

Essential Analytical Skills

Part of the CALHR Analyst Certificate Program



California Department of Human Resources Statewide Training

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WORKSHOP PRESENTED BY

The Los Rios Community College District's
Government Training Center
www.LosRiosTraining.org

Bruce Winner
916.563.3232
winnerb@losrios.edu

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Section 1: Overview

Outcome

Analysts will increase their knowledge and understanding of analyst competencies, especially critical thinking and problem-solving skills.

Objectives

Upon completion, participants will be able to:

- Define the behaviors of a competent analyst
- Self-assess their performance in core analyst competencies
- Apply critical thinking skills in written and numeric contexts
- Use problem-solving and decision-making techniques

Agenda

1. Overview
2. Thinking Skills
3. Problem Solving Skills
4. Action plan

What Makes a Successful Analyst

The work of an analyst does not come with a road map. Analysts in California state government perform a variety of duties depending on the department and the program responsibilities. Your job experience and scope of duties determine the level of responsibility and independence expected of you on the job. You may be working in areas where the problems are not well defined or where solutions require new or inventive approaches (and it is your responsibility to define the problem and identify and recommend the solutions).

Analytical work, in addition to the performance of staff work, involves substantial responsibility for:

- problem definition
- developing a unique project plan
- identifying alternative solutions
- implementing the desired course of action
- monitoring results

For example, as a beginning analyst, you may conduct research and identify every approach in existence to address a particular problem. As a more advanced analyst, you might propose new solutions, assess the costs and impacts of implementing that proposal, prepare budget documents to support it, and identify staffing needs.

In sum, good analysts are able to handle, and even thrive in, an environment where change is a constant and ambiguity is a given. Succeeding as an analyst means you continuously learn new subjects and demonstrate your willingness to take on progressively more complicated problems and propose effective solutions. That challenge is what makes analyst jobs attractive, whether you are already a state employee or looking at an analyst position as your first job into state service.

Entry into this series requires that you exercise flexibility and be willing to learn and become familiar with other functions with the organization and control agencies. Most importantly, State Service is a public service conducted with honesty, ethics, and integrity every day.

Analyst Competencies Defined

"Competency" refers to knowledge, skills, abilities, and personal characteristics as demonstrated by behaviors needed to succeed in a job. The State of California defines 37 different competencies on the CalHR website. Let's look at a few of them.

Diagnostic Information Gathering
Identifying the information needed to clarify a situation.
Behavioral Indicators
<ol style="list-style-type: none"> 1. Identifies the specific information needed to clarify a situation or to make a decision 2. Gets more complete and accurate information by checking multiple sources 3. Probes skillfully to get at the facts when others are reluctant to provide full, detailed information 4. Questions others to assess whether they have thought through a plan of action 5. Questions others to assess their confidence in solving a problem or tackling a situation 6. Asks questions to clarify a situation 7. Seeks the perspective of everyone involved in a situation 8. Seeks out knowledgeable people to get information or clarify a problem

Analytical Thinking
Approaching a problem by using a logical, systematic, sequential approach.
Behavioral Indicators
<ol style="list-style-type: none">1. Makes a systematic comparison of two or more alternatives2. Makes connections and patterns among systems and data issues3. Notices discrepancies and inconsistencies in available information4. Identifies a set of features, parameters or considerations to take into account in analyzing a situation or making a decision5. Approaches a complex task or problem by breaking it down into its component parts and considering each part in detail6. Weighs the costs, benefits, risks, implications, and chances for success, when making a decision7. Identifies many possible causes for a problem8. Weighs the priority of things to be done9. Recognizes key actions and underlying issues and problems

Decision Making
Making decisions and solving problems involving varied levels of complexity, ambiguity and risk.
Behavioral Indicators
<ol style="list-style-type: none">1. Makes critical and timely decisions in difficult or ambiguous situations2. Takes charge of a group when it is necessary to facilitate change, overcome an impasse, face issues, or ensure that decisions are made3. Makes tough appropriate decisions

Self-Assessment: What's Your Work Style?

Reflect on your present or past work situations. You probably have not thought much about whether you are an adapter or an innovator. Here is a chance to find out where you stand.

Directions: answer each item as it best describes you. Insert the letter that corresponds to your answer in the blue box.

1. I am precise and methodical in my approach to problems.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
2. I can usually tolerate boring jobs.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
3. It bothers me to cope with several problems at once.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
4. When faced with an assignment, I'm known as a "steady plodder."
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
5. Compared with others, I am a conformist when it comes to society's general expectations.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
6. I make few errors when involved with routine tasks for long periods of time.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
7. I stick to tried-and-true solutions to problems.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me
8. I would prefer to work for a company than to work for myself.
a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me

9. I like to work with colleagues who don't "rock the boat" by suggesting changes.

a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me

10. I have more patience with detailed work than do most people.

a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me

11. It would bother me to act without my boss's permission.

a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me

12. I enjoy detailed work.

a. Not like me b. Somewhat unlike me c. Somewhat like me d. Very much like me

Questions for reflection

Are you an adapter or an innovator?

How does your work style affect your work as an analyst?

SCORING

How many "a" responses did you get?

Give yourself 1 point for each

How many "b" responses did you get?

Give yourself 2 point for each

How many "c" responses did you get?

Give yourself 3 point for each

How many "d" responses did you get?

Give yourself 4 point for each

What's Your Work Style?

A score of 34-48 points: You are a highly adaptive worker. You follow guidelines and get the job done well.

A score of 22-33 points: You strike a balance between being an adapter and an innovator.

A score of 12-21 points: You are highly innovative worker. You like to modify, adjust, and reorganize different aspects of the job to come up with a different finished product.



Explanation

Adaptive workers, more so than their innovative comrades, can handle (and generally enjoy) jobs that require accuracy and precision. They are tolerant of repetitive work, make fewer errors than innovators in performing the same task, and deal better with details. Compared with innovators, adapters are rule-followers. They dislike surprises and prefer predictability. They try to do things better, while innovators try to do things differently. If given a choice, adapters usually opt to work in a company rather than on their own, believing that a company provides security.

Innovators, on the other hand, have a strong need for variety in their daily activities. They try to handle several projects at once and tend to be risk-takers who try new twists on old routines. They like to experiment, and they trust their own resources when confronted with novelty. Adapters and innovators will always be found anywhere people are involved in a cooperative effort.

In Kirton's book *Management Initiative*, he concludes that on a scale between adapter and innovator, most people fall in the middle. The adapter-innovator continuum is so prevalent, it even distinguishes work styles in the political arena. According to James David Barber, author of *The Presidential Character*, William Howard Taft, Warren Harding, and Dwight D. Eisenhower were essentially adaptive presidents, while Franklin D. Roosevelt, Harry S. Truman, and John F. Kennedy were primarily innovators.

