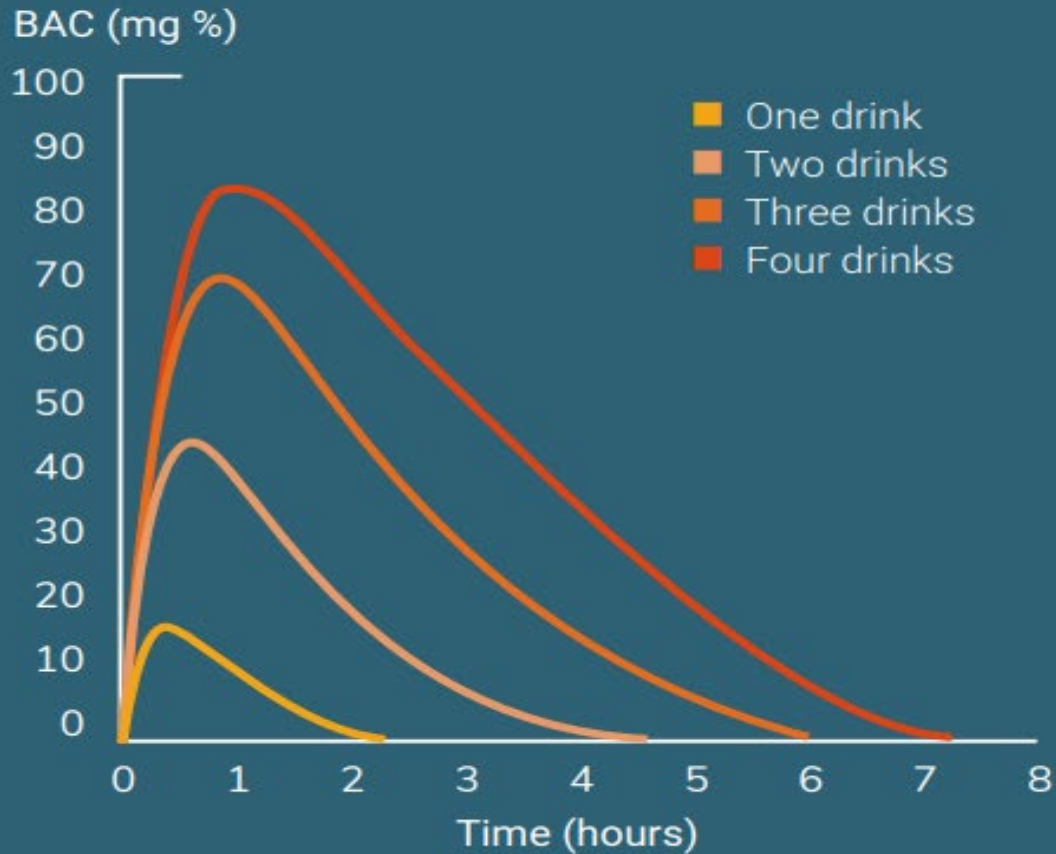
Everyone is different



Alcohol v. THC

FIGURE 3A

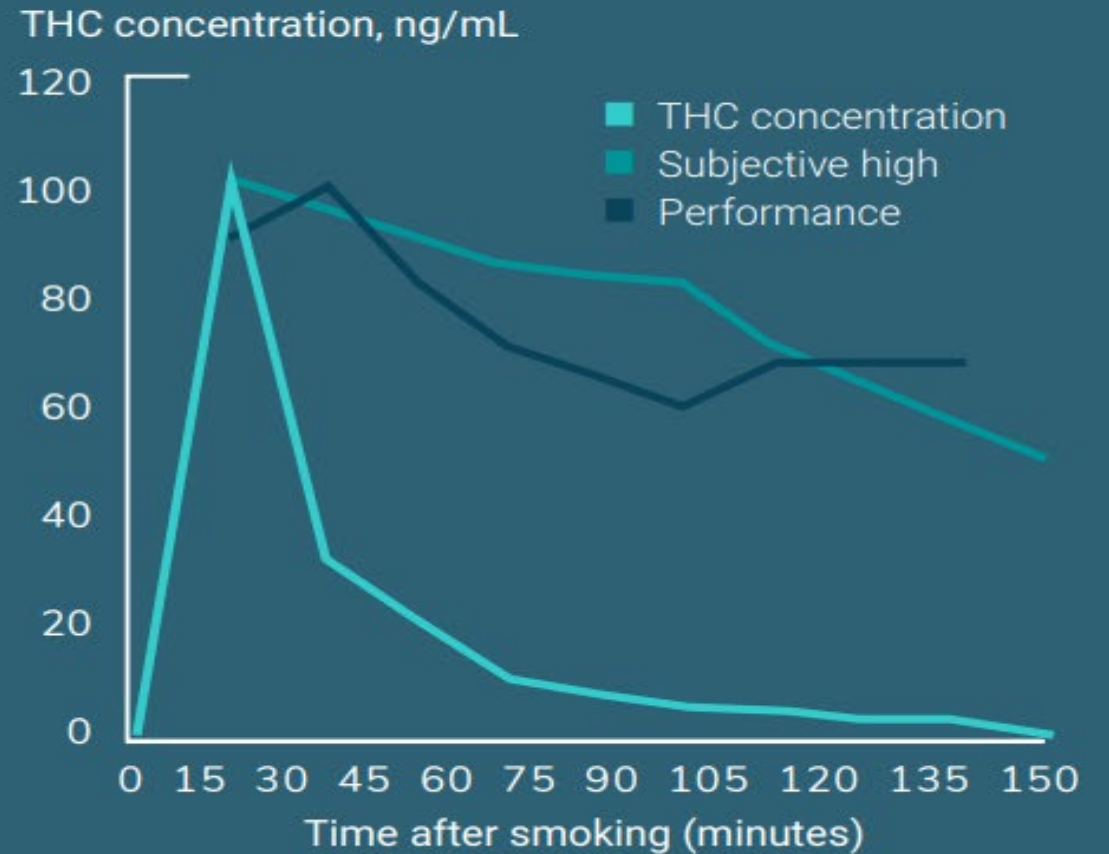
Blood Alcohol Concentration (BAC) Over Time After Drinking



