

# HUMAN RELATIONS COMMISSION

USE OF FORCE DATA

Chula Vista Police Department



# USE OF FORCE CBS8 REPORT

- Report appeared July 20, 2022
- Issues Raised:
  - Racial Disparity
  - Increase from 2020 to 2021
  - Increase in annual use of force rates





# USE OF FORCE PURPOSE AND CAUSE

- Respect for life and dignity
- Duty of police officers
- Necessary & reasonable force
- Continuum of resistance
- Continuum of force
- Lack of standard definitions or data
- Axioms

# RESPONSE TO RESISTANCE

## General Categories of Resistance

No Resistance

Passive Resistance

Active Resistance

Active Aggression

Lethal Aggression

## General Categories of Force

Presence

Words/Verbal

Display/threat of force

Muscling control

Personal body weapons

Weapons and tools

Lethal force





# USE OF FORCE

## PURPOSE AND CAUSE

- No standard definitions or data
- Axioms
  - De-escalation is the priority
  - Response to articulable actions & facts
  - Presence of weapons
  - Time = Increasing risk
  - Medical care
  - Robust reporting requirements
  - Supervisory & expert review



# USE OF FORCE POLICY & TRAINING

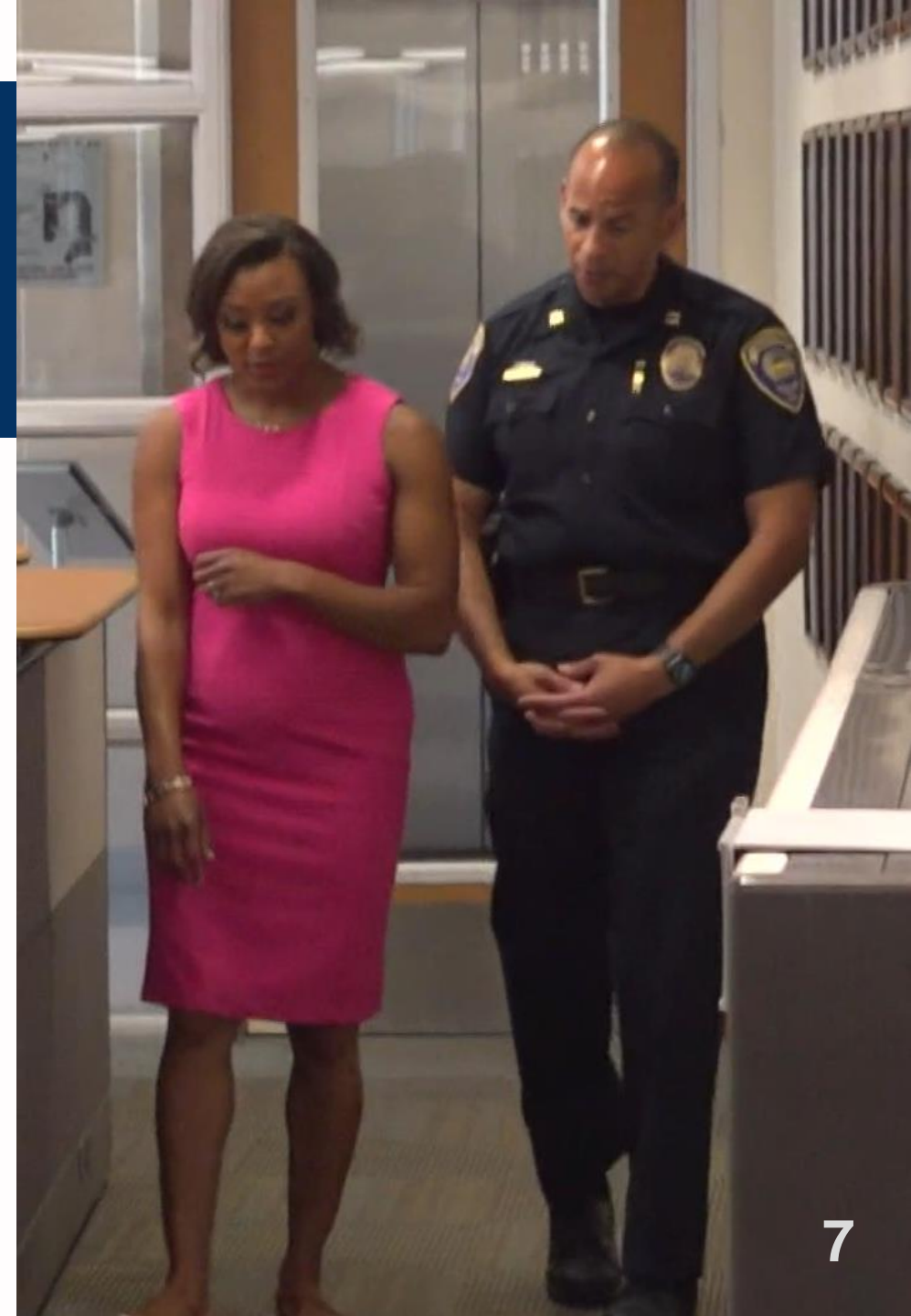
- Respect for human life & dignity
- Must be reasonable and necessary
- Based on facts and totality of circumstances
- Initial training
- Annual training
- Mission and priorities
- Culture



