

Agent-based Modeling Of Worker Safety Behavior At The Construction Workface

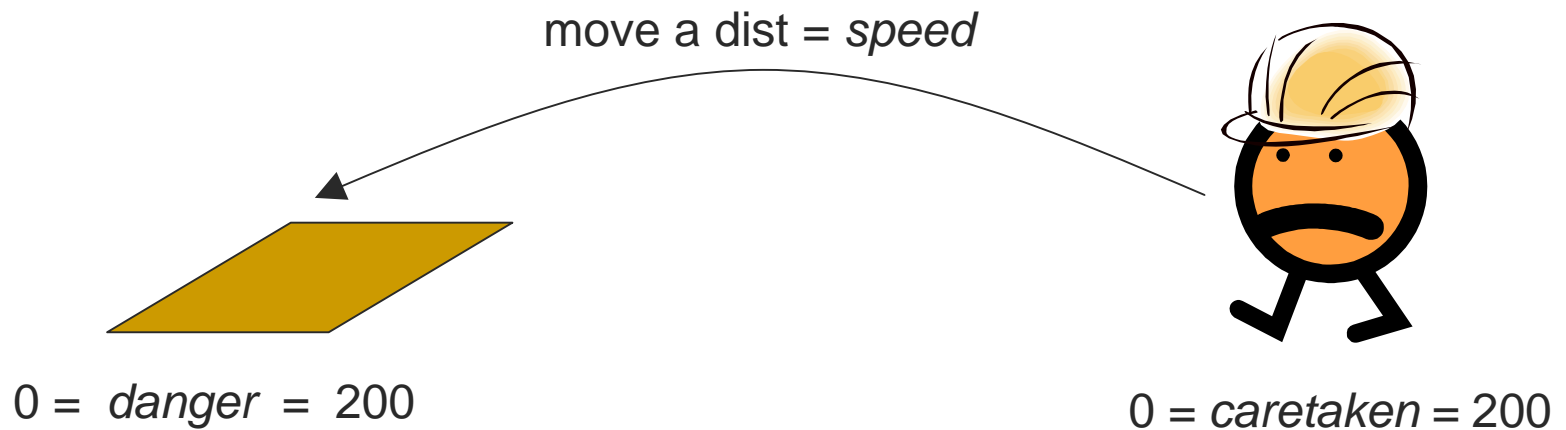
Ken Walsh, SDSU

Anil Sawhney, ASU

[Big picture]

- Why would workers take risks at the construction site?
- There must be a perception of value in the risk.
- Might that perception come from reward systems?

[Worker Behavior Model]



if $\text{caredtaken} = \text{danger}$, worker is safe
if $\text{caredtaken} < \text{danger}$, *might* be an incident

$1 = \text{speed} = 5$

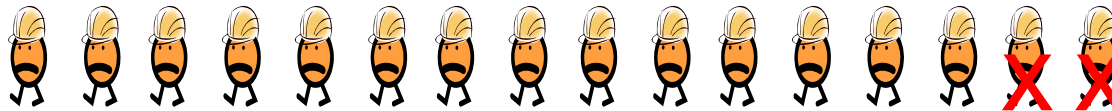
Initially,
 $\text{caredtaken} = f(\text{speed})$
 $\text{caredtaken} = 225 - 25\text{speed}$

[Value model]