Adapters and innovators often make excellent teammates, whether in work, friendship, or love. More often than not, they tend to balance each other out. It might be interesting to compare answers with your spouse, partner, or close friend to see if your traits are mutually complementary.

Section 2: Critical Thinking Skills

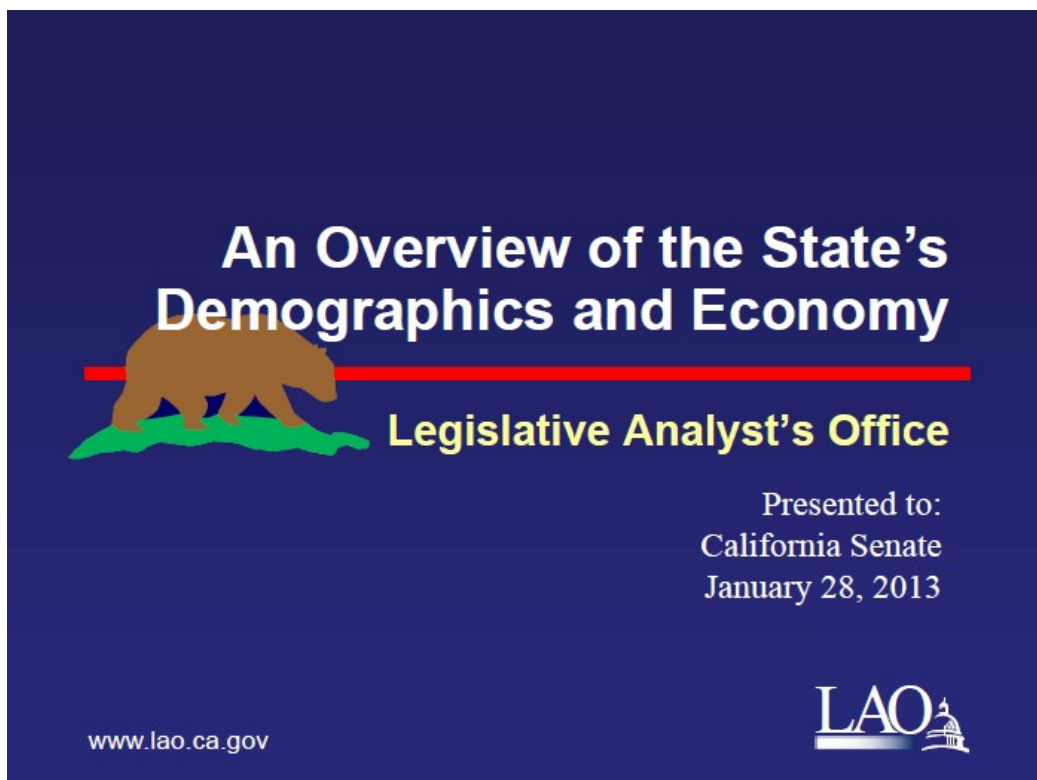


Exercise: Asking Questions & Interpreting Data

Possibly the most essential analytical skill is the ability to ask questions. Whether the goal is to simply gather information, question assumptions, check sources, or gain better understanding, questions are where quality analysis begins.

In particular, this exercise deals with the ability to effectively interpret data and information that is gathered for analysis and decision-making. Some typical questions for this type of analysis include:

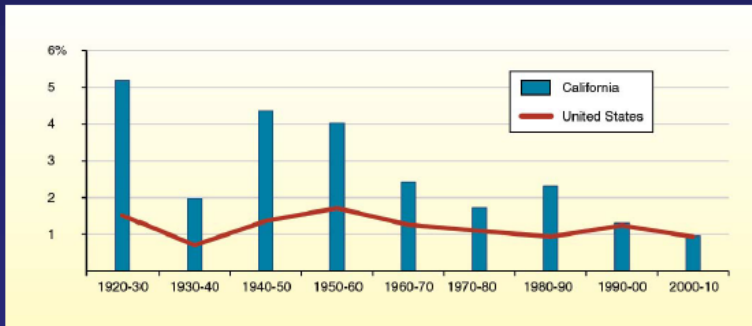
- What is the purpose or objective?
- What is this “saying”?
- Does it make sense?
- What other information is needed or missing?
- Is it descriptive?
- Is it appropriate?
- Is this data useful?
- How might it be used?



What is it saying?

California's Population Has Grown Faster Than the U.S. ... Until Recently

Average Annual Growth Rate by Decade



1

What is it saying?

California Somewhat Younger Than the Nation

2010

Age Group	California	United States
0 – 19	28.1%	27.0%
20 – 39	28.6	26.8
40 – 64	31.9	33.2
64 – 74	6.1	7.0
75 and over	5.3	6.1

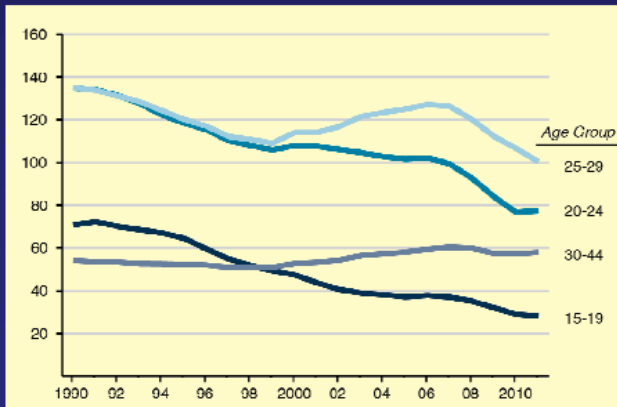


2

What is it saying?