Source: Adapted from NIAAA (1997)

FIGURE 3B

Marijuana (THC) Concentration, Subjective High, and Impairment Over Time After Smoking



Source: Adapted from Compton (2017), Figure 4.

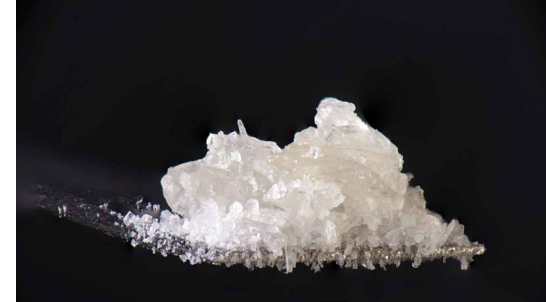
FLOWER/BUD



CONCENTRATES



ISOLATE



EDIBLES



- General average THC content for flower/bud is mid 20% (retail sales)
- Impairing product is primarily in the flower
- CBD impairs as well-acts as a sedative

- Retail sale THC concentration is 60-76%.
- THC concentrations can reach much higher upwards of 90%
- Vape is common consumption method as are dab rigs and smoking
- More expensive to purchase

- Furthest you can take biomass to refine it into a pristine substance
- Crystal or powder form
- Is formed through temperature control, pressure, and agitation
- Lose the entourage effect of multiple cannabinoids working together

- Impairing effects are difficult to determine
- Later onset
- Intense high due to primary metabolite being more impairing than Delta 9 THC

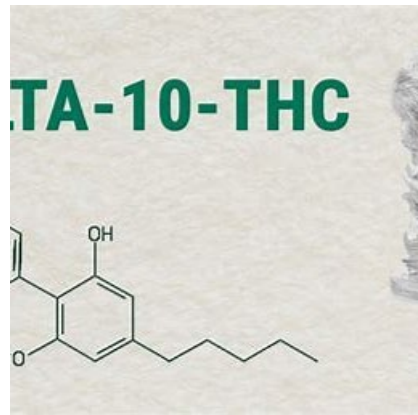
Other cannabinoid players

Delta-8



- CBD extracted from hemp, delta 8 THC is extracted from CBD, and then acetic anhydride is added to delta -8
- Considered the “psychedelic cannabinoid” due to hallucinatory effects
- 20-30 minutes to kick in since it is not activated until metabolized

Delta-10



- Hemp-derived CBD
- Difficult to extract
- Numerous chemicals are used for extraction
- Energizing effect
- Less of a high than Delta-8

THC-0



- Processed from Hemp derived CBD.
- Produces sedating effects
- Produces less of a high than Delta-9

Ingestion

Ingestion methods matter!

Cannabis can be ingested via the following:

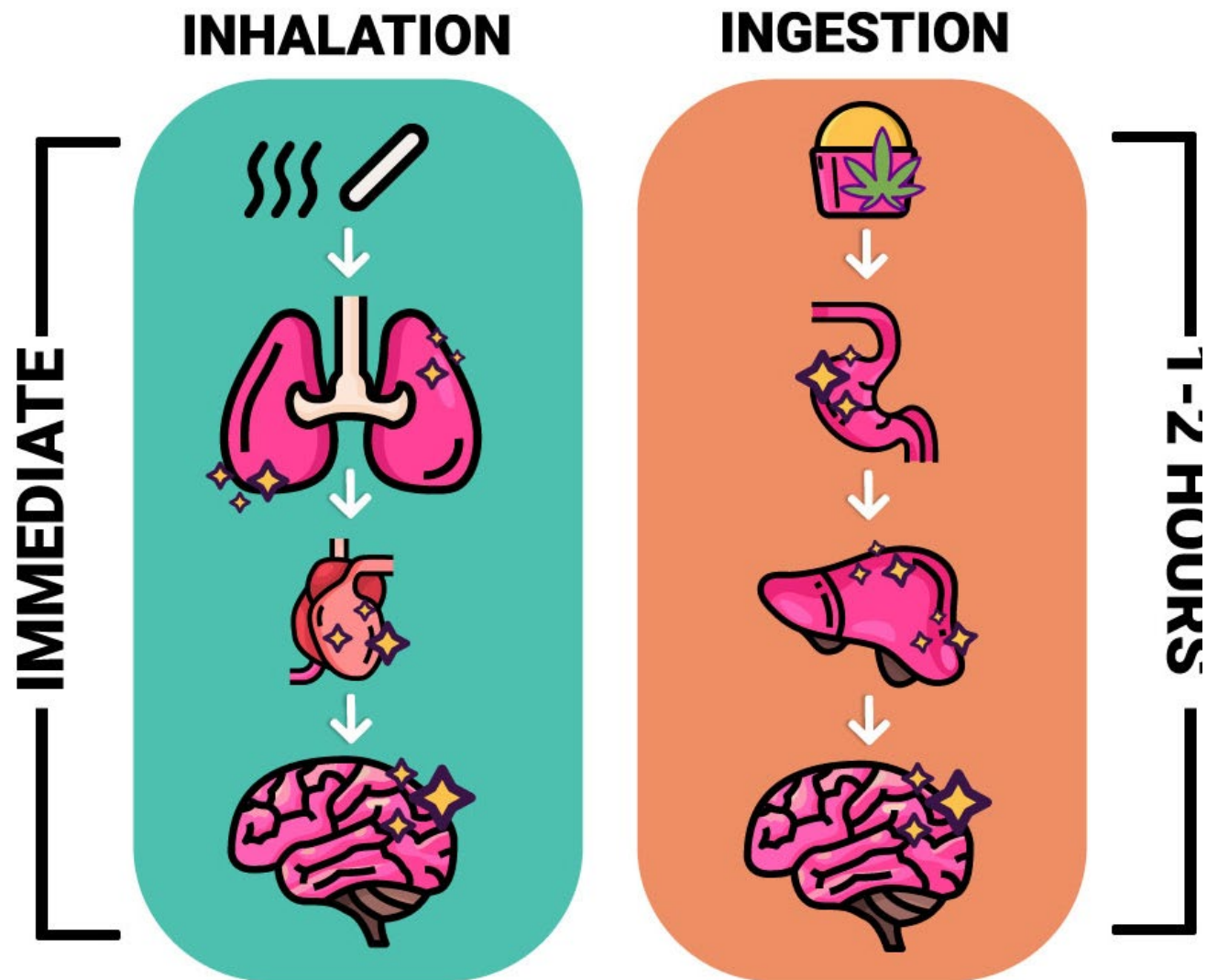
- Inhalation
- Oral
- Transdermal

Method of ingestion determines peak effect of drug and duration of high

Method also potentially changes metabolism process

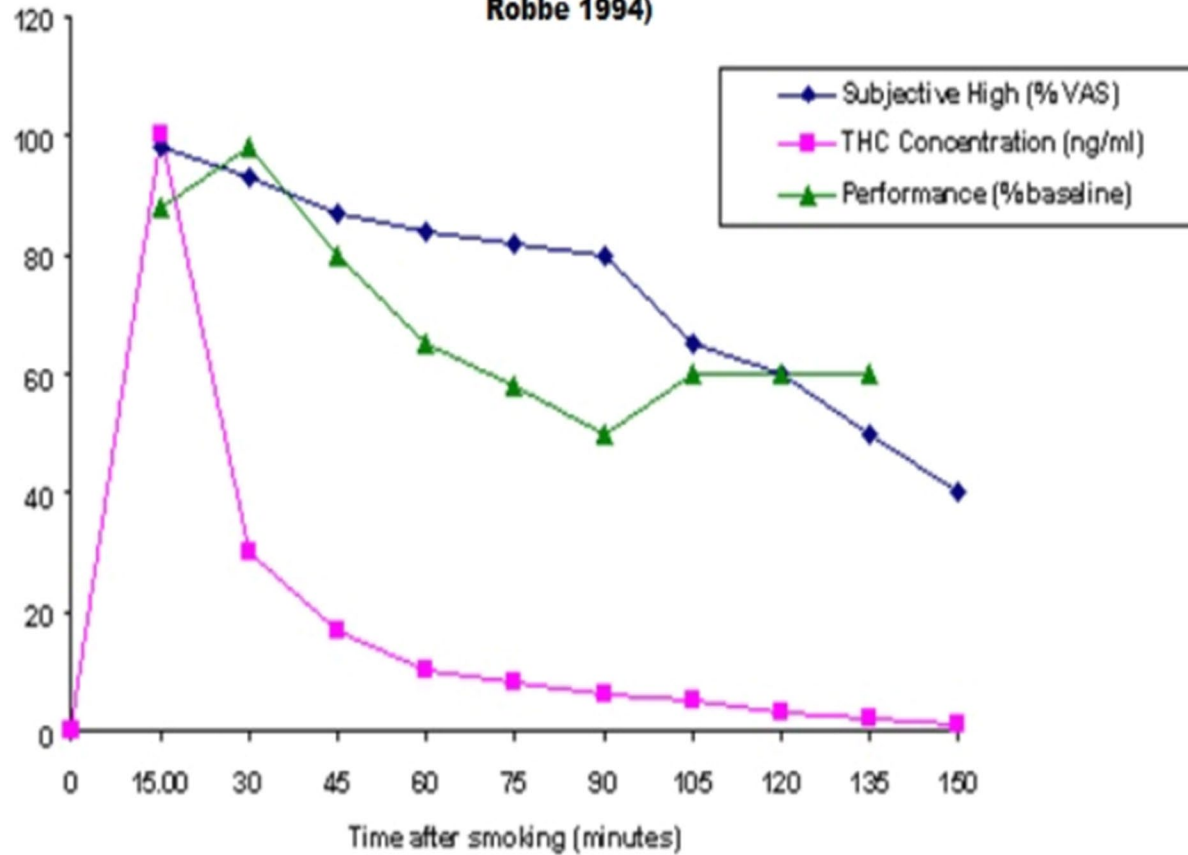
- Hydroxy-THC versus Delta-9 THC

HOW CANNABINOIDS REACH THE BRAIN

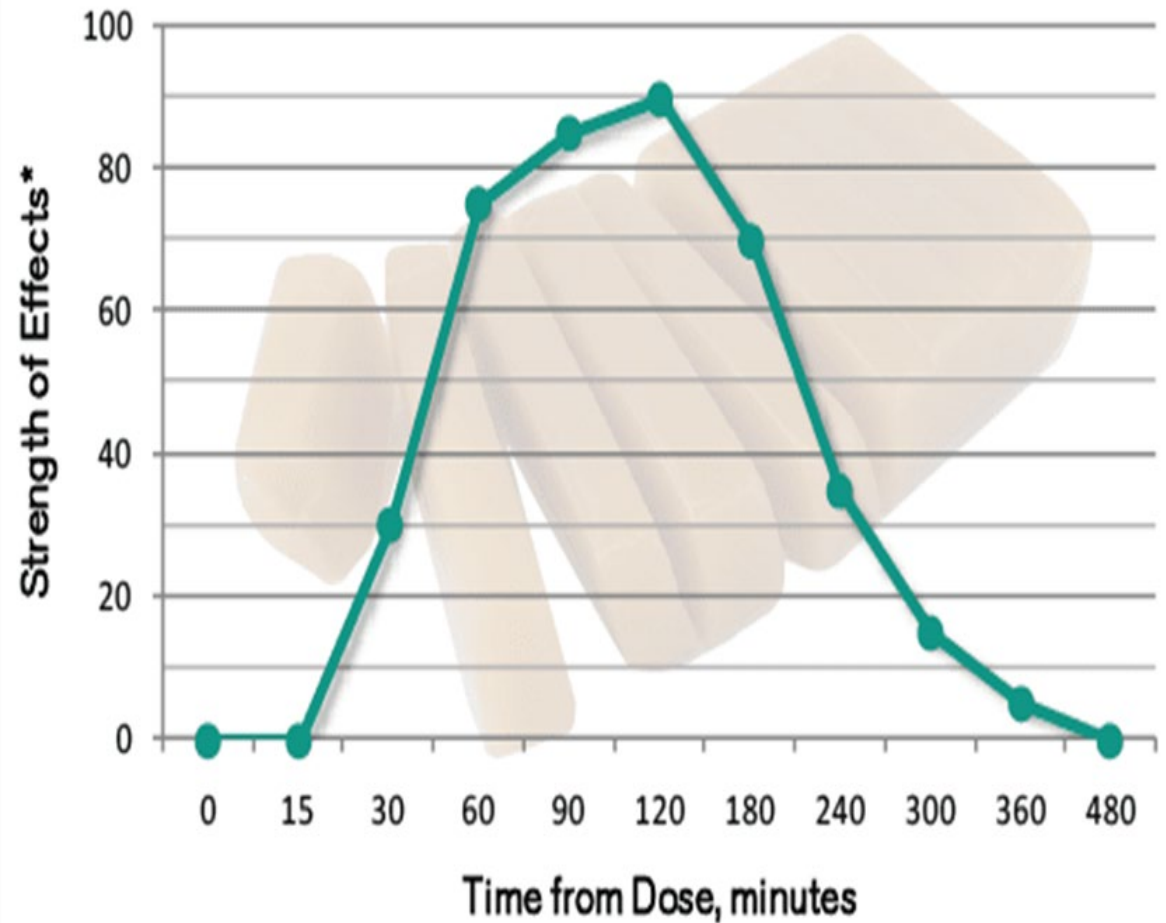


Ingestion method matters