After a period of time, calculate

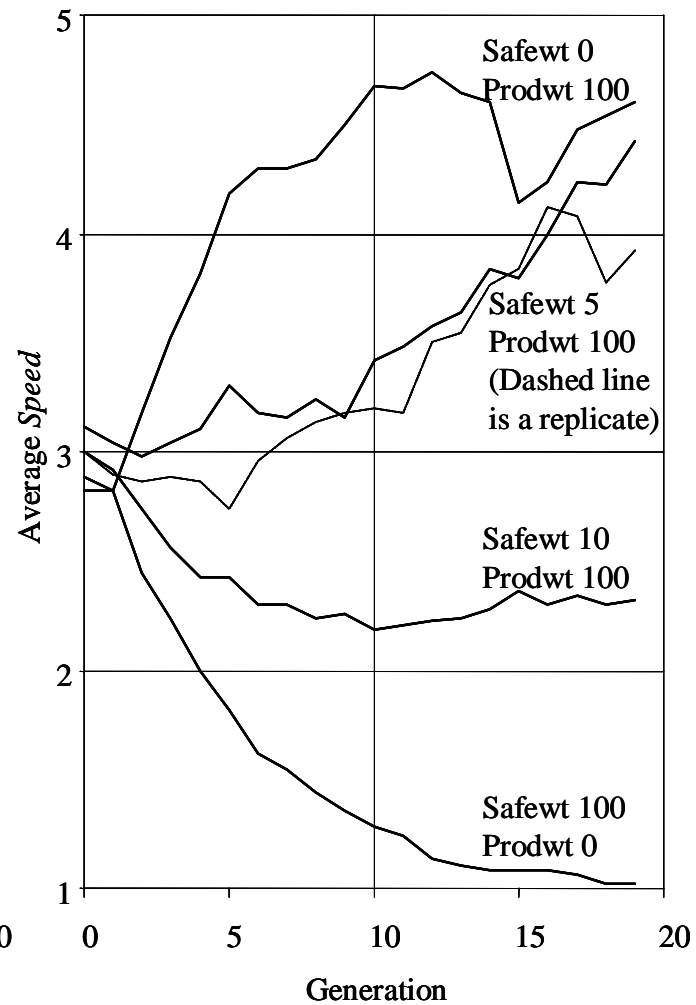
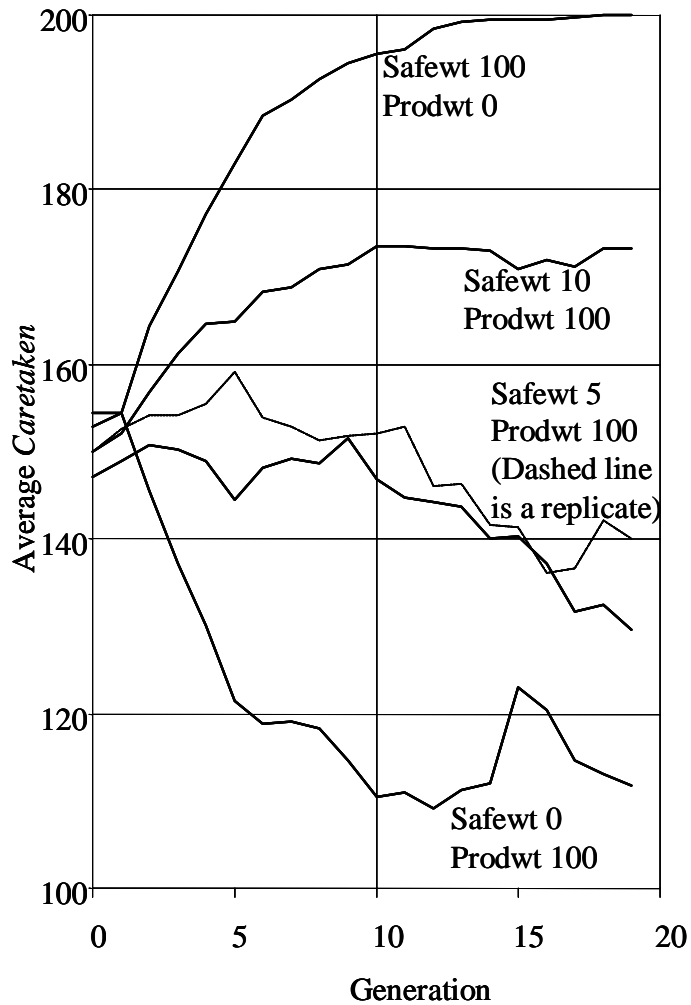
$$\text{Score} = \text{Production Wt} * \text{Production} - \text{Safe Wt} * \text{Num. of Incidents}$$

for all workers. Rank workers by Score.