Birth Rates Falling Significantly

Births per 1,000 Women per Year

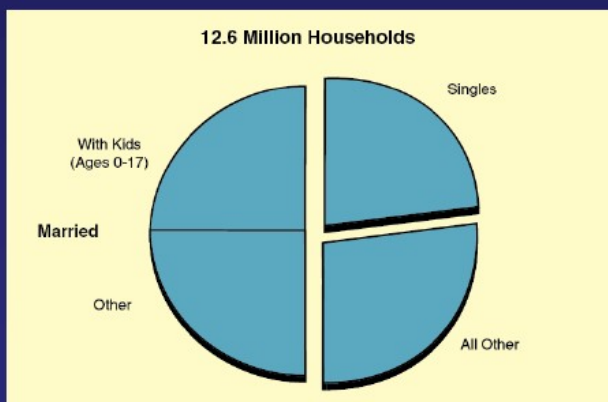


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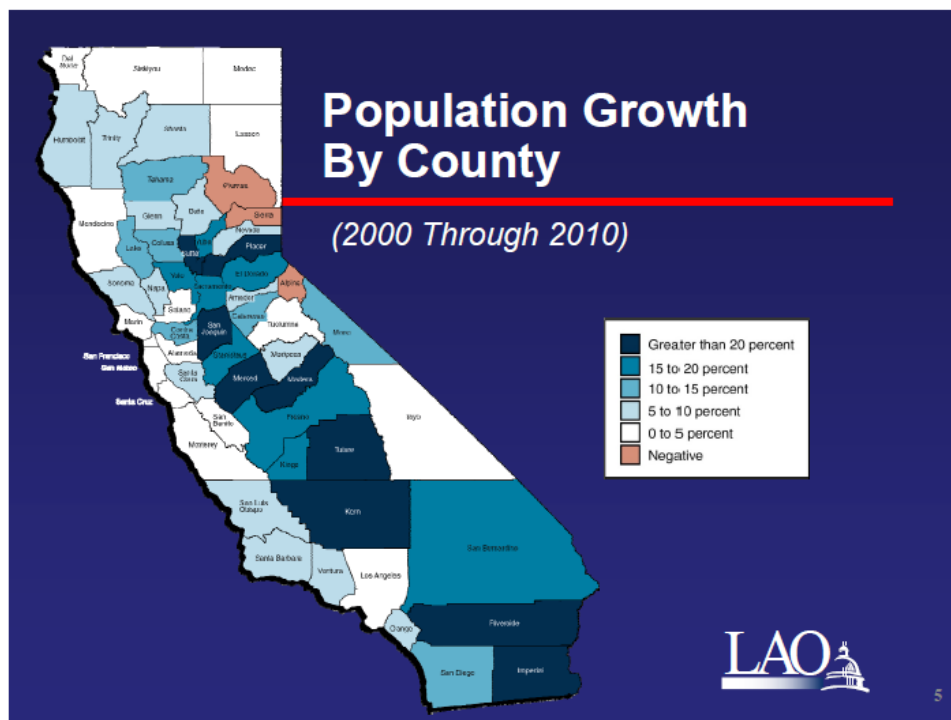
What is it saying?

Characteristics of California Households

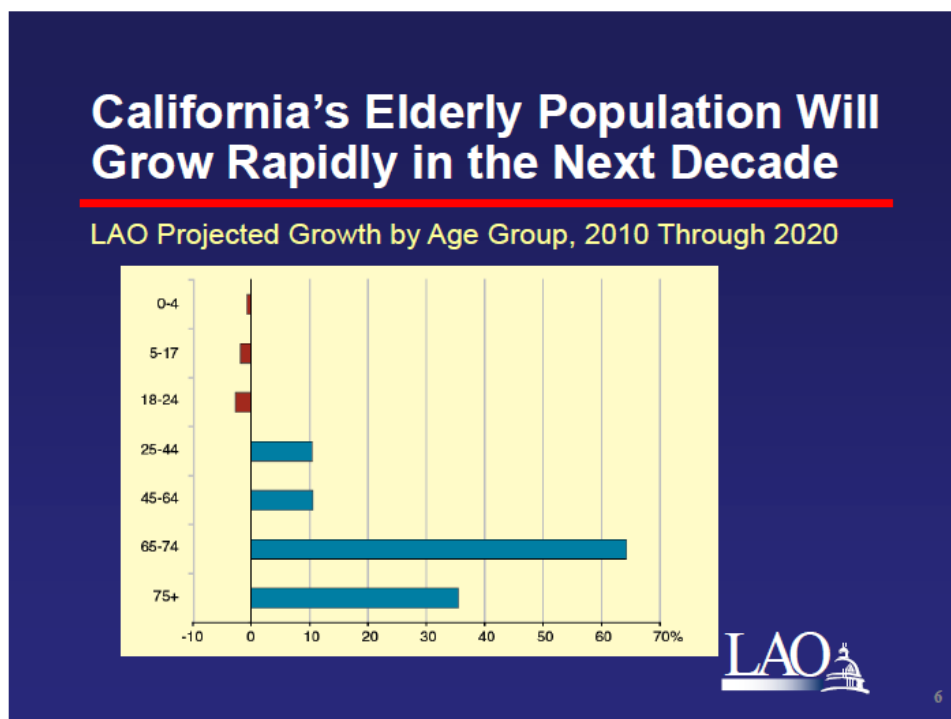
2010



4



What is it saying?

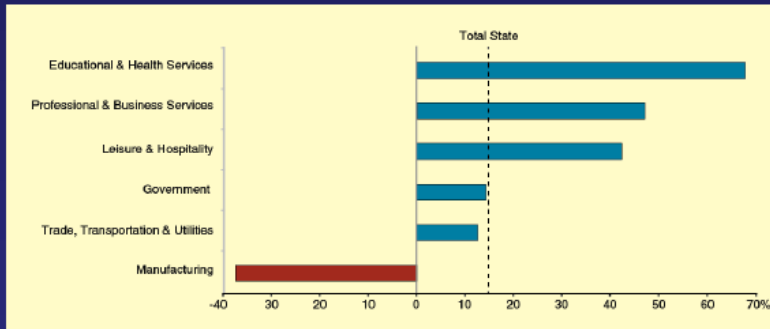


What is it saying?

What is it saying?

Changes in California's Job Mix Since 1990

Percent Change in Jobs, 1990 to 2012

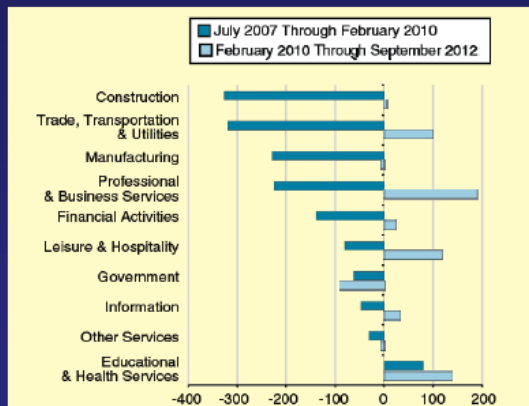


7

What is it saying?

Jobs Since the Recession: Some Sectors Are Struggling

Change in California Employment (In Thousands)



8

What is it saying?

Trade Is an Important Source of California Economic Activity

2011 International Exports (In Billions)

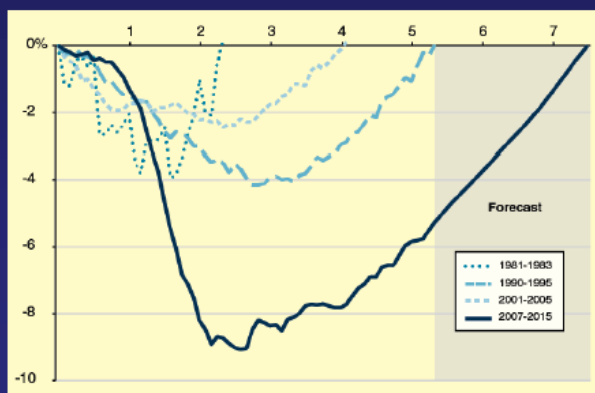


9

What is it saying?