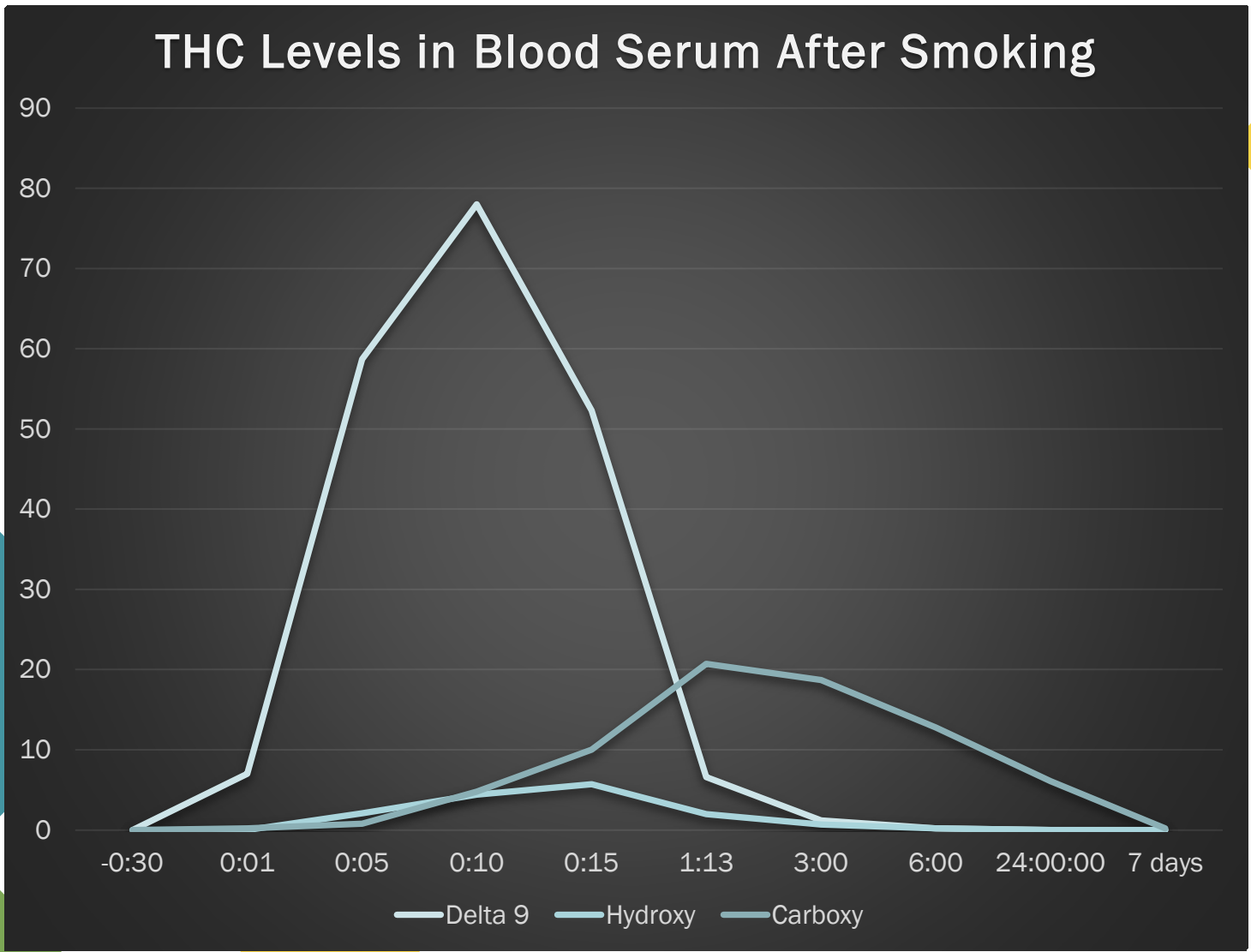
Time Course of Standardized THC Concentration in Plasma, Performance Deficit and Subjective High after Smoking Marijuana
(Adapted from Berghaus et al. 1998, Sticht and Käferstein 1998 and Robbe 1994)



Oral Cannabis Effects



Dissipation Rate



- **THC peak & dissipation rate**

Within 30 minutes after inhalation the THC level has dropped to 80-90 percent of the peak level

THC levels peak very quickly after use (inhalation)

THC levels drop to less than 2 nanograms per milliliter of blood after about four hours (depending on the user)

Everyone is different



- Frequency of use
- Length of use
- Length of time since last use
- Tolerance
- Consumption habits
- Preferred product



