

Xmas 4.0

Digitalisierung am Nordpol

Maximilian Schwenger





- Erneuerbare Energien
- Big Data
- $P \neq NP$
- Donald Trump
- Higgs-Boson
- Krebs
- Hybride Systeme
- Brexit
- Deep Learning
- Neuronale Prothesen
- Unendliche Präzision
- Quantencomputer
- Anschläge in Manchester
- Verteilte Synthese
- ~~Alternative für De~~ Politik
- Prinz Harrys Verlobung

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- $P \neq NP$
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- Quantencomputer
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- $P \neq NP$

- Unendliche Präzision

- Quantencomputer

- Verteilte Synthese

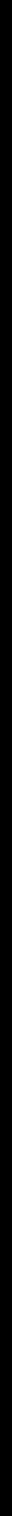
- Hybride Systeme

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- Quantencomputer







Elf; 30 Jahre; ca 140cm

⇒ ca 1500 kcal pro Tag!



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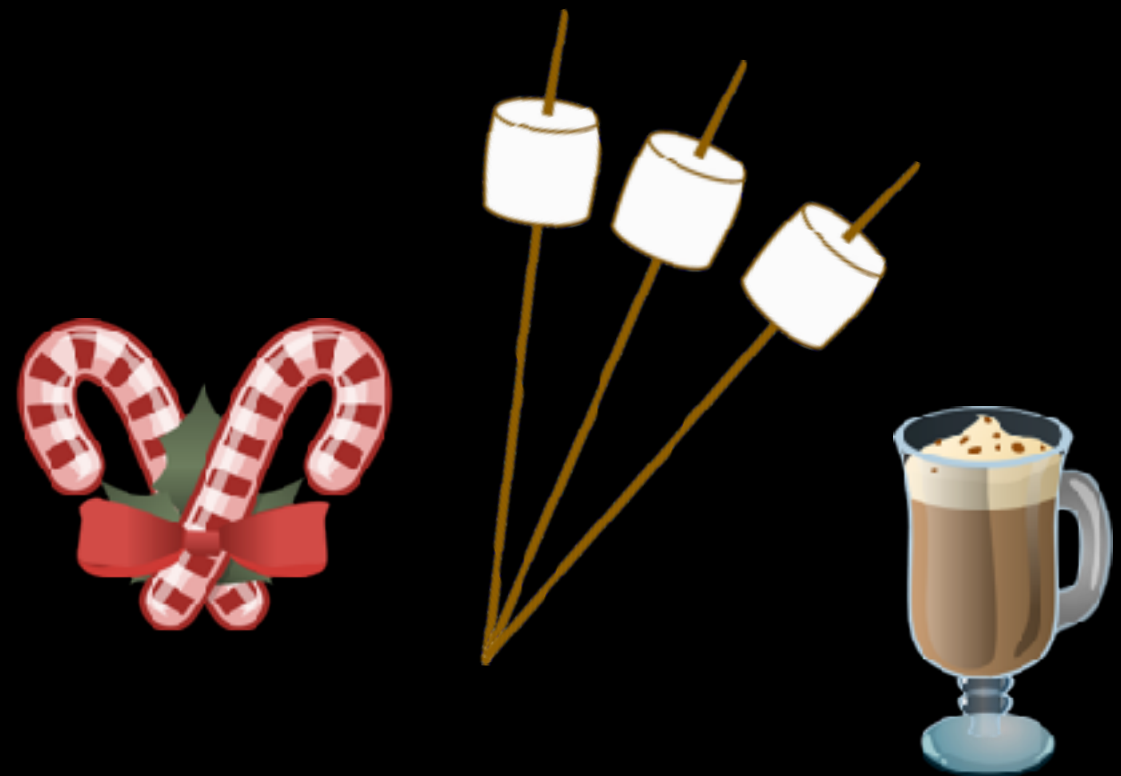
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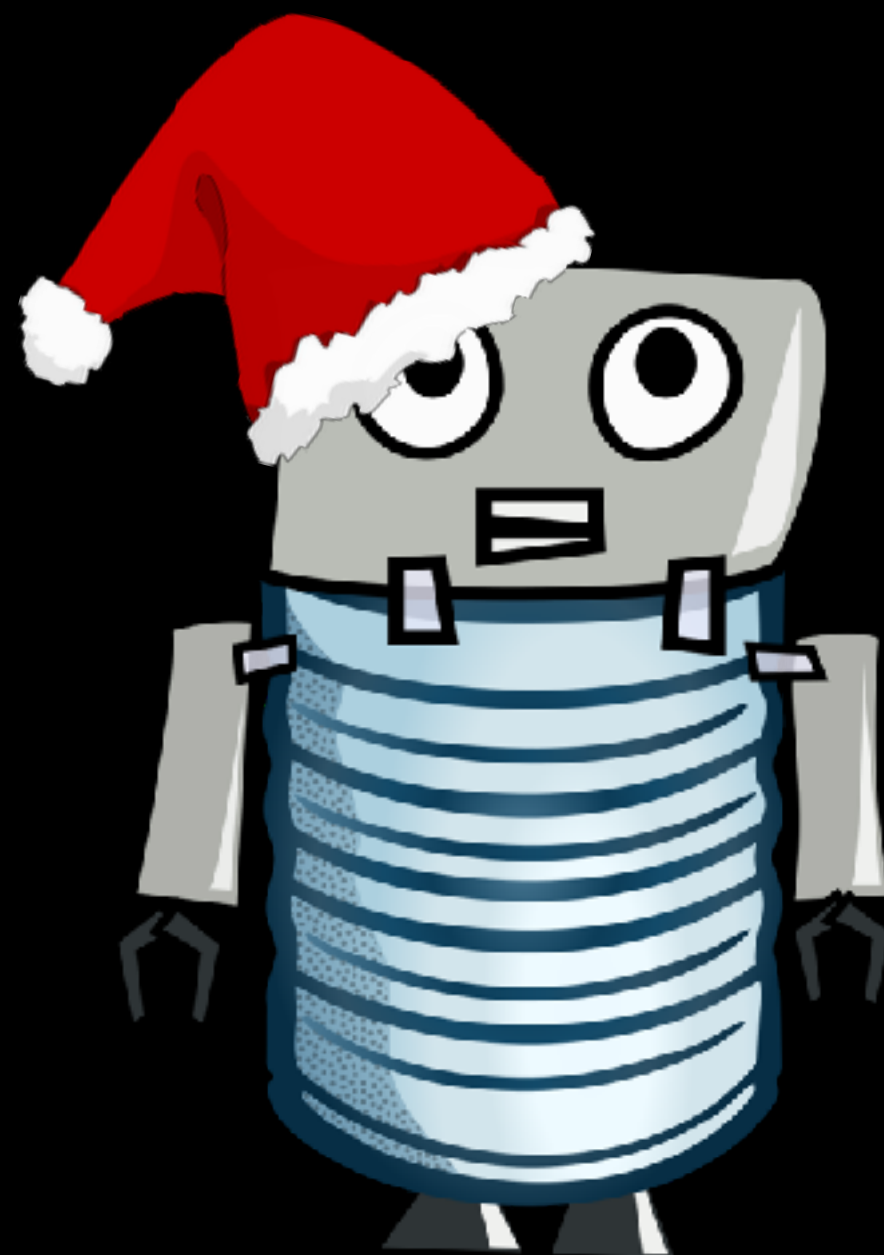
⇒ ca 1500 kcal pro Tag!