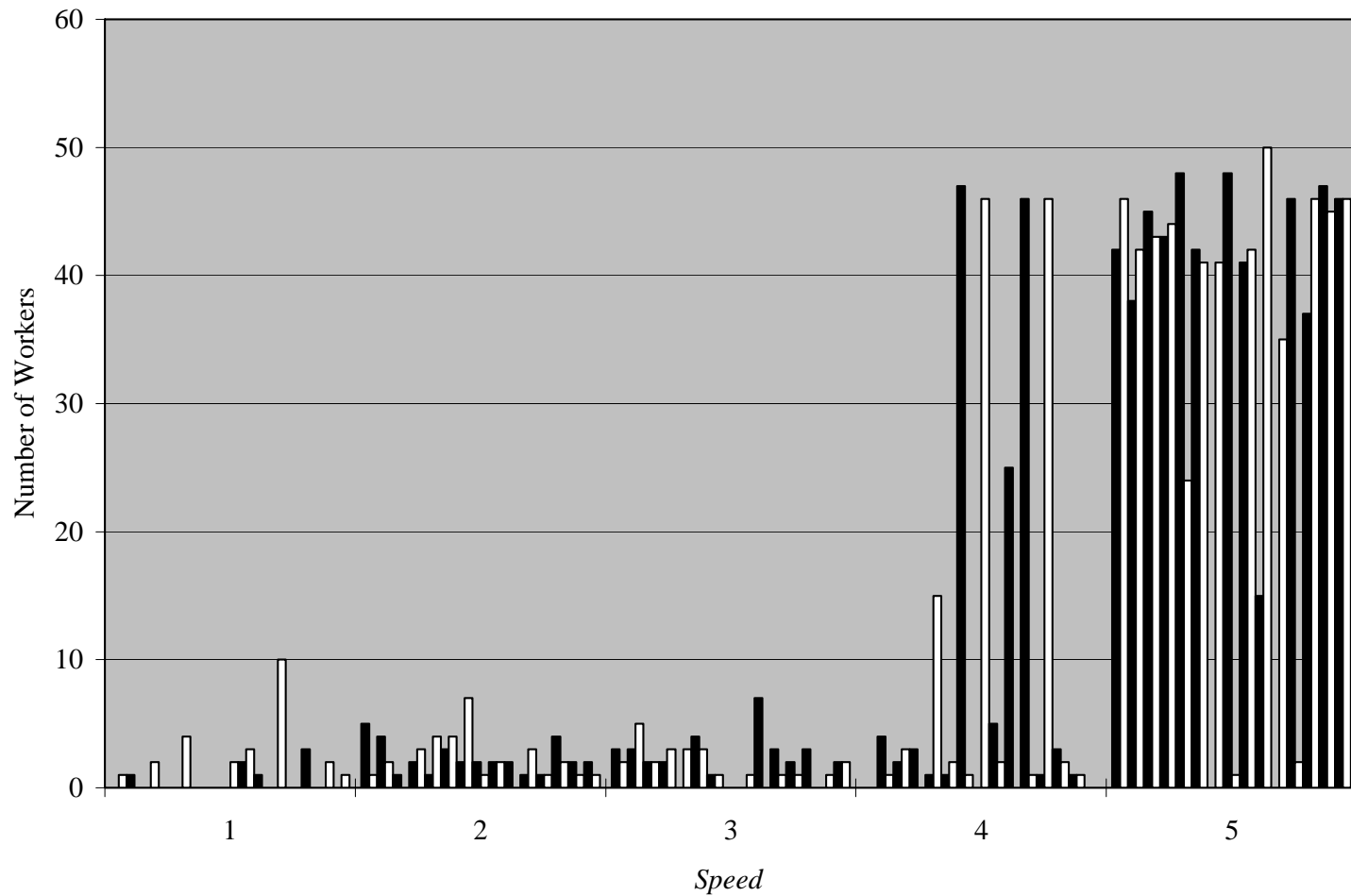


Eliminate and replace lowest scorers with new workers having characteristics averaged from the best workers.

