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### Evaluating the Effectiveness of Distracted Driving Laws

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### National Distracted Driving Coalition (NDDC)

The National Distracted Driving Coalition (NDDC) was formed in March 2021 to address distracted driving which is a contributing factor to road deaths and injuries. This road safety issue is a priority concern shared by many organizations across many sectors. A diverse cross-section of entities, representing academia, non-profits, government, advocacy, and industry, including insurance, transportation, automotive and technology, have come together to create a National Action Plan to tackle this important issue.

#### Vision

To accelerate national efforts to implement effective interventions and encourage attentive driving by eliminating distractions.

#### Mission

To promote innovative and collaborative approaches to create a traffic safety culture of attentive drivers.

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A list of members of the NDDC Steering Committee is available at: usnddc.org/wp-content/uploads/2023/09/NDDC-Steering-Committee-23.pdf

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### Introduction

In the past two decades, research investigating distracted driving and its role as a contributing factor in fatal road crashes has grown immensely. Improvements in data collection have further substantiated increasing concern about the risks posed by this unsafe behavior across several modes of transportation. While important gaps in data collection remain, the available evidence demonstrates a clear need for effective strategies to discourage risk-taking associated with cellphone and smartphone use, as well as other forms of distraction while driving.

Several US jurisdictions have moved to implement some form of legislation prohibiting handheld phone use, texting, and even other forms of distraction in the past decade. In some jurisdictions, the primary focus has been on young drivers or other special populations, whereas in others these bans have been applicable to drivers of all ages.

Legislation imposing a reasonable penalty for a risky behavior communicates that the level of risk is unacceptable and aims to discourage risk-taking by changing social norms. Consistent enforcement to raise awareness and create strong general and specific deterrent effects is another important element which is essential to influence behaviors on the road. In this regard, drivers must believe there is a real likelihood of detection, but also perceive there is a real likelihood of being sanctioned. Finally, it is essential that these laws are evaluated to ensure they are positively affecting driver behavior and the choices they make on the road as well as reducing crashes and injuries.



This fact sheet summarizes key features of evaluations in order to provide jurisdictions with a framework for developing and implementing an evaluation plan for their own distracted driving law. It describes:

- the status and scope of existing distracted driving laws and their known effectiveness
- key research questions to inform action and resource allocations
- fundamental considerations which should be discussed as part of the planning process to ensure the evaluation achieves its objectives and provides actionable information
- different types of variables which can provide insight into critical issues and how to approach the definitions used in the evaluation
- useful resources that can support the development of evaluation plans

In addition, the National Highway Traffic Safety Administration (NHTSA) has published guidance on how to conduct proper evaluations of programmatic safety interventions, including laws. This comprehensive guide contains knowledge, strategies and tools to measure road safety. It is perhaps the most useful and practical starting point and foundation for discussions among jurisdictions planning to evaluate their distracted driving law. What is noteworthy is there are two critical components of any evaluation to understand, irrespective of the specific law, program or strategy being evaluated.

Evaluations have two important objectives. First, an evaluation provides evidence that laws are indeed having the desired effect and improving safety on the roads. Not only does this justify the continued investment in resources, but it also helps to ensure initiatives are prioritized. Second, it can also provide insight into ways to further strengthen outcomes.

- Collecting relevant, well-defined data is essential to answer key questions. Often a wide array of variables can be employed to measure the effectiveness of a new distracted driving law, however, it is important that these variables are sensitive and specific enough to answer key questions. For example, not finding a change in one or more of these variables may not necessarily mean a law is not having an effect. Instead, it may simply be an indication that the measures are not specific or sensitive enough to identify a change, or that the sample is simply not large enough to find an effect. Hence, variables and outcome measures should be carefully selected and clearly linked to research questions.
- Collecting baseline data for comparison purposes is a prerequisite for a strong evaluation. Having baseline data (i.e., pre-intervention data of behaviors or outcomes) is a pre-requisite to a well-designed evaluation. In other words, an evaluation plan should be developed at the same time as the law to ensure jurisdictions can compare outcomes pre- and post-intervention on a similar population. This is a common problem encountered with road safety evaluations because evaluation plans are often considered or pursued only several years after a law or other intervention has been put in place. Ultimately, the success and quality of any evaluation is dependent on whether jurisdictions approached these two main issues.