Jobs in California Recovering Much More Slowly Than in Prior Recoveries

Job Loss and Years to Return to Pre-Recession Employment Peak



10

Eliminating Bias

Cognitive biases are tendencies to think in certain ways that can lead to systematic deviations from a standard of rationality or good judgment, and are often studied in psychology and behavioral economics.

Although the reality of these biases is confirmed by replicable research, there are often controversies about how to classify these biases or how to explain them. There are also controversies over some of these biases as to whether they count as useless or irrational, or whether they result in useful attitudes or behavior. For example, when getting to know others, people tend to ask leading questions which seem biased towards confirming their assumptions about the person. However, this kind of confirmation bias has also been argued to be an example of social skill: a way to establish a connection with the other person.

20 COGNITIVE BIASES THAT MESS UP YOUR DECISIONS

1. Anchoring bias.

People are **over-reliant** on the first piece of information they hear. In a salary negotiation, whoever makes the first offer establishes a range of reasonable possibilities in each person's mind.



2. Availability heuristic.

People **overestimate the importance** of information that is available to them. A person might argue that smoking is not unhealthy because they know someone who lived to 100 and smoked three packs a day.



3. Bandwagon effect.

The probability of one person adopting a belief increases based on the number of people who hold that belief. This is a powerful form of **groupthink** and is reason why meetings are often unproductive.



4. Blind-spot bias.

Failing to recognize your own cognitive biases is a bias in itself. People notice cognitive and motivational biases much more in others than in themselves.



5. Choice-supportive bias.

When you choose something, you tend to feel positive about it, even if that **choice has flaws**. Like how you think your dog is awesome — even if it bites people every once in a while.



6. Clustering illusion.

This is the tendency to **see patterns in random events**. It is key to various gambling fallacies, like the idea that red is more or less likely to turn up on a roulette table after a string of reds.



7. Confirmation bias.

We tend to listen only to information that confirms our **preconceptions** — one of the many reasons it's so hard to have an intelligent conversation about climate change.



8. Conservatism bias.

Where people favor prior evidence over new evidence or information that has emerged. People were **slow to accept** that the Earth was round because they maintained their earlier understanding that the planet was flat.



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9. Information bias.

The tendency to **seek information when it does not affect action**. More information is not always better. With less information, people can often make more accurate predictions.



10. Ostrich effect.

The decision to **ignore dangerous or negative information** by "burying" one's head in the sand, like an ostrich. Research suggests that investors check the value of their holdings significantly less often during bad markets.



11. Outcome bias.

Judging a decision based on the **outcome** – rather than how exactly the decision was made in the moment. Just because you won a lot in Vegas doesn't mean gambling your money was a smart decision.



12. Overconfidence.

Some of us are **too confident about our abilities**, and this causes us to take greater risks in our daily lives. Experts are more prone to this bias than laypeople, since they are more convinced that they are right.



13. Placebo effect.

When **simply believing** that something will have a certain effect on you causes it to have that effect. In medicine, people given fake pills often experience the same physiological effects as people given the real thing.



14. Pro-innovation bias.

When a proponent of an innovation tends to **overvalue its usefulness** and undervalue its limitations. Sound familiar, Silicon Valley?



15. Recency.

The tendency to weigh the **latest information** more heavily than older data. Investors often think the market will always look the way it looks today and make unwise decisions.



16. Salience.

Our tendency to focus on the **most easily recognizable features** of a person or concept. When you think about dying, you might worry about being mauled by a lion, as opposed to what is statistically more likely, like dying in a car accident.



17. Selective perception.

Allowing our expectations to **influence how we perceive** the world. An experiment involving a football game between students from two universities showed that one team saw the opposing team commit more infractions.



18. Stereotyping.

Expecting a group or person to have certain qualities without having real information about the person. It allows us to quickly identify strangers as friends or enemies, but people tend to **overuse and abuse** it.



19. Survivorship bias.

An error that comes from focusing only on surviving examples, causing us to **misjudge a situation**. For instance, we might think that being an entrepreneur is easy because we haven't heard of all those who failed.



20. Zero-risk bias.

Sociologists have found that **we love certainty** – even if it's counterproductive. Eliminating risk entirely means there is no chance of harm being caused.



Weighing Information

The classic process for weighing information and making a decision is the tried-and-true Pros and Cons. In this example, we'll explore how you can analyze the pros and cons of a decision quantitatively, so that you can make considered and well-informed choices.

Scenario

You manage a department that went to telework during COVID. The SAH order is now complete and you need to decide whether or not to continue telework for your staff. Use Quantitative Pros and Cons to make your decision.

Should we continue telework in the licensing department?	
Pros	Cons

Making a Decision

For each statement, choose the answer that best describes you. Please answer questions as you actually are (rather than how you think you should be), and don't worry if some questions seem to score in the 'wrong direction'. When you are finished, use the scoring sheet on the next page. Use the following rating scale:

<u>N</u> ot at all	<u>R</u> arely	<u>S</u> ometimes	<u>O</u> ften	<u>V</u> ery often
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Statement	Rating	Score
1. I evaluate the risks associated with each alternative before making a decision.		
2. I try to determine the real issue before starting a decision-making process.		
3. I use a well-defined process to structure my decisions.		
4. If I have doubts about my decision, I go back and recheck my assumptions and my process.		
5. I take the time needed to choose the best decision-making tool for each specific decision.		
6. I consider a variety of potential solutions before I make my decision.		
7. Before I communicate my decision, I create an implementation plan.		
8. When communicating my decision, I include my rationale and justification.		
9. I determine the factors most important to the decision and then use those factors to evaluate my choices.		
10. After I make a decision, it's final—because I know my process is strong.		
11. I rely on my own experience to find potential solutions to a problem.		
12. I tend to have a strong "gut instinct" about problems and I rely on it in decision-making.		
13. I am sometimes surprised by the actual consequences of my decisions.		
14. I think that involving many stakeholders to generate solutions can make the process more complicated than it needs to be.		
15. In a group decision-making process, I tend to support my friends' proposals and try to find ways to make them work.		

16. Some of the options I've chosen have been much more difficult to implement than I expected.		
17. I prefer to make decisions on my own, and then let other people know what I've decided.		
18. I emphasize how confident I am in my decision as a way to gain support for my plans.		