**THE HEART  
BEHIND  
THE BADGE**

# USE OF FORCE REPORT INACCURACIES

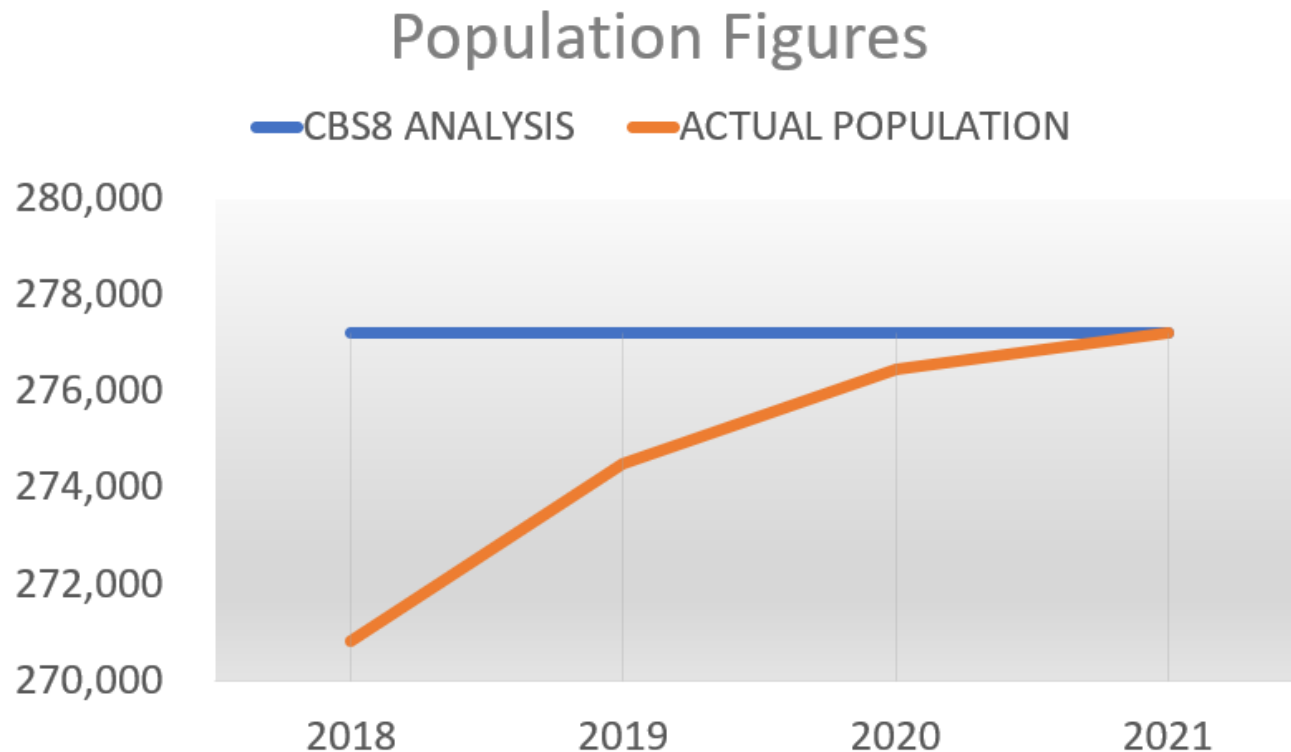
- Early indications of errant data & analysis
- Selected & limited data
- Comparing apples to oranges
- Necessary force vs. Excessive force