For more information see: National Highway Traffic Safety Administration The Art of Appropriate Evaluation: A Guide for Highway Safety Program Managers (DOT HS 811 061), edited by Nancy C. Pullen-Seufert and William L. Hall, U.S. Department of Transportation Washington, DC.



### **Key questions**

#### What is the status of US distracted driving laws?

The first distracted driving law with a specific focus on mobile communication devices was passed in New York and took effect in 2001. In the past 23 years, a majority of US jurisdictions have put in place some form of distracted driving law, however, the scope and features of these laws vary widely. As of April 2024:

- Texting is banned for all drivers in 49 states (except Montana) and D.C.
- Handheld phone conversations are banned in 28 states and the District of Columbia.
- Handheld phone conversations are banned in specific situations (e.g., school zones) or among specific populations (e.g., young drivers with a learner permit) in another 9 states.
- Laws banning holding a phone while driving have been passed in 14 states. These are AL, AZ, GA, HI, IN, MA, MI, MO, OR, TN, VA, VT, WA, WV

A current summary of distracted driving laws is available at

- https://www.iihs.org/topics/distracted-driving#cellphone-laws
- https://www.ncsl.org/transportation/distracted-driving-cellphone-use

#### How effective are distracted driving laws?

The effectiveness of distracted driving laws can be measured in a variety of ways ranging from whether they change beliefs and attitudes, behaviors or the number of crashes, injuries or fatalities. Some of the key findings emerging from previous evaluations of distracted driving laws are summarized below to provide insight into the types of outcomes that can be achieved.

- What effects have distracted driving laws had on driver behavior? Bans on handheld mobile phone conversations were associated with a reduction in that behavior by drivers. The effects of texting bans are less clear. In 2023, four states passed hands-free legislation. Analyses from Cambridge Mobile Telematics (CMT) found lower phone interaction continued for months after the introduction of Ohio's law. Analysis of data seven months post-implementation revealed smartphone distraction decreased 7.4% from the month prior to the enactment of the law. When extrapolating the change in behavior within the state of Ohio seven months post-law implementation and correlating the 7.4% reduction in smartphone distraction to the models insurance companies use to predict crash risk, Cambridge Mobile Telematics (CMT) estimated the law has prevented 3,200 crashes, eight fatalities, and \$78 million in economic damages.
  - https://www.cmtelematics.com/distracted-driving/the-impact-of-grace-periods-on-hands-freelaws/
  - McCartt, A. T., Kidd, D. G., & Teoh, E. R. (2014). Driver cellphone and texting bans in the United States: evidence of effectiveness. Annals of Advances in Automotive Medicine / Annual Scientific Conference. Association for the Advancement of Automotive Medicine. Scientific Conference, 58, 99-114. https://www.enddd.org/PDF/McCartt-et-al.pdf

- What effects have been achieved with high-visibility enforcement campaigns associated with handheld calling and texting bans? Research has suggested that high-visibility enforcement campaigns can reduce cell phone use while driving.
  - Kirley, B. B., Robison, K. L., Goodwin, A. H., Harmon, K. J. O'Brien, N. P., West, A., Harrell, S. S., Thomas, L., & Brookshire, K. (2023, November). Countermeasures that work: A highway safety countermeasure guide for State Highway Safety Offices, 11th edition, 2023 (Report No. DOT HS 813 490). National Highway Traffic Safety Administration. https://www.nhtsa.gov/book/ countermeasures-that-work/distracted-driving/countermeasures/enforcement/high-visibility-cellphone-enforcement