Scoring

For responses 1-9, use this scale:

<u>Not at all</u>	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>	<u>Very often</u>
1	2	3	4	5

For responses 10-18, use this scale:

<u>Not at all</u>	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>	<u>Very often</u>
5	4	3	2	1

Score Interpretation

Score	Comment
18-42	Your decision-making hasn't fully matured. You aren't objective enough, and you rely too much on luck, instinct or timing to make reliable decisions. Start to improve your decision-making skills by focusing more on the process that leads to the decision, rather than on the decision itself. With a solid process, you can face any decision with confidence.
43-66	Your decision-making process is OK. You have a good understanding of the basics, but now you need to improve your process and be more proactive. Concentrate on finding lots of options and discovering as many risks and consequences as you can. The better your analysis, the better your decision will be in the long term. Focus specifically on the areas where you lost points, and develop a system that will work for you across a wide variety of situations.
67-90	You have an excellent approach to decision-making! You know how to set up the process and generate lots of potential solutions. From there, you analyze the options carefully, and you make the best decisions possible based on what you know. As you gain more and more experience, use that information to evaluate your decisions, and continue to build on your decision-making success. Think about the areas where you lost points, and decide how you can include those areas in your process.

Section 3: Problem Solving

The Five-Step Method

Why use a standard method?

-
-
-
-

Step	Description
Step 1—State the Problem	Concisely state the problem and its current impact.
Step 2—Identify the Cause(s)	Identify the real cause(s), not just symptoms of the problem.
Step 3—Choose Solution(s)	Identify solution(s) that you believe will eliminate the cause(s) of the problem.
Step 4—Apply Solution(s)	Implement solution(s) that will eliminate the cause(s) of the problem.
Step 5—Plan Next Steps	Communicate results and lessons learned. Determine where to go from here.

Root Cause Analysis

The 5 Whys is an iterative interrogative technique used to explore the cause-and-effect relationships underlying a particular problem.

The vehicle will not start. (the problem)

Why? - The battery is dead. (first why)

Why? - The alternator is not functioning. (second why)

Why? - The alternator belt has broken. (third why)

Why? - The alternator belt was well beyond its useful service life and not replaced. (fourth why)

Why? - The vehicle was not maintained according to the recommended service schedule. (fifth why, a root cause)

Problem Statement
Why?
Why?
Why?
Why?
Why?
Counter-measures

Case Study: DMV's GDL Program

Introduction

Teenage drivers have a much higher crash risk than do older drivers due to their fundamental lack of driving skill, inexperience at driving, tendency towards increased risk-taking, immaturity, inaccurate risk perception, and overestimation of driving skills (Janke, Masten, McKenzie, Gebers, & Kelsey, 2003). States have tried to mitigate the increased crash risk of teenagers by implementing modified driver licensing programs for teenagers that focus on improving their skills and reducing their exposure to those situations in which they are at the highest risk, such as driving at night or with young passengers. The modified licensing systems for teenagers usually include several stages leading to an unrestricted license. The licensing stages for teenagers typically include a supervised practice period, license restrictions, and accelerated post-licensing control actions that do not apply to adults. This report presents results of an evaluation of the safety impact of several enhancements made in July 1998 to improve the effectiveness of California's licensing program for drivers under age 18.

California's first teen licensing program (called the provisional licensing program), implemented in October 1983, included all of the following components for license applicants under age 18:

- A mandatory one-month instruction permit period allowing driving only when supervised by a parent/guardian, spouse, or licensed adult 25 years of age or older.
- A parent/teen driver-practice guide that contains structured driving exercises that the teen must master before taking a drive test.
- A distinctive looking driver license, allowing easy identification of the driver as a provisional license.
- A one-week wait after failing the written knowledge test and two-week wait after failing the behind-the-wheel drive test before retesting.
- Parent certification that the teen successfully completed the exercises in the parent/teen guide and is skilled enough to pass the DMV drive test.
- An accelerated post-licensing control action program in which teens receive a warning letter after their first traffic violation or responsible crash, a one-month restriction allowing only supervised driving after their second violation or at-fault crash in a 12-month period, a six-month license suspension and one-year probation after a

third offense in 12 months, and extended license suspension or possible revocation after a fourth offense, violation of probation, failure to appear in court, or failure to pay a fine.

Hagge and Marsh (1988) evaluated the California provisional licensing program using time series analysis and also an assessment of individual driver records. They found that the program as a whole was associated with 5.3% lower per capita crash rates for 15- to 17-year-olds and 23% lower violation rates for 16-year-old licensed drivers.

California Vehicle Code Section 12814.6 added enhancements to the teen driver license program starting in July 1998. This program is called the graduated driver licensing (GDL) program. In addition to having to pass the vision, written, and drive tests, the California graduated licensing program evaluated in this report includes all of the components of the original provisional licensing program identified above plus:

- A minimum six-month instruction permit period.
- Parent/guardian certification that the teen driver completed a minimum of 50 hours of behind-the-wheel practice (ten hours of which must be at night) supervised by a licensed parent/guardian, spouse, or adult 25 years of age or older, or a certified driving instructor.
- A 12-month restriction from driving between 12:00 a.m. and 5:00 a.m., unless supervised as defined above. Exceptions are granted for medical or family necessity, school activities, and employment needs, with a note signed by the proper authority such as a parent or principal and specifying the ending date for the exception.
- A six-month restriction from driving with passengers under the age of 20, unless supervised as defined above. Exceptions are allowed under the same circumstances indicated above.

Method

Monthly statewide per capita crash rates for January 1994 to December 2001 were analyzed using Autoregressive Integrated Moving Average (ARIMA) intervention time series analysis to determine whether implementing the GDL enhancements in July 1998 changed the rate of crashes involving 15-to-17-year-old drivers, and in some cases the rates of crashes involving 16-year-old and 18-19-year-old drivers. The crash rates for adult drivers aged 24 to 55 were used as a control series in some of the analyses to account for history-related factors that would have affected crashes for both age groups. The following criterion crash series were created and analyzed in this evaluation:

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1. Total crashes
2. Fatal/injury crashes
3. Proportion of total crashes occurring during 12:00-5:00 a.m.
4. Proportion of fatal/injury crashes occurring during 12:00-5:00 a.m.
5. Proportion of total crashes involving passengers under age 20
6. Proportion of fatal/injury crashes involving passengers under age 20
7. Total crashes involving 16-year-olds
8. Fatal/injury crashes involving 16-year-olds
9. Total crashes involving 18-19-year-olds
10. Fatal/injury crashes involving 18-19-year-olds

The first two series were analyzed to evaluate the impact of GDL as a whole. The analyses of crashes in which a 16-year-old was the youngest involved driver are conceptually less biased for purposes of evaluating the impact of the GDL enhancements, because of a shorter transition time period for all drivers in this age group to be completely under the new GDL program requirements. The four series involving proportions of crashes during the restricted time period and involving passengers less than 20 years of age were used to evaluate the impact of the nighttime restriction and passenger restriction components of GDL respectively. The analyses of 18-19-year-old drivers in crashes were conducted to determine if the program had any positive or negative effects on this age group. Two additional crash series not listed above were also analyzed. These consisted of crash involvements in which a single crash incident was typically assigned multiple times.