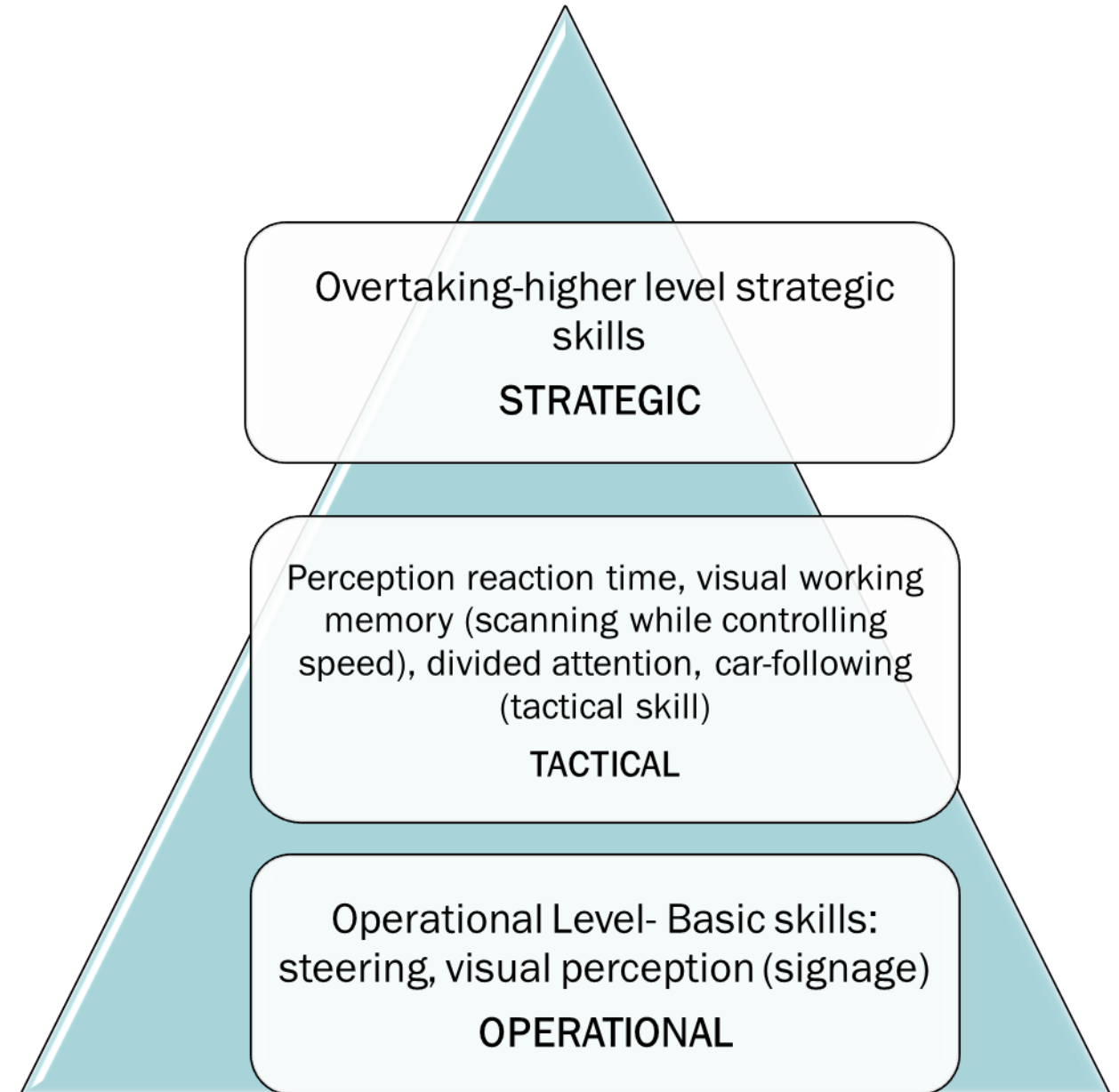
Enforcement Tactics

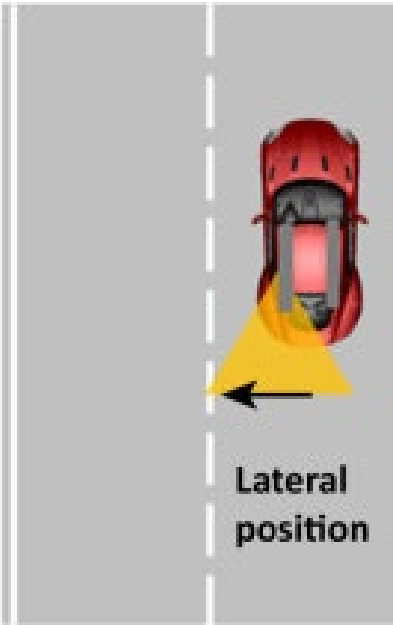
How to improve, what to look for, & if nothing else...keep doing what you're doing

Cannabis & Driving



THC < 14 %

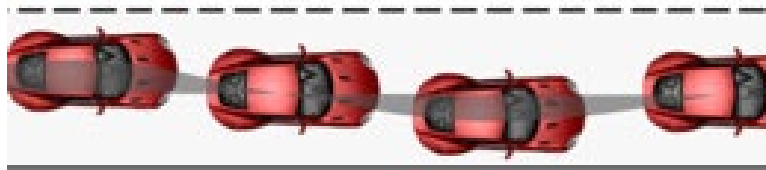




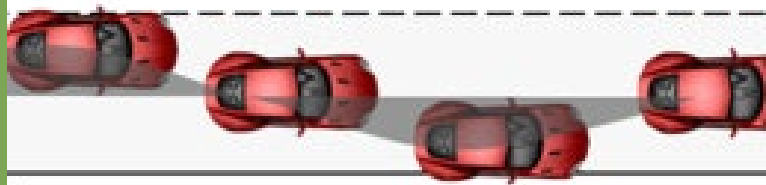
SDLP – Standard Deviation of Lateral Positioning (operational)

- Proven method used for measuring impairment and driving ability (lane drifts)
- Typically completed on:
 - An open course
 - For the length of approximately 1 hour
 - Instructed to keep steady lane position and constant speed

Standard deviation of lateral position (SDLP)



Furthest left Lane center Furthest right Lane center



- Displays momentary lapse in attention during lane drifts
- 3-12" off center for cannabis impaired driving
- .05 BAC = SDLP > 2.5 cm (just under 1 inch)

But...how likely is law enforcement to see this?