- What effects have distracted driving laws had on crashes? These research findings are mixed, with some studies finding no effect, some finding increases in crashes, and some finding decreases in crashes.
  - Kirley, B. B., Robison, K. L., Goodwin, A. H., Harmon, K. J. O'Brien, N. P., West, A., Harrell, S. S., Thomas, L., & Brookshire, K. (2023, November). Countermeasures that work: A highway safety countermeasure guide for State Highway Safety Offices, 11th edition, 2023 (Report No. DOT HS 813 490). National Highway Traffic Safety Administration. https://www.nhtsa.gov/book/ countermeasures-that-work/distracted-driving/countermeasures/enforcement/high-visibility-cellphone-enforcement
- What effects have distracted driving laws had on fatal crashes? It can be challenging to generalize findings from the evaluation of distracted driving laws and their impact on fatal crashes, particularly when different types of methodologies are employed. However, evidence to date suggests any type of statewide bans on texting or hand-held conversations were associated with a reduction ranging from 0.8% to 18.2% in fatal crash metrics compared to states without bans. The reductions for bans which permitted primary enforcement ranged from 4.5% to 25%. Again, it's important to keep in mind these ranges are broad as a reflection of differences in the type of evaluation conducted. And, while promising, the results do not represent strong evidence of a causal relationship due to methodological limitations associated with the studies.

- Flaherty, M. R., Kim, A. M., Salt, M. D., & Lee, L. K. (2020). Distracted driving laws and motor vehicle crash fatalities. Pediatrics, 145(6), e20193621. doi:10.1542/peds.2019-3621. https://publications. aap.org/pediatrics/article/145/6/e20193621/76936/Distracted-Driving-Laws-and-Motor-Vehicle-Crash?autologincheck=redirected
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- Rocco, L., & Sampaio, B. (2016). Are handheld cell phone and texting bans really effective in reducing fatalities? Empirical Economics, 51(2), 853-876. doi:10.1007/s00181-015-1018-8. https:// link.springer.com/article/10.1007/s00181-015-1018-8
- Rudisill, T. M., Chu, H., & Zhu, M. (2018). Cell phone use while driving laws and motor vehicle driver fatalities: Differences in population subgroups and location. Annals of Epidemiology, 28(10), 730-735. doi:10.1016/j.annepidem.2018.07.015. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC6486885/
- Tsai, Y., Alhwiti, T., Swartz, S. M., & Megahed, F. M. (2015). The effects of socio-economic and public policy factors on us highway safety. Journal of Transportation Law, Logistics, and Policy, 82, 31-48. https://trid.trb.org/view/1417530
- Zhu, M., Shen, S., Redelmeier, D.A., Li, L., Wei, L., Foss, R. (2021). Bans on Cellphone Use While Driving and Traffic Fatalities in the United States. Epidemiology. Sep 1;32(5):731-739. doi: 10.1097/ EDE.000000000001391. PMID: 34348395; PMCID: PMC8318565. https://www.ncbi.nlm.nih.gov/ pmc/articles/PMC8318565/
- What effects did distracted driving laws banning almost all manipulation of a mobile device have on rear-end injury crashes? Laws in Oregon and Washington that banned almost all manipulation of a mobile device were associated with significant reductions of 8.8% and 10.9%, respectively, in the rates of monthly rear-end crashes with injury relative to the rates in the control states.
  - Reagan, I.J., Cicchino, J.B., Teoh, E.R., Cox, A.E. (2023). The association between strengthened cellphone laws and police-reported rear-end crash rates. Journal of Safety Research https://www. iihs.org/topics/bibliography/ref/2260

### What are important research questions for an evaluation?

Some of the most important research questions for an evaluation of distracted driving laws relate to whether and how the law influenced choices by drivers to drive distracted. Essentially laws are designed to make roads safe by reducing distracted driving behaviors and reducing crashes involving distracted driving. Thus, the effectiveness of distracted driving laws can be assessed at the level of behaviors or at the level of crashes.

- Did driver behavior change after the law compared to before? To answer this question, measures of driver behavior must be collected both before the law takes effect and after the law is implemented. The two most common methods of assessing driver behavior are observational data and self-report data. It's important to conduct a power analysis to determine the sample size needed to measure an expected difference at a specific level of statistical significance. In addition, choices with respect to sample design also have important implications for the generalizability of any research findings.
- Did the number of crashes change after the law compared to before? To answer this question, a strategy to collect crash data pre- and post-implementation must be developed. Crashes are a very broad category and can be defined in different ways to gauge change along separate dimensions.
  - All crashes regardless of severity
  - Fatal and serious injury crashes

• Distracted driving-related crashes or proxies for this measure. For example, if police reports are not designed to capture specific elements of distraction as a contributing factor, a proxy such as rearend and run-off-road crashes, which are characteristic of distraction, may be a reasonable proxy.