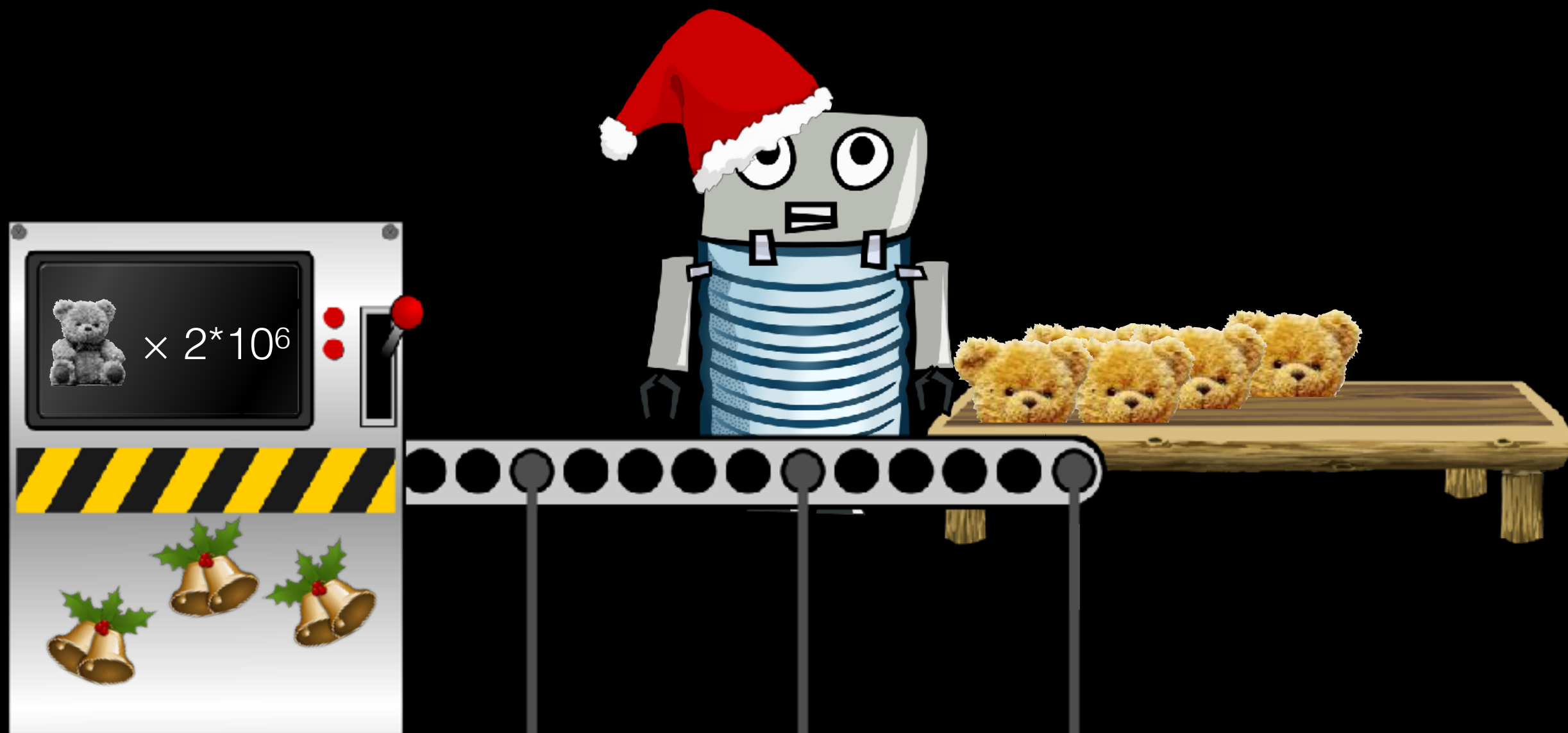