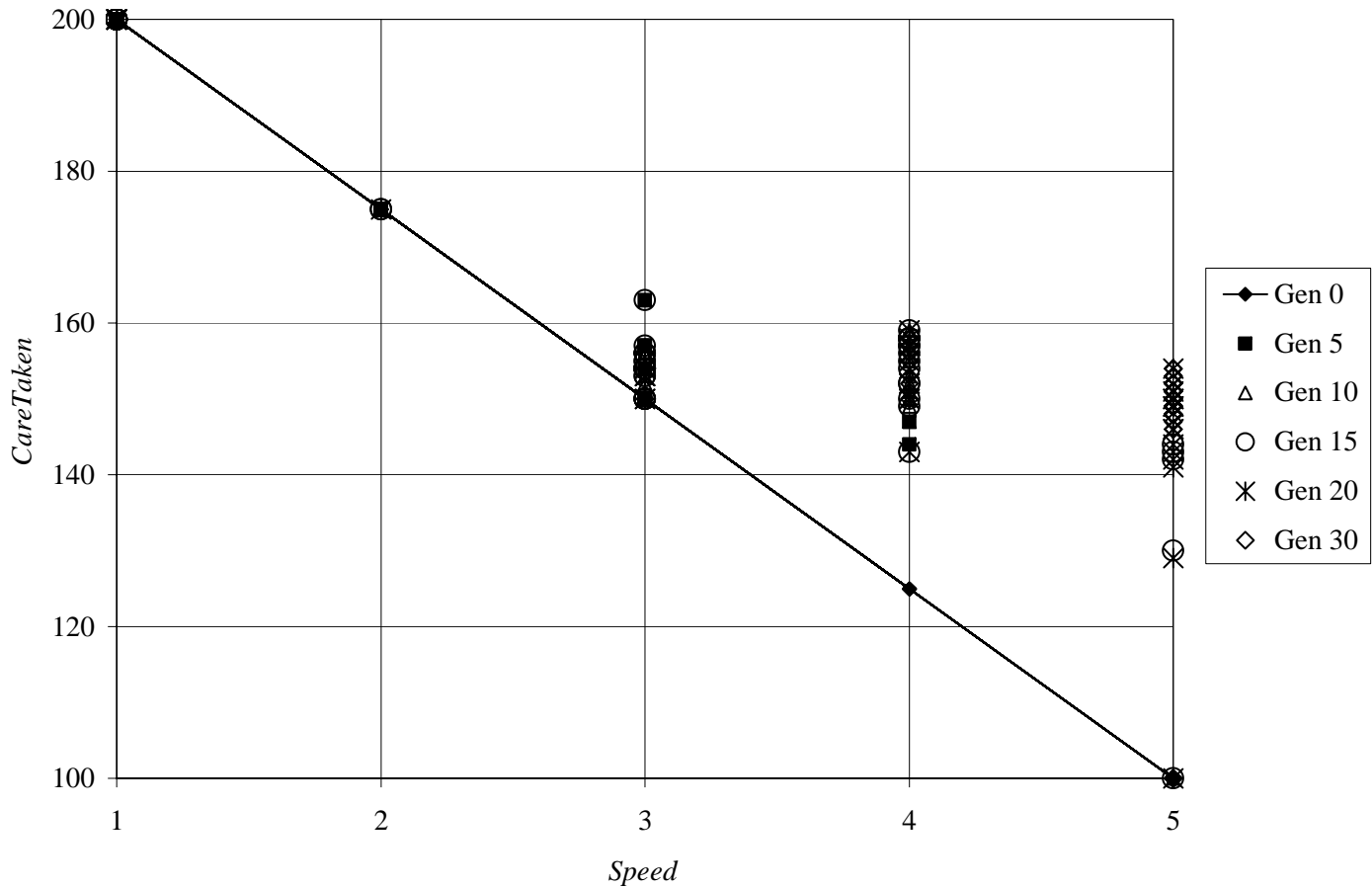
Weights affect population



[Multiple solutions exist]



[Learning occurs]



[Suggestions]

- In this simple model, reward system is related to performance
- Fatalities tend to increase attention to safety
- This is a simple and idealized model, but suggests that agent-based models can provide some insights into behavior-based problems.