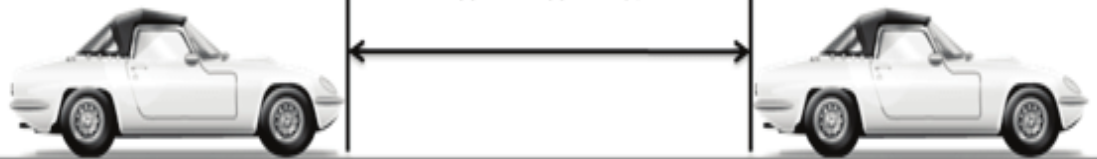
Car Following (tactical)

- Driver is instructed to keep an even distance between their vehicle and an identified vehicle in front of them
- Distance is specified at the beginning
- Driver is expected to change speeds based on vehicle's speed that he/she was instructed to follow

Acceleration	$a_F(t)$		Acceleration	$a_L(t)$
Speed	$v_F(t)$		Speed	$v_L(t)$
Position	$x_F(t)$		Position	$x_L(t)$

Range
 $R(t) = x_L(t) - x_F(t) = \Delta x$

Range rate
 $RR(t) = \Delta V(t) = dR(t)/dt$



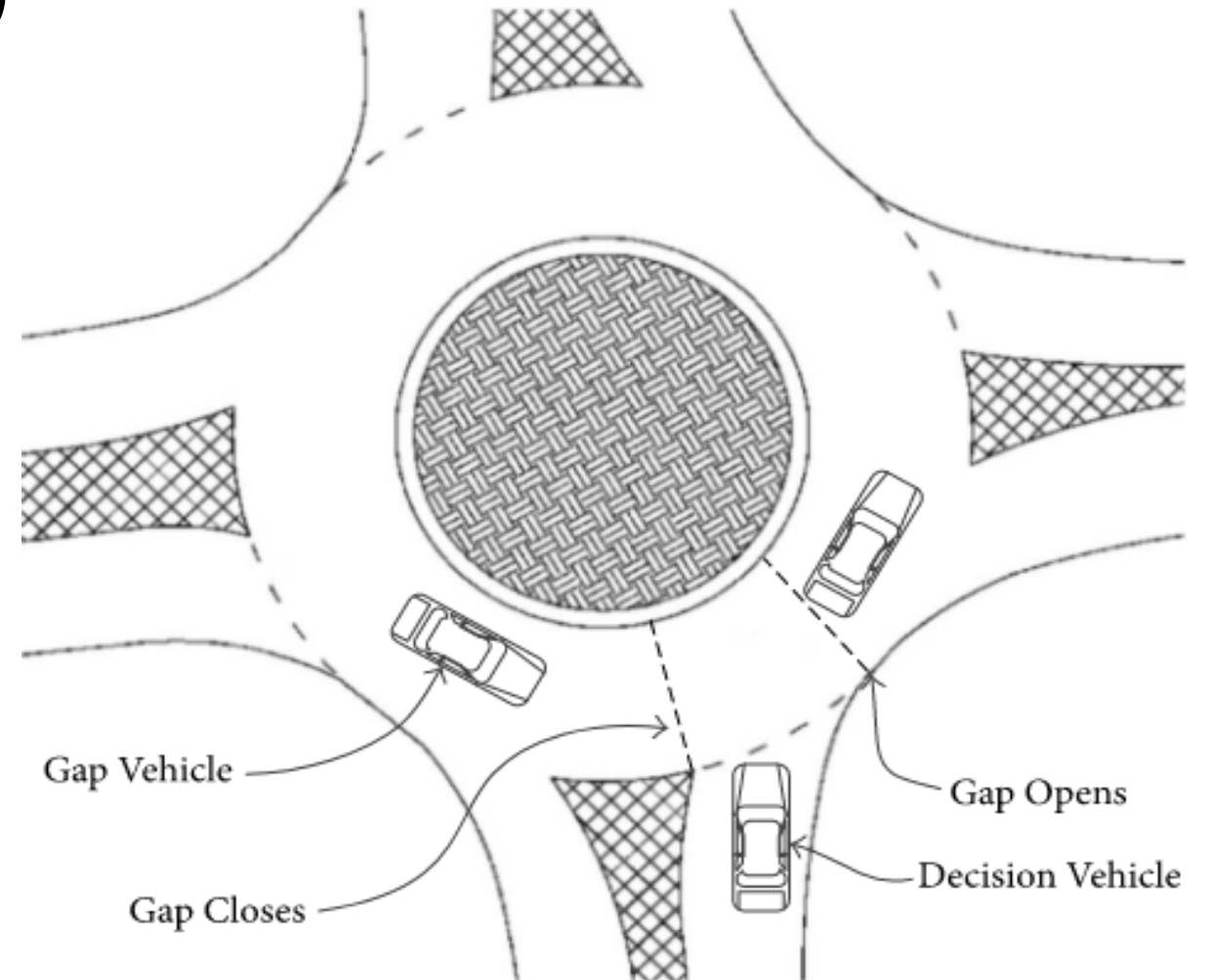
Following Vehicle

Leading Vehicle

But...how likely is law enforcement to see this?