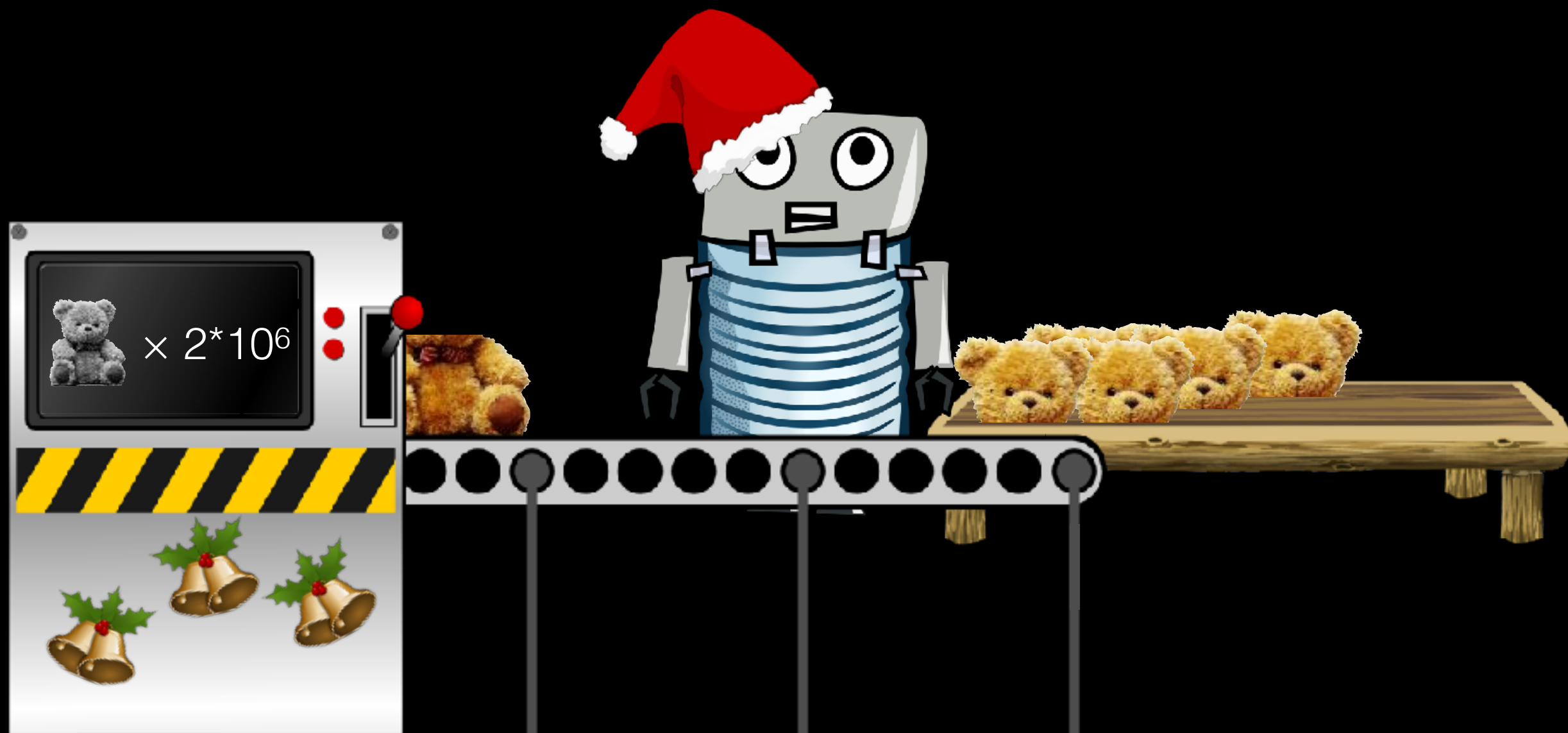
Elf; 30 Jahre; ca 140cm