Results

This study analyzed several different crash types and age-groups, various intervention models, and flexible intervention start points to determine whether the enhancements made to the California teen licensing program in July 1998 resulted in crash reductions for teen drivers. The results are summarized below:

- No overall reduction in total crashes or fatal/injury crashes was found immediately following program implementation or beginning six months later. This outcome was the same even when transition components were added to the models to adjust for the influence of the influx of teen licensees before the implementation date, when the adult series was included as a control variable, when only 16-year-old driver crashes were analyzed, and when the rates were calculated as crash involvements rather than being based on the youngest involved driver. However the program was found to be associated with a 19.45% gradual-permanent increase in total crashes for 18-19-year-olds six months after the program was implemented (about 9,464 additional crashes per year). No significant effect was found in the 18-19-year-olds fatal/injury crashes.

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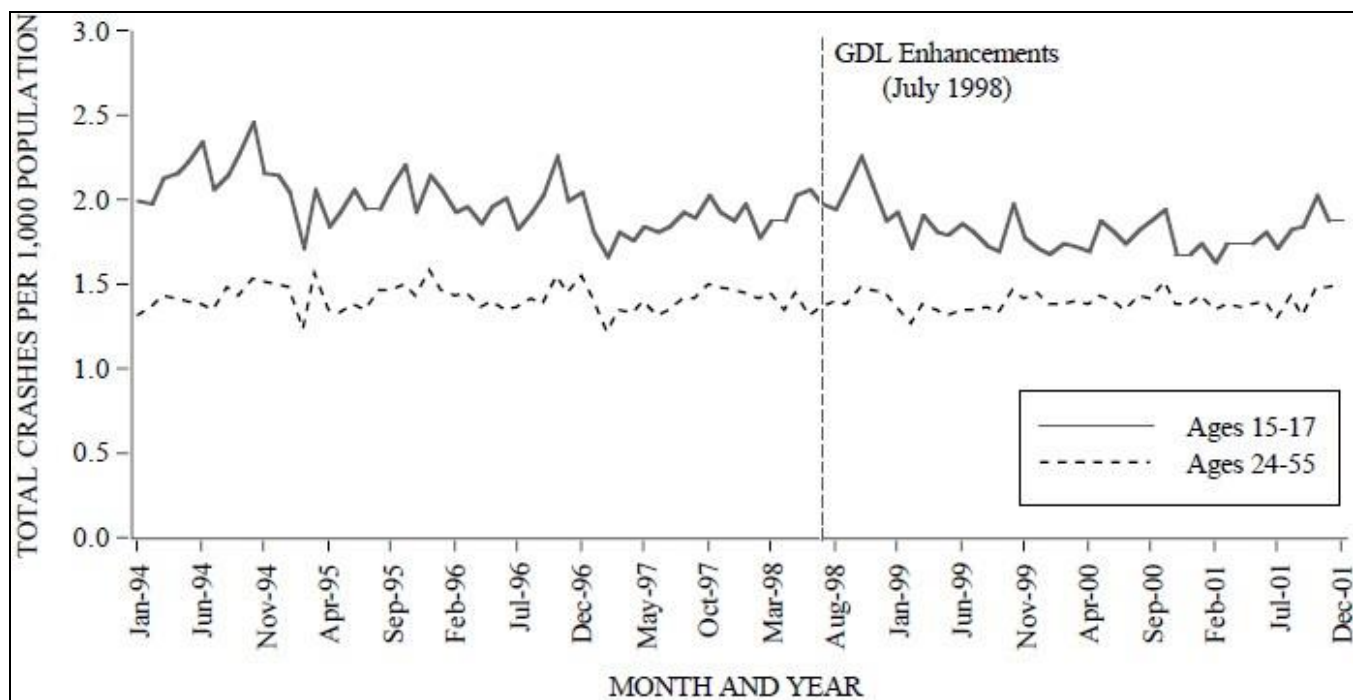


Figure 2. Monthly total crashes per 1,000 population for 15-17-year-olds and 24-55-year-olds during January 1994 through December 2001 by age of youngest driver involved.

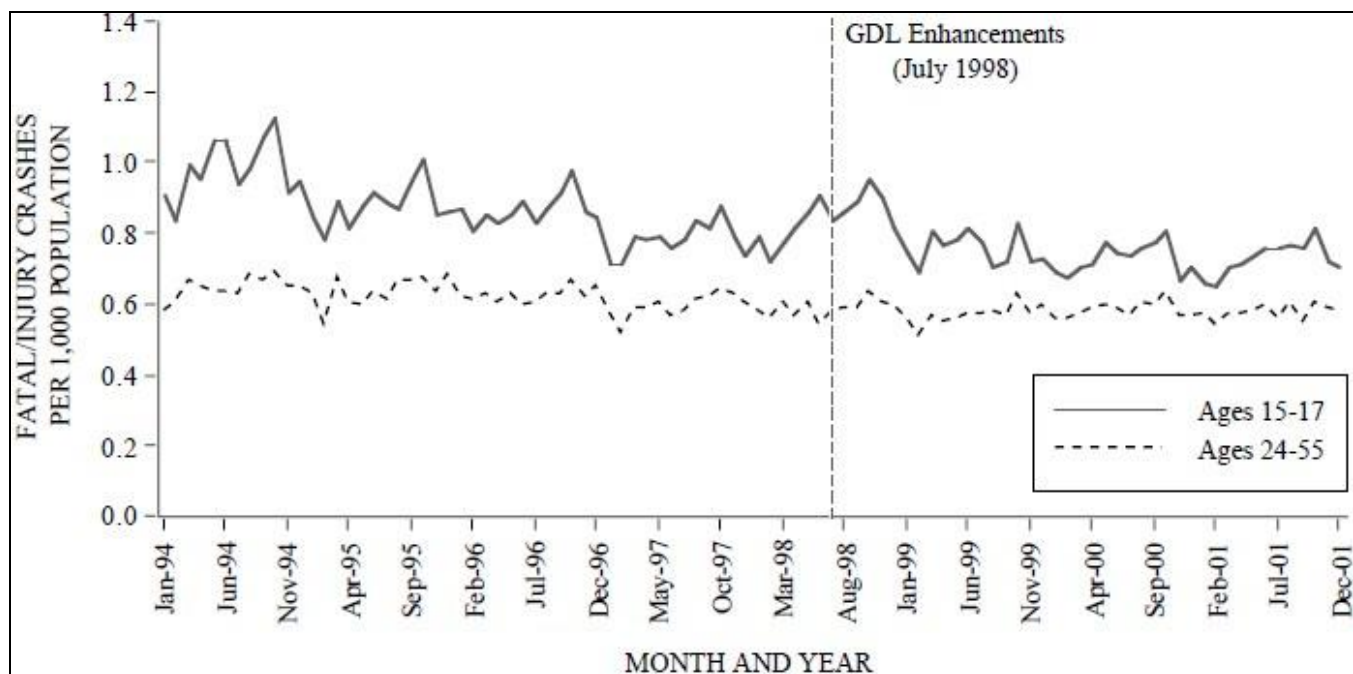


Figure 3. Monthly fatal/injury crashes per 1,000 population for 15-17-year-olds and 24-55-year-olds during January 1994 through December 2001 by age of youngest driver involved.