Gap Acceptance (strategic)

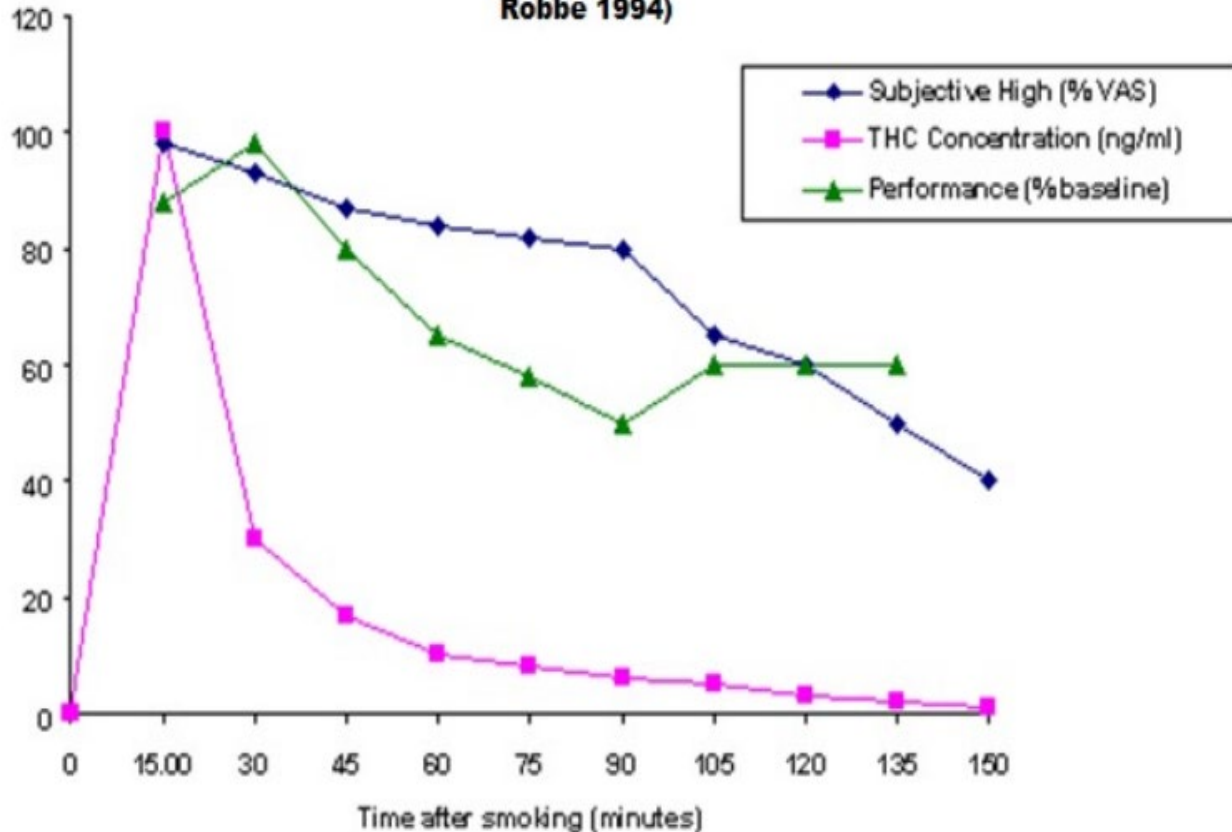
- Takes place when a traffic stream merges or crosses with another traffic stream
- Measures risk-taking (size of gap chosen)
- Accounts for a level of depth perception (minimum of time to contact)
- Alludes to reaction time (size of gap chosen)
- Accounts for decision making issues/non-issues



But...how likely is law enforcement to see this?... most likely, after a crash.

Perception of Risk

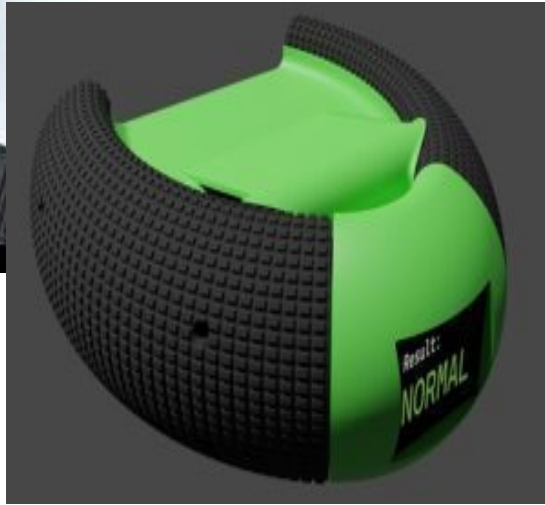
Time Course of Standardized THC Concentration in Plasma, Performance Deficit and Subjective High after Smoking Marijuana (Adapted from Berghaus et al. 1998, Sticht and Käferstein 1998 and Robbe 1994)



- High THC content products boosts THC levels in the blood, *but* they don't necessarily elevate impairment
 - *Possible that receptors are already oversaturated*
- Tolerance is a huge issue as is how the product is consumed. Smoking and vaping-not about how long one holds it in, but in optimization of inhalation (not coughing, no side-stream loss, etc.)



Oral Fluid testing



Eye movement



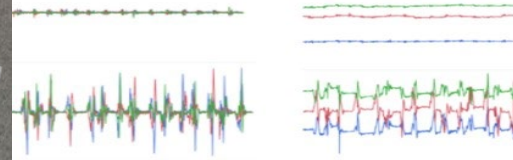
Cognitive testing



Breath testing



Sensor-based digital mapping



New approaches



Questions

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Traffic Division

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301-512-4422 (cell)