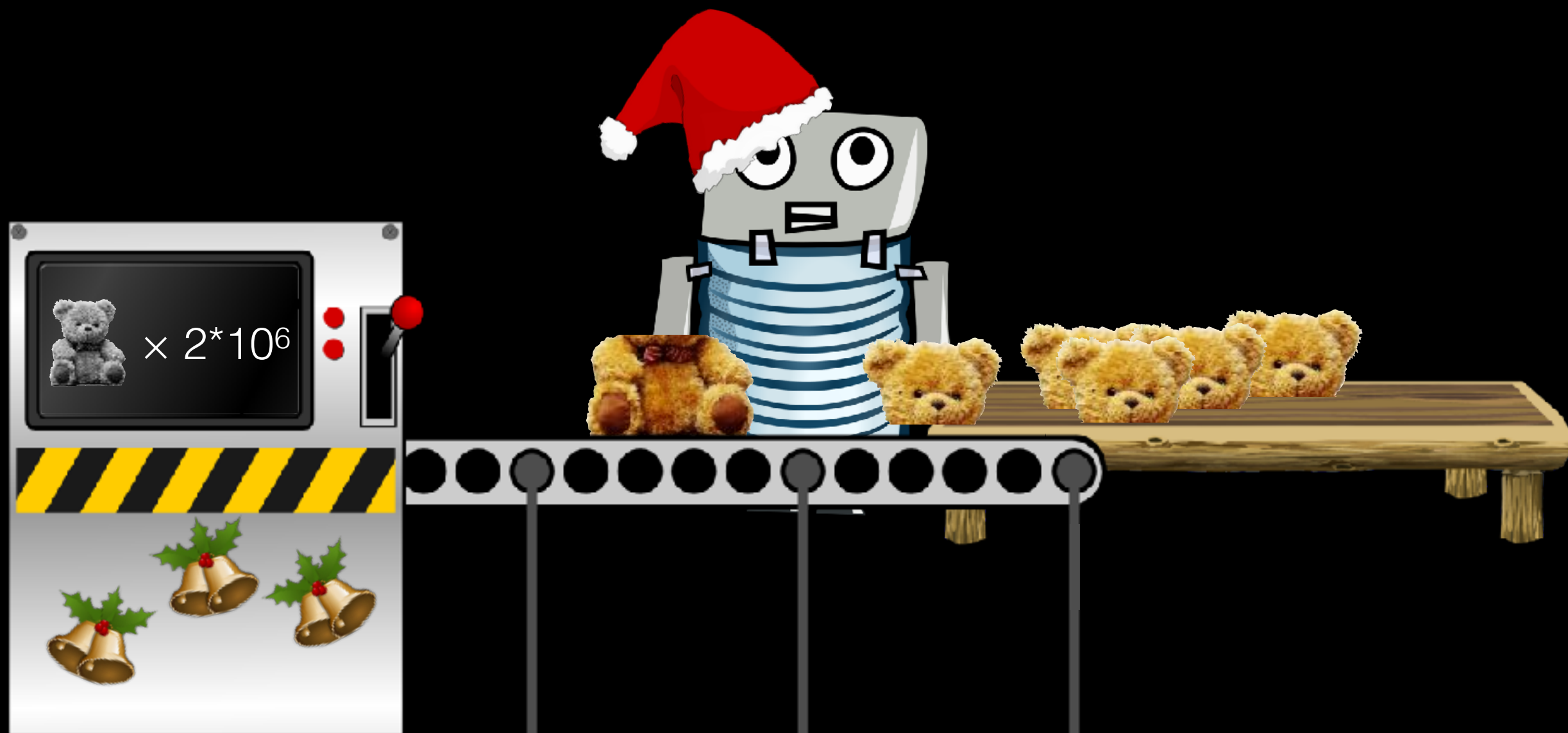
⇒ ca 1500 kcal pro Tag!