- The 12-month nighttime restriction was associated with a sudden- permanent 0.44% reduction in total crashes occurring during the hours of midnight to 5:00 a.m. for 15-17-year-olds starting one-year subsequent to the implementation of the nighttime restriction. The results also suggested a marginally significant sudden-permanent 0.45% reduction in their nighttime fatal/injury crashes starting one-year subsequent to the program implementation. These effects translate into savings of 153 total crashes and 68 fatal/injury crashes annually for 15- 17-year-olds. These crash savings estimates are based on an assumption that the GDL night driving restriction did not increase daytime crashes.

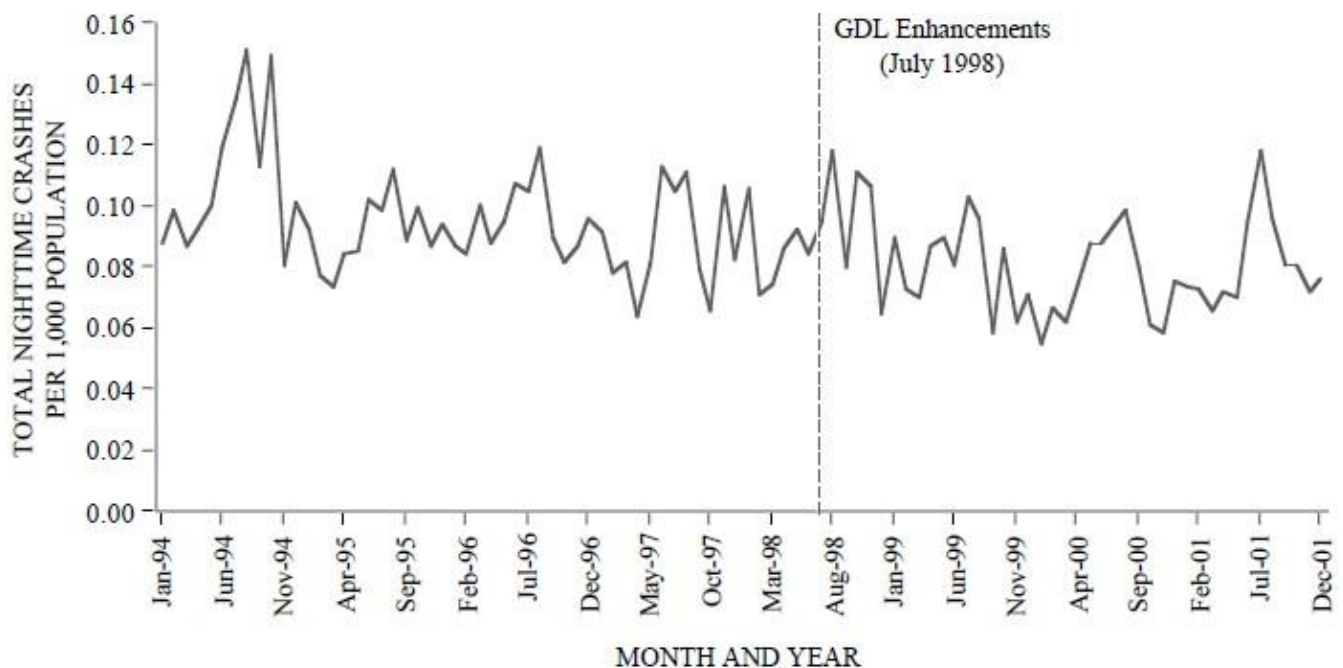


Figure 4. Monthly total nighttime crashes per 1,000 15-17-year-olds during January 1994 through December 2001 by age of youngest driver involved.

- The six-month passenger restriction was associated with a marginally significant sudden-permanent 2.52% reduction in 15-17-year-old total teen passenger crashes, and a significant gradual-permanent reduction stabilizing at -6.43% in fatal/injury passenger crashes when using an intervention date one-year subsequent to the program start date. These effects equate to savings of 878 total crashes and 975 fatal/injury crashes annually for 15-17-year-olds. These crash savings estimates are based on an assumption that the GDL passenger restriction did not cause an increase in non-passenger crashes for the 15-17-year-old age group.

Essential Analytical Skills

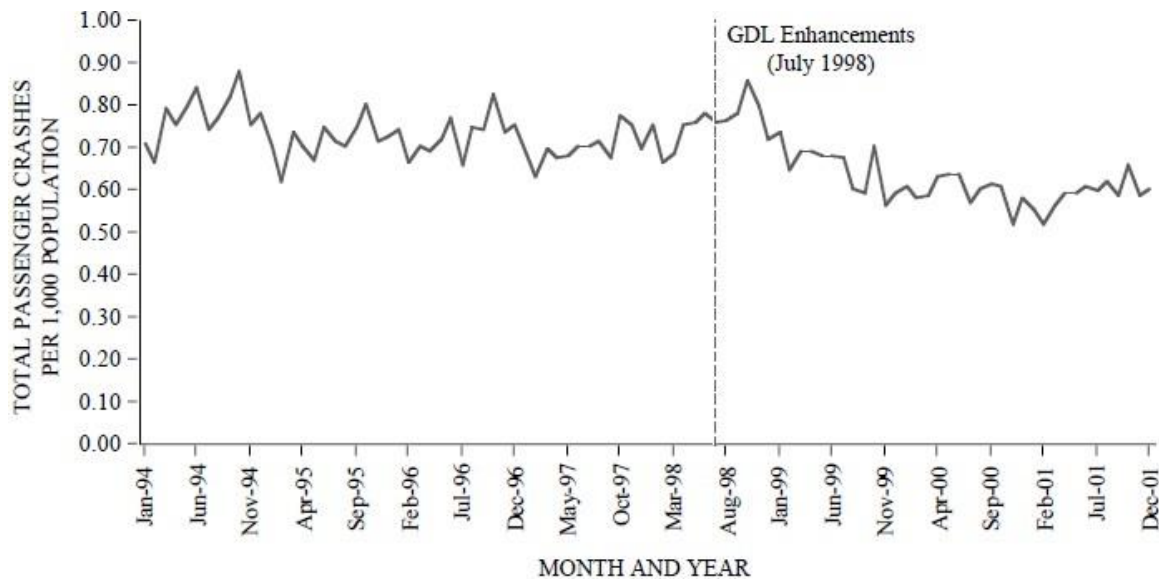


Figure 8. Monthly total crashes with a passenger under age 20 per 1,000 15-17-year-olds during January 1994 through December 2001 by age of youngest driver involved.