It is critical to have a good understanding of what distraction-related variables are collected and how each of these data elements are defined. This step has important implications for the types of analysis that can be undertaken and the types of conclusions that can be drawn.

### What other key steps are part of preparing for an evaluation?

There are several other important steps to complete once key research questions have been identified. Completing these steps results in a well-designed evaluation plan.

- Identify potential data sources. This step is designed to help the research team determine what data are already collected as well as what data are needed to adequately answer key research questions. How the data are collected will also determine whether the data are representative of the population of interest, and the sample size will determine what effect sizes are able to be detected. Ultimately, the quality and overall usefulness of the outcomes of an evaluation are dependent on this step. For example, if police arrest and crash reports simply have a checkbox indicating *distraction*, it will be more challenging to draw specific conclusions about the effectiveness of a cellphone ban because it will be difficult to discern how many of the *distraction* cases specifically involve a cellphone, or the type of cellphone. Similarly, without distinct variables for handheld and hands-free, the effectiveness of a handheld ban will be less clear. As such, including database managers and analysts in this step can provide important insight to ensure research questions can be answered. Some of the different types of data sources that may be available and can be considered, along with their strengths and limitations, are summarized below.
- **Develop needed data collection tools.** While some data sources such as arrest and crash data are routinely collected, it may be necessary for the research team to develop additional data collection tools, such as surveys or observational reports. Guidance on this important step can be found in NHTSA's Program Evaluation Guide referenced above.
- Select a robust methodological design. A pre-post design is an ideal way to measure the baseline behavior prior to the implementation of the law and then compare it to measures of behavior following implementation. For this reason, it is imperative that an evaluation plan is developed at the same time the law is being put forward. Early planning for an evaluation can help to ensure appropriate data are collected in advance of implementation as well as that comparable measures are available afterwards. Another important feature that can help make study findings more robust is the use of comparison groups such as a neighboring jurisdiction where there is no law in effect, or at a minimum where the law is not being actively enforced. This can help control for confounding factors.
- **Control for confounding factors.** While it is impossible to control for all confounding factors that can muddy the interpretation of results, it is important to make efforts to control for as many factors as possible that could have logically played a role. For example, if additional countermeasures are put in place at the same time the new distracted driving law takes effect, it may be possible that one or more of the other countermeasures such as a distracted driving intervention for offenders, or other traffic laws may account for the change. Similarly, it is important to measure the level of traffic enforcement prior to the law coming into effect, and once it takes effect in order to understand what role the intensity of enforcement played in the effectiveness of the law.
- Train the data collection team and monitor collection. Meeting collectively with all of the staff (e.g., surveyors, observers, police officers, crash investigators, data analysts) involved in data collection is essential to ensure data are accurate, consistent and complete. Any errors or gaps in data collection may result in not being able to draw any meaningful conclusions.

Identify the most appropriate types of analyses. In addition to the use of univariate and bivariate techniques, it is important to consider the use of more sophisticated approaches such as Bayesian analyses, time-series analyses or logistic regression analyses which would provide greater insight into, and understanding of, the relationships between various factors and different sub-sets of the sample. This helps to refine conclusions and be more precise with respect to opportunities to strengthen the law and improve outcomes. Involving a statistician in the development of the evaluation plan will help in identifying the types of analyses that can best answer the research questions and ensuring the data collected meets the needs of those analyses.

### What data sources can help evaluate the effectiveness of distracted driving laws?

There are a variety of approaches to evaluating a distracted driving law which jurisdictions can consider. As noted above, the availability of data sources influences the methodology selected for the study. An overview of the most common data sources used to evaluate laws is below.