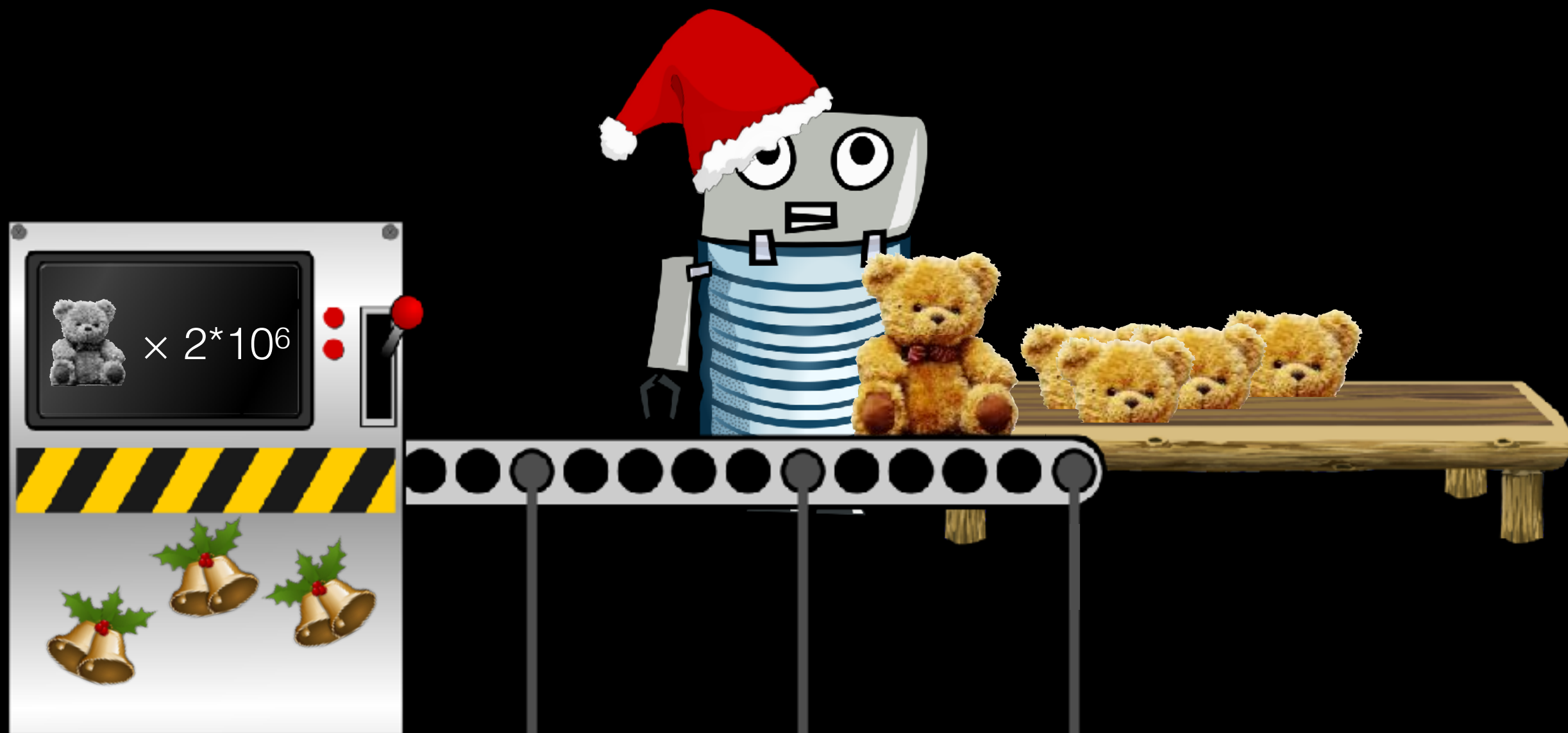


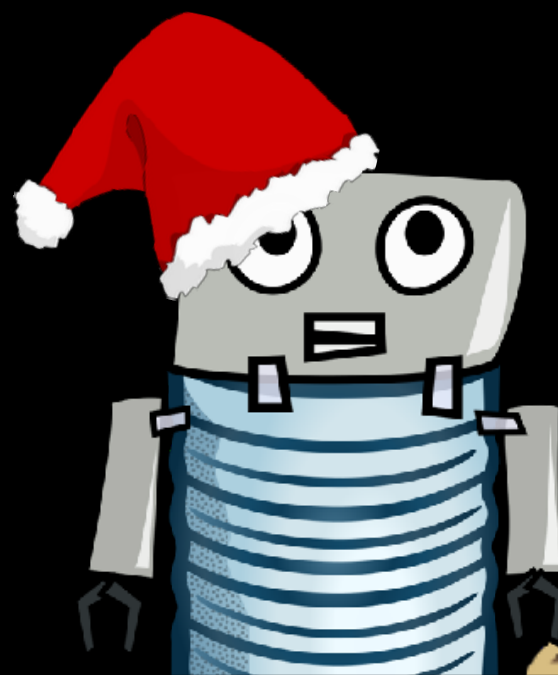






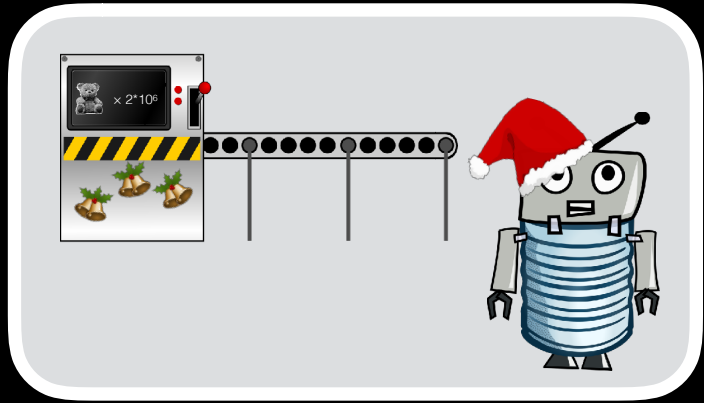


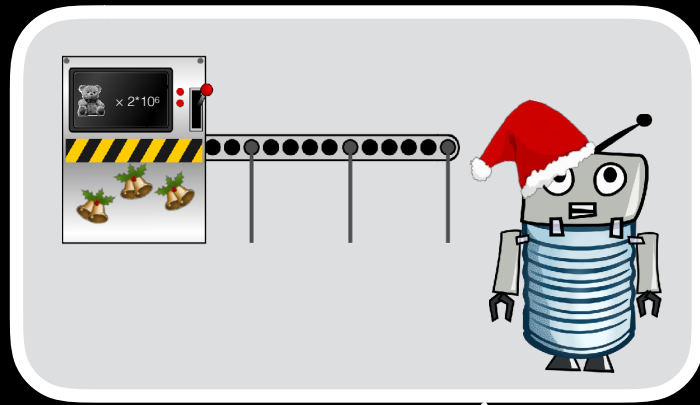