# EARLY CONCERNS ABOUT ACCURACY

**BAD DATA = BAD RESULTS**





# USE OF FORCE EVENTS BY RACE

## DATA REPORTED BY CBS8

(limited selection of data was reported by CBS8)

Use of Force Events		2020	2021
Black/African American		35	65

# USE OF FORCE EVENTS BY RACE

## COMPLETE DATA

(including data not reported by CBS8)

Use of Force Events		2020	2021
Black/African American		35	65

# REASONABLE & NECESSARY

## RESPONSE TO RESISTANCE OR AGGRESSION



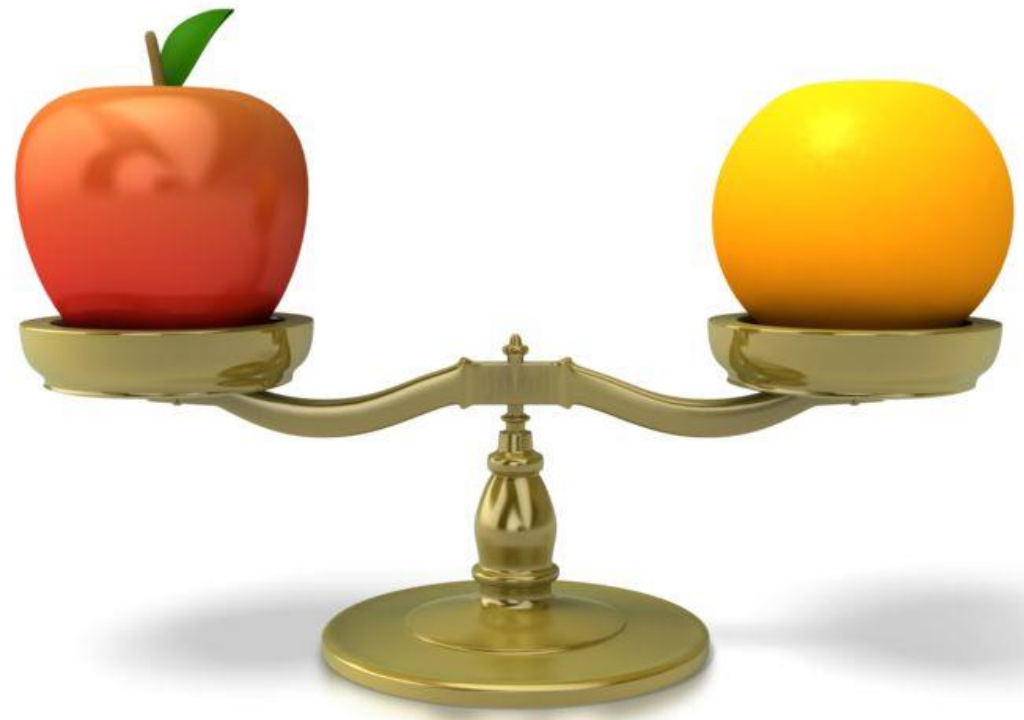
vs



# APPLES TO ORANGES

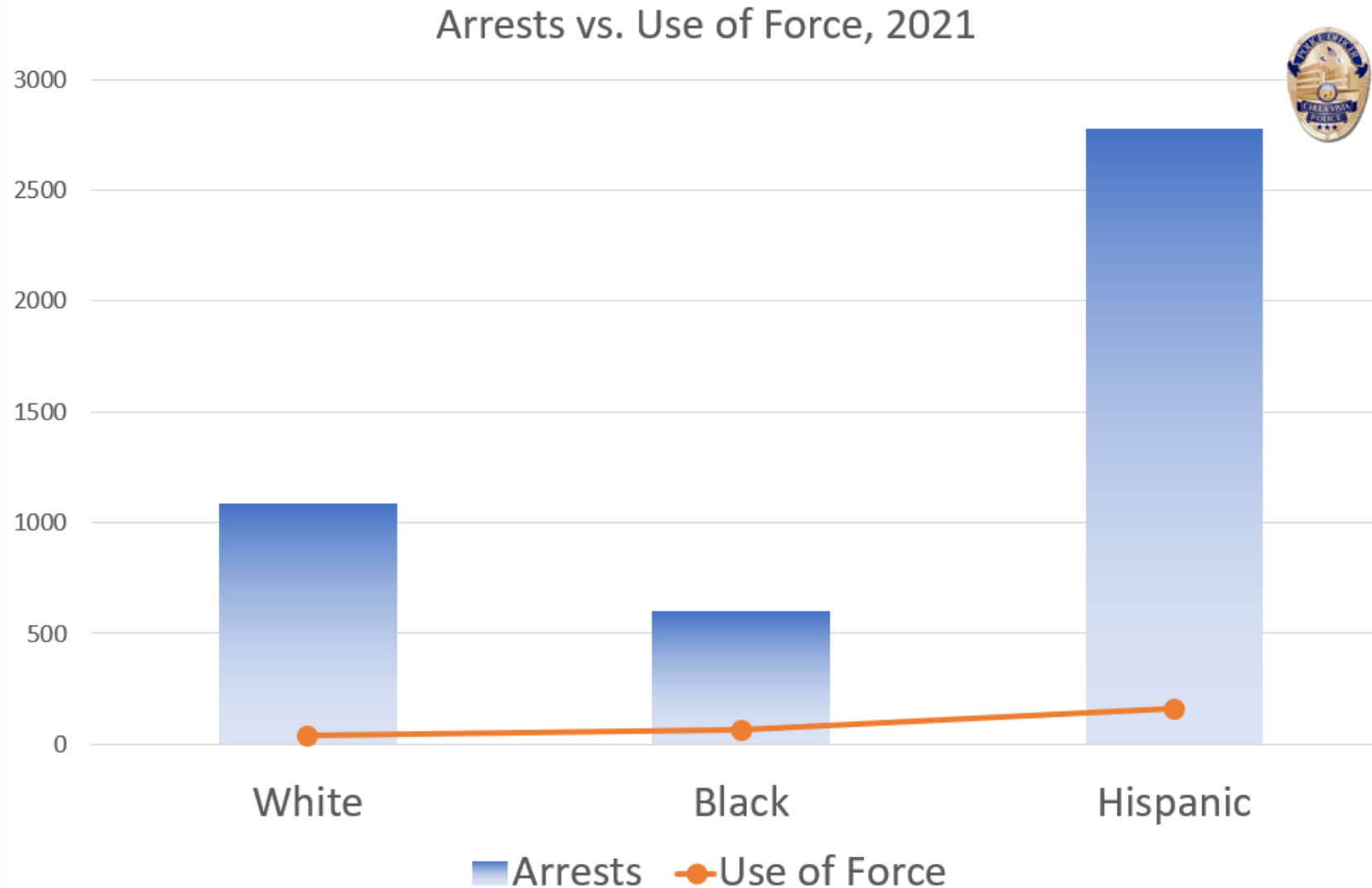
## Analyzing Police Use of Force Population vs. Contacts

- CBS8 compared to the entire Chula Vista population.
- More accurate to compare to police contacts or arrests.