DATA SOURCE	Measure	Strengths	Limitations
Public Opinion Data	<ul> <li>Self-report of distraction-related tasks.</li> <li>Self-report of crashes/near-crashes.</li> <li>Self-report of ticket for phone use while driving.</li> </ul>	<ul> <li>Identify whether new law changes self-reports of risky driving behaviors, as well as outcomes of risky driving behaviors.</li> <li>The data is more easily and more efficiently collected</li> </ul>	• There is a difference between what people report and what they actually do. This means that simply reporting a change in behavior does not necessarily mean that crashes have been prevented. Also, people may be less inclined to report activities now that they are illegal.
Police Crash Reports	<ul> <li>Police accounting of fatal, severe injury, and property damage crashes</li> </ul>	<ul> <li>Over time, the accumulation of data from police crash reports allows for trend analysis.</li> <li>If police reports do not systematically track distracted driving as a contributing factor, then rear-end and run-off-road crashes may be a reasonable surrogate.</li> </ul>	<ul> <li>Not all crashes are reported to police, especially minor ones. Underreporting can lead to incomplete data and may not reflect the true extent of distracted driving crashes.</li> <li>Different police departments may have different reporting forms, making it challenging to compare data from different regions and draw comprehensive conclusions.</li> <li>People may not be able to report, or may not be truthful in reporting, what activities they performed prior to a crash.</li> </ul>
Fatality Analysis Reporting System (FARS)	<ul> <li>Police accounting of fatal crashes.</li> </ul>	<ul> <li>FARS contains comprehensive data on fatal crashes, including information about environmental conditions during the crash, people, vehicle, crash characteristics, and potential factors contributing to the crash.</li> <li>It includes the entire US in a standardized way, allowing for a broad analysis of trends and patterns at a national level.</li> <li>FARS has been collecting data for many years, allowing researchers to conduct trend analysis over a longer period.</li> </ul>	<ul> <li>Data are reported annually. The lag between a crash occurring and the data being entered into the FARS database affects the opportunity for real-time analysis.</li> <li>FARS captures data on fatal crashes which represent only a small fraction of all road crashes. Hence, it might not represent the overall impact of a distracted driving law's effectiveness.</li> <li>FARS includes information from police crash reports which may be subject to underreporting.</li> <li>While FARS data can indicate correlations between distracted driving and fatal crashes, it might not establish a direct causal relationship.</li> </ul>

DATA SOURCE	MEASURE	Strengths	LIMITATIONS
Naturalistic Driving Studies (NDS)	<ul> <li>Camera-based observation of participants driving their own vehicle without an experimenter present over an extended period of time.</li> </ul>	<ul> <li>Captures real-world driver behavior in the seconds leading up to a crash/near-crash.</li> <li>Allows for estimation of crash risk by comparing prevalence of distraction prior to crashes relative to prevalence of distraction during baseline driving.</li> </ul>	<ul> <li>No fatal crashes have been observed despite the size of data collection efforts.</li> </ul>
National Occupant Protection Use Survey (NOPUS	<ul> <li>Roadside observation of driver engagement in handheld phone conversation and visible manipulation of a device.</li> </ul>	<ul> <li>Survey has been collected annually for many years and provides a source of driver distraction prevalence.</li> </ul>	• Observations performed at intersections when vehicles are nearly stopped and/or stopped. This survey data suggests drivers engage in secondary tasks more often in these scenarios, so estimates may not reflect distraction prevalence in moving vehicles across different contexts.
Telematics Data	<ul> <li>Phone- or car-based collection of kinematic and device data such as speed, acceleration, location, and phone use.</li> <li>Smartphone telematics data utilized in the insurance industry has been reviewed and accepted by regulators for use in billions of dollars of insurance pricing.</li> </ul>	<ul> <li>Telematics derived analysis has been shown to provide a representative sample equal to, and exceeding, the analysis derived from NOPUS observations (IIHS paper to be published)</li> <li>Smartphone telematics data provides the ability to detect distraction behavior across all road segments and times when the technology is being used.</li> <li>Smartphone telematics data is now being used for insurance pricing, claims notifications and crash reconstruction.</li> </ul>	<ul> <li>Telematics systems are not universally adopted, and not all vehicles may be equipped with such technology, leading to incomplete data representation.</li> <li>Drivers may alter their behavior when aware of telematics monitoring in programs with active driver behavior management potentially affecting the accuracy of the data related to distracted law effectiveness.</li> <li>Telematics data relies on sensors and technology, and occasional glitches or inaccuracies may occur, affecting the reliability of the information. However, companies that use this technology within the insurance industry are often required to file affidavits of accuracy. Furthermore, drivers that are enrolled in these programs are presented with analysis of their driving, creating a feedback loop with millions of drivers that are designed to assess data passively.</li> </ul>
Overhead Cameras	<ul> <li>Roadside capture of presence of distraction and other driver factors such as seatbelt use or speed.</li> </ul>	<ul> <li>Cameras can capture real time images and data that would be unsafe or inconvenient for human observers. Devices have potential to measure prevalence, can be used for enforcement purposes as well as research to increase knowledge.</li> </ul>	<ul> <li>Relatively new technology which can be fixed or mounted. Devices are being piloted in some US jurisdictions.</li> </ul>
Insurance Claims	<ul> <li>Analysis of the prevalence of insurance claims, including the type and severity.</li> </ul>	• Captures whether there is a change in prevalence, type, and severity of crashes after a law is introduced.	<ul> <li>Unable to determine which driver behavior(s) occurred prior to the crash.</li> </ul>