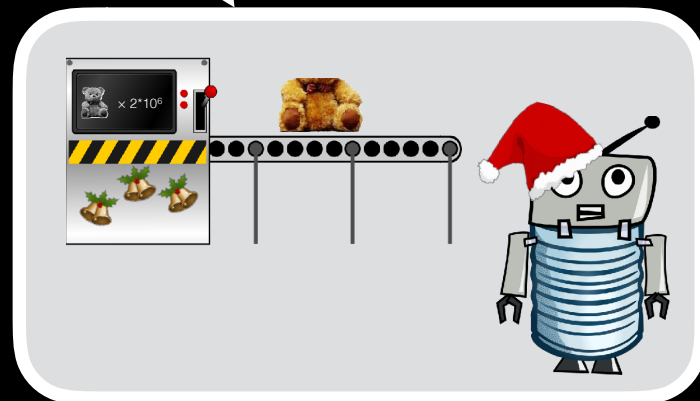


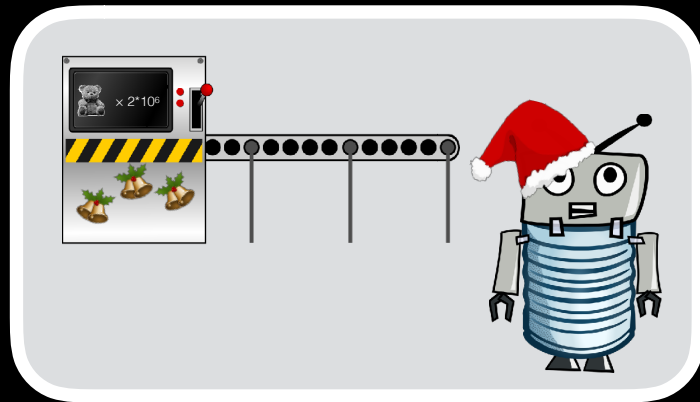
KEEP
CALM
AND
MATH
IT OUT





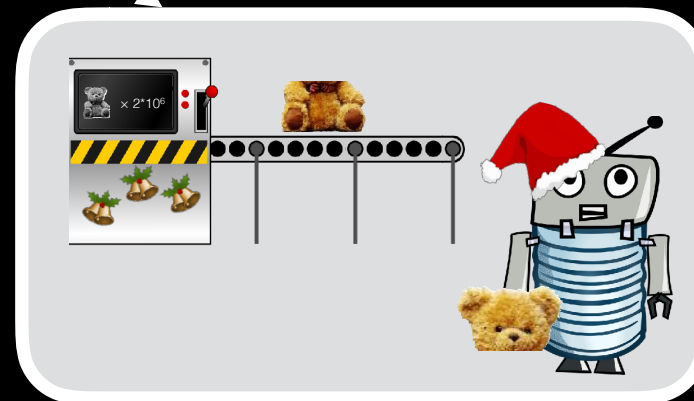
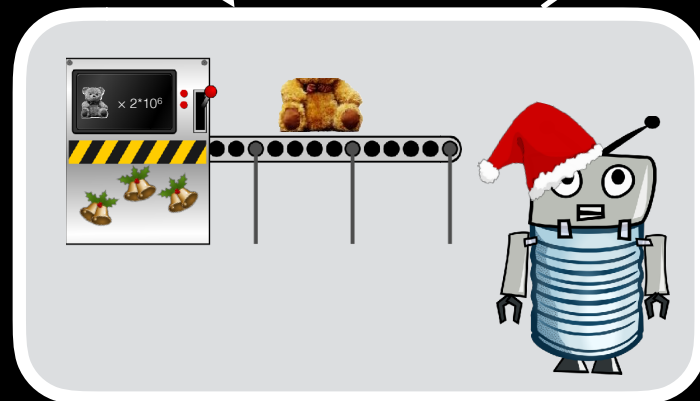
produce!