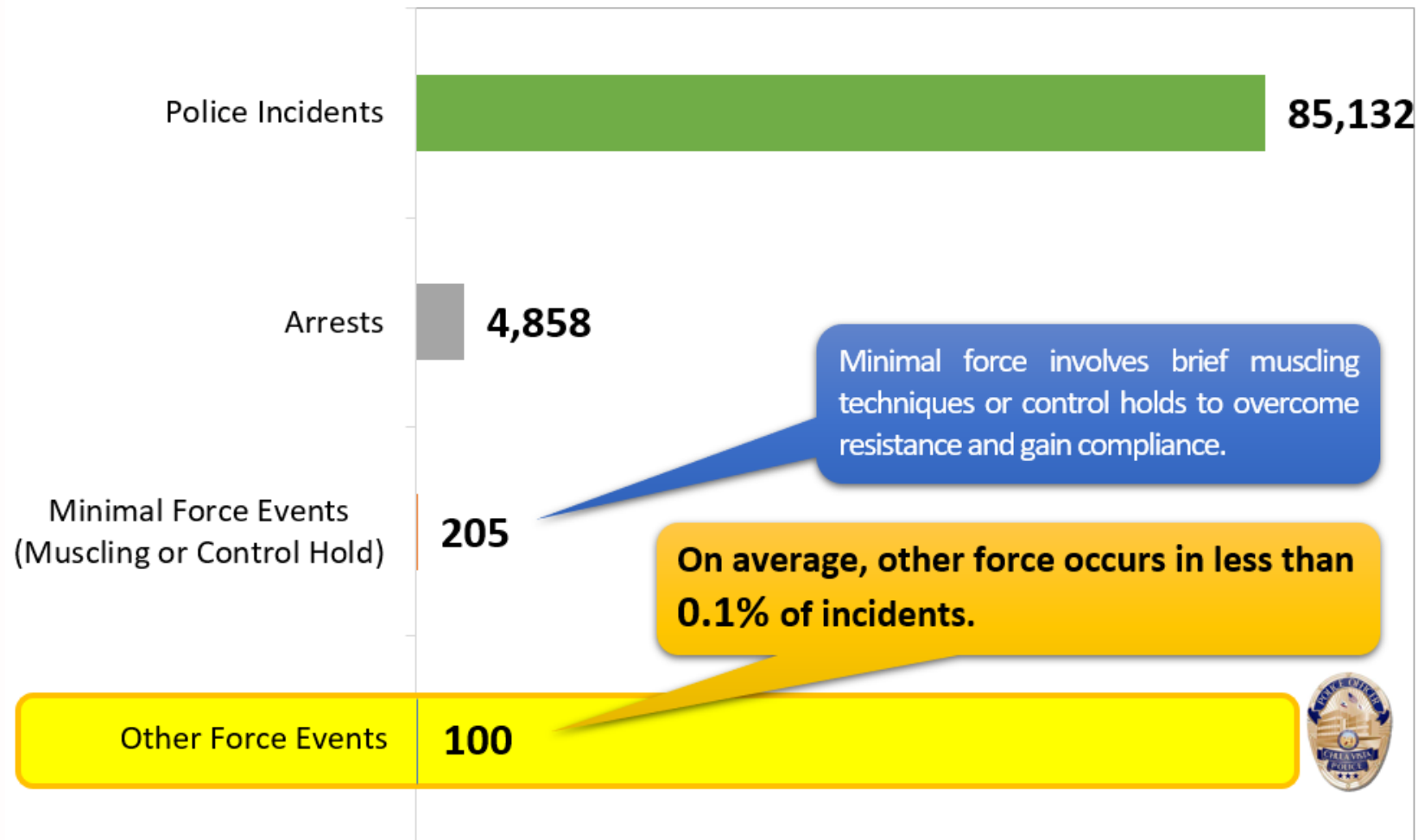


# USE OF FORCE EVENTS ARE RARE



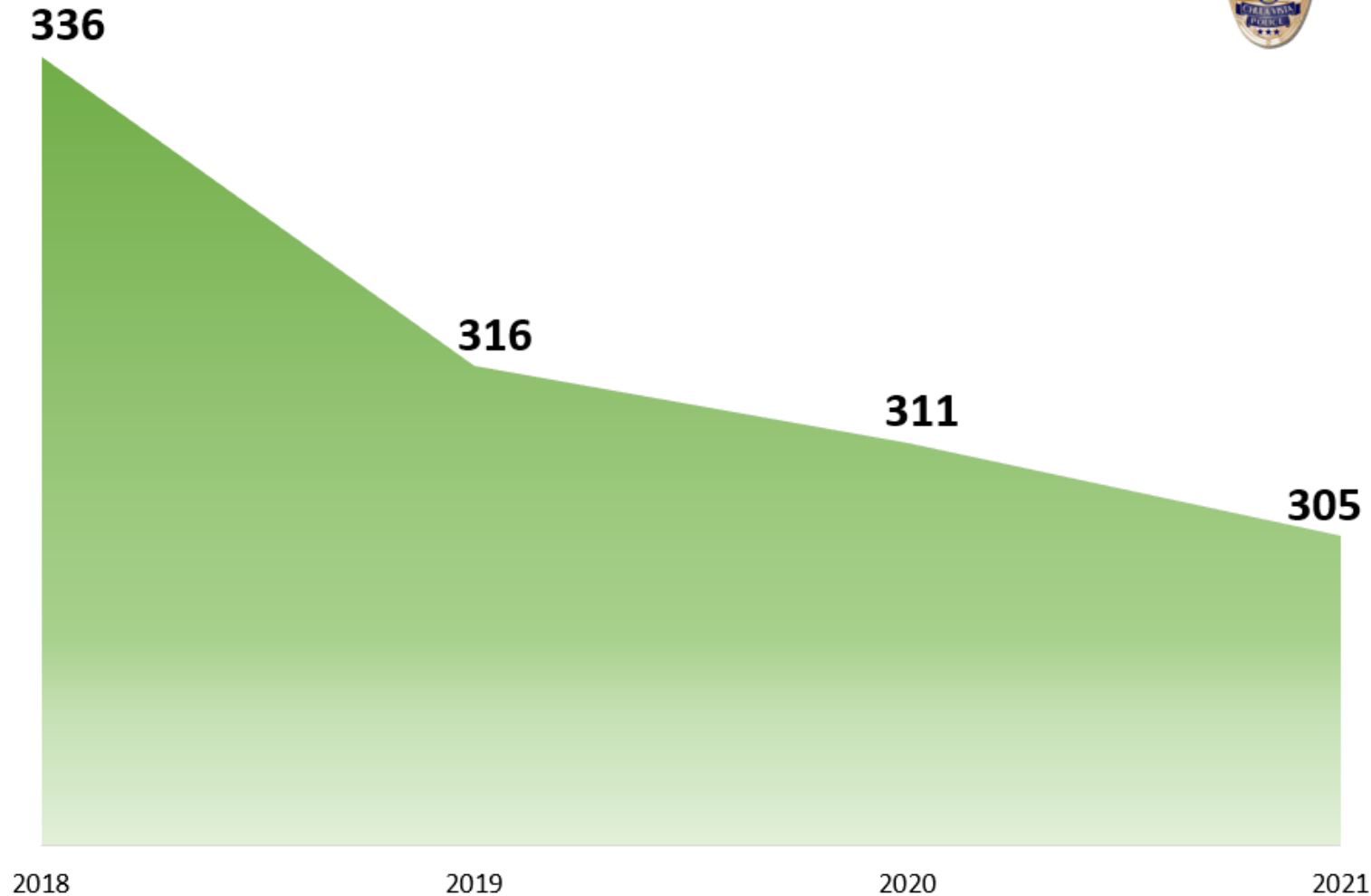
# USE OF FORCE EVENTS ARE RARE

Police Responses by the Numbers, 2021



# USE OF FORCE EVENTS DECLINING

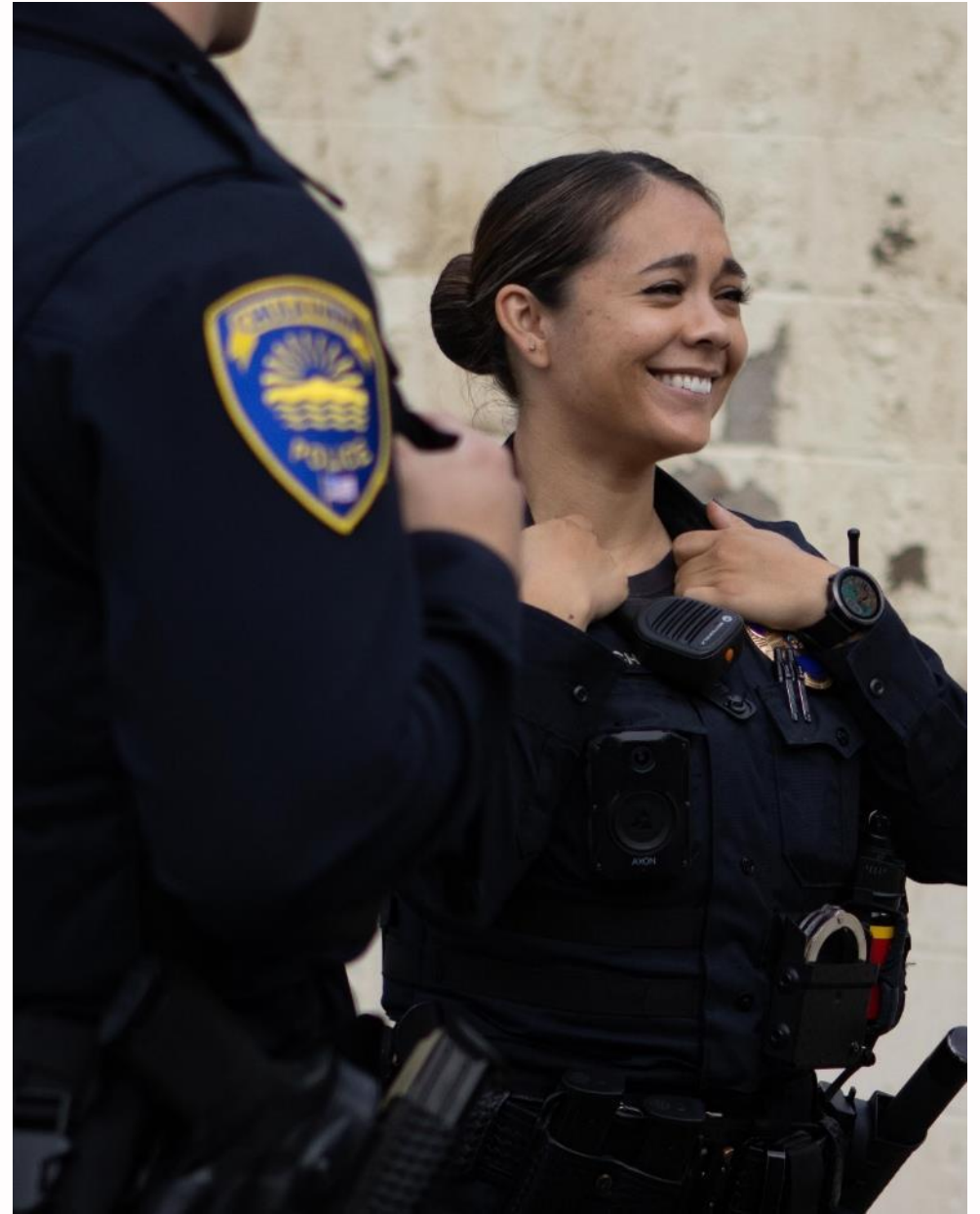
Use of Force Events 2018-2021



# USE OF FORCE

## KEY FACTS

- Overall use of force very low
- Use of force beyond “momentary” extremely low
- Direct result of suspect actions
- Each case reviewed and confirmed necessary & reasonable





# USE OF FORCE CONTINUED PROGRESS

- Trust & Relationships
- Community Engagement
- Recruiting and Hiring
- Advanced Training
- Auditing and Accountability
- Necessary to reduce likelihood of injury