Data source	Measure	Strengths	LIMITATIONS
<ul> <li>Analysis of the prevalence of crashes within a fleet, including the type and severity.</li> </ul>			• Fleet safety reports only capture data from commercial drivers (truck drivers, but also taxi fleets).
	<ul> <li>It enables employers to assess</li> </ul>	• Fleet drivers are financially motivated to follow fleet policies, so may not reflect non-commercial driver behaviors.	
	within a fleet, including the type and severity.	driver safety and any gaps in training.	• Not all fleet incidents may be reported consistently, leading to potential gaps in the data.
			• Data from fleet safety reports may be influenced by factors specific to the company.
			<ul> <li>Consolidating and standardizing data from various fleets can be challenging.</li> </ul>



### **Call to action**

There is a real and immediate need for effective countermeasures to reduce distracted driving risk-taking on the road. Data providing insight into the prevalence of distracted driving warrants considerable concern. This is true, even in spite of recognized gaps and limitations associated with available data sources. Laws are an essential first step to both define and deter unacceptable behaviors that pose risks to society. Evaluations are critical to ensure the investment of resources results in real benefits that protect road users and change behavior.

Evaluations of laws, or any road safety countermeasure for that matter, are essential to effectively shape positive behaviors as well as reduce risk-taking on the road that jeopardizes the safety of all road users.

The outcomes of well-designed evaluations are always valuable, irrespective of whether they demonstrate a tool was effective or not.

- Evaluations that do not provide any evidence of effectiveness are useful to demonstrate the need for different tools, or for different approaches to the implementation of a tool. The failure to demonstrate effectiveness is equally important to validate decisions to terminate the use of ineffective tools and enable jurisdictions to make those decisions more quickly, as well as the investment of resources in them. Evaluations must be carefully designed to avoid mistakenly concluding that a law was not effective (for example, if a sample size is too small to detect the effect of the law).
- In the same vein, evaluations that demonstrate weak or only moderate effectiveness provide evidence that a tool is on the right track, but it may need adjustments to strengthen outcomes. This may mean revisiting the penalty structure, adjusting the enforcement strategy to account for temporal factors, or that the law is only effective with some subsets of the population but not others, suggesting other targeted tools may be necessary.
- Evaluations providing clear evidence of effectiveness can increase public support for measures, increase the confidence and willingness of officers to enforce the law, and justify prioritizing the enforcement of this law and the investment of resources to support it.

Evaluations are also critical to encourage the adoption of the countermeasure in other jurisdictions. Often findings from evaluations are used to build political leadership and support, not only by demonstrating but also quantifying the magnitude of the benefits that can be accrued in terms of more positive social norms, crash reductions, lives saved, and or reductions in social costs.

The reality is that jurisdictions simply cannot afford to invest in countermeasures that do not work, and evaluations can help jurisdictions accelerate progress and save more lives.

### Additional resources

Distracted Driving Enforcement Demonstrations: Lessons Learned, December 2020

Evaluation of NHTSA Distracted Driving High-Visibility Enforcement Demonstration Projects in California and Delaware, January 2015

Traffic Tech. Report No. DOT HS 811 993: Distracted Driving High-Visibility Enforcement Demonstrations in California and Delaware, April 2014

CMT's analysis on the impact of grace periods on hands free laws. https://www.cmtelematics.com/ distracted-driving/the-impact-of-grace-periods-on-hands-free-laws/







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