Discussion

The fact that no overall reductions were found in teen total or fatal/injury crash rates from the program start date or from a six-months subsequent date is not surprising given the Williams, Nelson, and Leaf (2002) findings indicating that many teens were simply applying for their instruction permit earlier to avoid delaying licensure, and that only small increases were found in the percentages of teens receiving additional hours and miles of supervised on-the-road practice during this longer instruction permit period. In addition, the reductions associated with the nighttime and passenger restrictions were small and occurred some months later in time and therefore would not have helped detect an effect using the time periods analyzed for the overall analyses.

The fact that an increase was found in total crashes for 18-19-year-olds suggests that GDL programs may have unintended negative consequences for this and possibly other age groups. One possibility for this finding is that any positive effects of the program may not continue into later years and that 16-17-year-olds under the program might not be as safe and skilled at age 18 as they would have been without the GDL restrictions. The increase in 18-19-year-old crash rates could also be due to a higher percentage of that age group being licensed due to younger teens waiting to license until age 18 to avoid the program. In any case, it is recommended that 18-19-year-olds not be used as a comparison group for evaluations of GDL programs because it appears that drivers in this age group are impacted by such programs.

Although the California GDL program evaluated in this report is considered to be one of the strongest in the United States, there are additional features that could be added or changed that may serve to strengthen the program even further. In addition to starting the nighttime restriction at an earlier time and finding ways to increase compliance with the nighttime and passenger restrictions, the program could be improved by making a teen's advancement from one stage of licensure to another contingent upon maintaining a crash- and violation-free driving record, and by tying the passenger and nighttime restrictions to the intermediate licensing stage rather than to a set period of time (McKnight, 1986). Furthermore, compliance with the nighttime and passenger restrictions could be increased by allowing law enforcement officers to stop teens simply because they believe they are violating these restrictions (i.e., primary enforcement).

Other authors (e.g., Mayhew & Simpson, 2002) have recommended that driver education and training be integrated into GDL programs so that they are multi-staged, with a basic driver education course before teens learn how to drive and an advanced course after they have gained some experience driving on the road. More complex topics, such as hazard perception, might be better taught in the advanced course where experience on the road might make these topics more understandable.

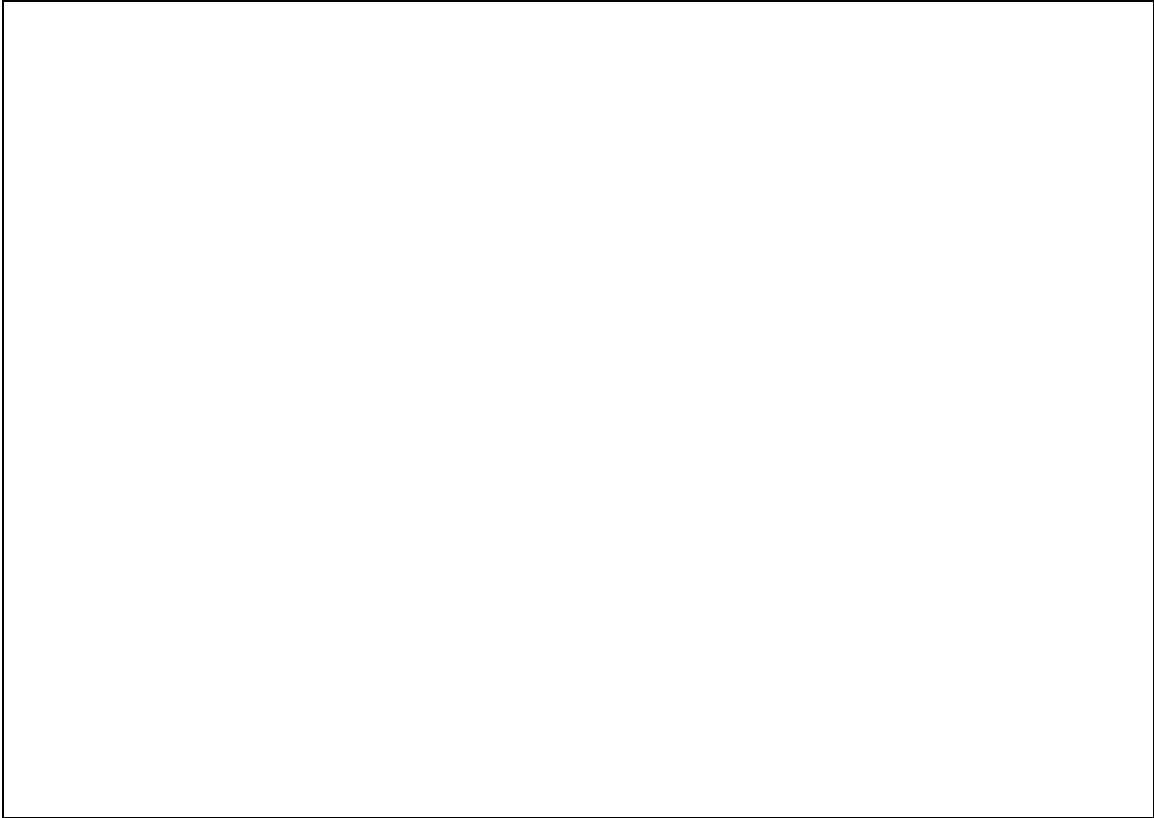
Results of a recent evaluation (Masten & Chapman, 2003) showing that home-study driver education courses were just as effective as classroom-based courses for teaching basic driver education content may provide a means for removing some of the potential roadblocks for integrating such a two-staged driver education and training system with California's GDL program. The use of home-study driver education for the first stage of a tiered driver education and training program may also increase parental involvement in their teen's early driving experience, and motivate them to more fully enforce the GDL restrictions.

Essential Analytical Skills

Exercise: Improve DMV's Graduated Driver's License Program

Step	Output
Step 1 – State the Problem	
Step 2 – Identify the Cause	
Step 3 – Choose Solution(s)	
Step 4 – Apply Solution(s)	
Step 5 – Plan Next Steps	We will not do this step in class.

Section 4: Action Plan



https://www.mindtools.com/pages/article/newTED_79.htm

<https://hbr.org/2012/09/are-you-solving-the-right-problem/ar/1>

<http://www.businessinsider.com/cognitive-biases-that-affect-decisions-2015-8>

https://en.wikipedia.org/wiki/List_of_cognitive_biases

<https://www.appd.org/meetings/2015SpringMeetingPres.cfm>

https://www.mindtools.com/pages/article/newTED_05.htm

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Bruce Winner
916.563.3232
winnerb@losrios.edu

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