# CULTURAL COMPETANCY TRAINING

HUMAN RELATIONS  
COMMISSION

Chula Vista Police  
Department





# 21<sup>st</sup> Century Policing – Cross Cultural Competency

Officer Jeff Pace





# Natural Language Grammatical Inference with Recurrent Neural Networks

Steve Lawrence, Member, IEEE, C. Lee Giles, Fellow, IEEE, and Sandiway Fong

**Abstract**—This paper examines the inductive inference of a complex grammar with neural networks—specifically, the task considered is that of training a network to classify natural language sentences as grammatical or ungrammatical, thereby exhibiting the same kind of discriminatory power provided by the Principles and Parameters linguistic framework, or Government-and-Binding theory. Neural networks are trained, without the division into learned vs. innate components assumed by Chomsky, in an attempt to produce the same judgments as native speakers on sharply grammatical/ungrammatical data. How a recurrent neural network could possess training capability and the properties of various common recurrent neural network architectures are discussed. The problem exhibits several behavior which is often not present with smaller grammars and training was initially difficult. However, after implementing several techniques aimed at improving the convergence of the gradient descent backpropagation-through-time training algorithm, significant learning was possible. It was found that certain architectures are better able to learn an appropriate grammar. The operation of the networks and their training is analyzed. Finally, the extraction of rules in the form of deterministic finite state automata is investigated.

**Index Terms**—Recurrent neural networks, natural language processing, grammatical inference, government-and-binding theory, gradient descent, simulated annealing, principles-and-parameters framework, automata extraction.

## 1 INTRODUCTION

This paper considers the task of classifying natural language sentences as grammatical or ungrammatical. We attempt to train neural networks, without the bifurcation into learned vs. innate components assumed by Chomsky, to produce the same judgments as native speakers on sharply grammatical/ungrammatical data. Only recurrent neural networks are investigated for computational reasons. Computationally, recurrent neural networks are more powerful than feedforward networks and some recurrent architectures have been shown to be at least Turing equivalent [53], [54]. We investigate the properties of various popular recurrent neural network architectures, in particular Elman, Narendra and Parthasarathy (N&P), and Williams and Zipser (W&Z) recurrent networks, and also Frasconi-Gori-Soda (FGS) locally recurrent networks. We find that both Elman and W&Z recurrent neural networks are able to learn an appropriate grammar after implementing techniques for improving the convergence of the gradient descent based backpropagation-through-time training algorithm. We analyze the operation of the networks and investigate a rule approximation of what the recurrent network has learned—specifically, the extraction of rules in the form of deterministic finite state automata.

Previous work [38] has compared neural networks with other machine learning paradigms on this problem—this work focuses on recurrent neural networks, investigates

additional networks, analyzes the operation of the networks and the training algorithm, and investigates rule extraction.

This paper is organized as follows: Section 2 provides the motivation for the task attempted. Section 3 provides a brief introduction to formal grammars and grammatical inference and describes the data. Section 4 lists the recurrent neural network models investigated and provides details of the data encoding for the networks. Section 5 presents the results of investigation into various training heuristics and investigation of training with simulated annealing. Section 6 presents the main results and simulation details and presents the operation of the networks. The extraction of rules in the form of deterministic finite state automata is investigated in Section 7 and Section 8 presents a discussion of the results and conclusions.

## 2 MOTIVATION

### 2.1 Representational Power

Natural language has traditionally been handled using symbolic computation and recursive processes. The most successful stochastic language models have been based on finite-state descriptions such as  $n$ -grams or hidden Markov models. However, finite-state models cannot represent hierarchical structures as found in natural language<sup>1</sup> [48]. In the past few years, several recurrent neural network architectures have emerged which have been used for grammatical inference [9], [21], [19], [20], [68]. Recurrent neural networks have been used for several smaller natural language problems, e.g., papers using the Elman network for natural language tasks include: [1], [12], [24], [58], [59]. Neural network models have been shown to be able to

<sup>1</sup> The inside-outside reestimation algorithm is an extension of hidden Markov models intended to be used for learning hierarchical systems. The algorithm is currently only practical for relatively small grammars [48].

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For information on obtaining reprints of this article, please send e-mail to: tkd@computer.org, and reference IEEECS Log Number 104381.



# OUR MISSION

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The Chula Vista Police Department, in partnership with the Community, is dedicated to providing community policing, with the highest level of professionalism and transparency.

Chula Vista Police Department Employees will provide fair, courteous, and compassionate service to enhance the quality of life in Chula Vista.



# OUR VALUES

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**Leadership   Respect   Integrity   Accountability**





THANK YOU