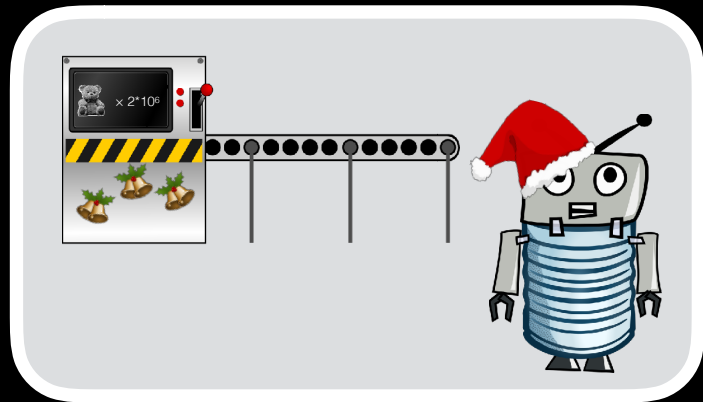




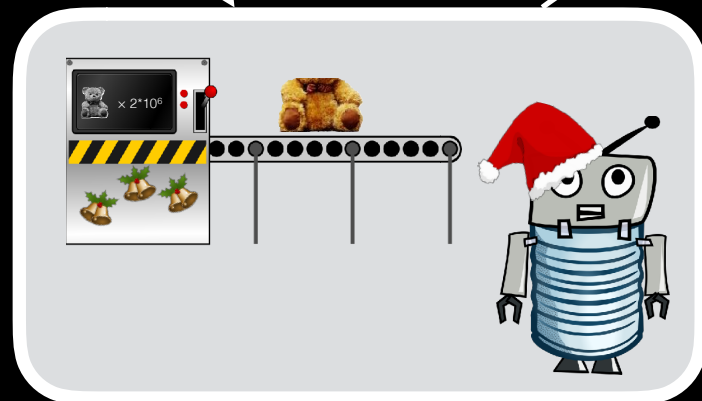
produce!

grab!

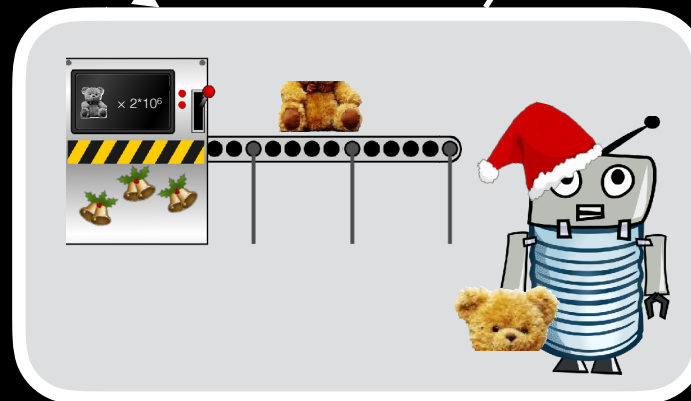




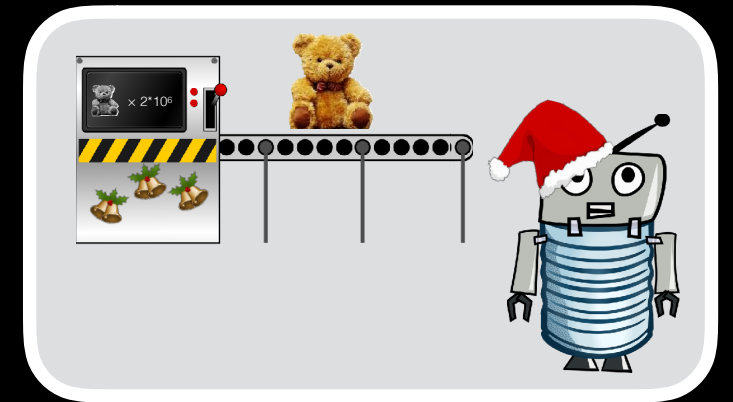
produce!

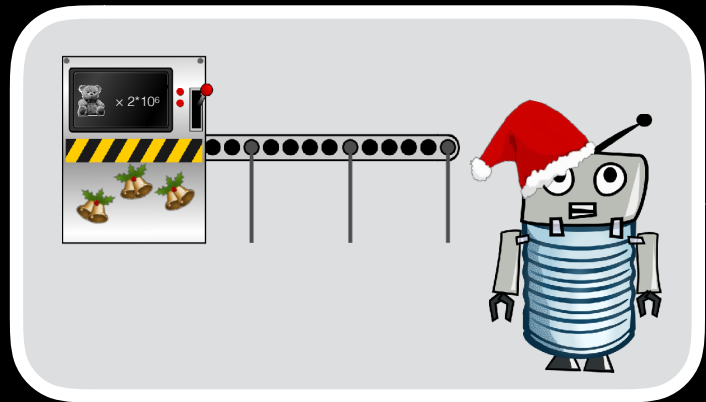


grab!

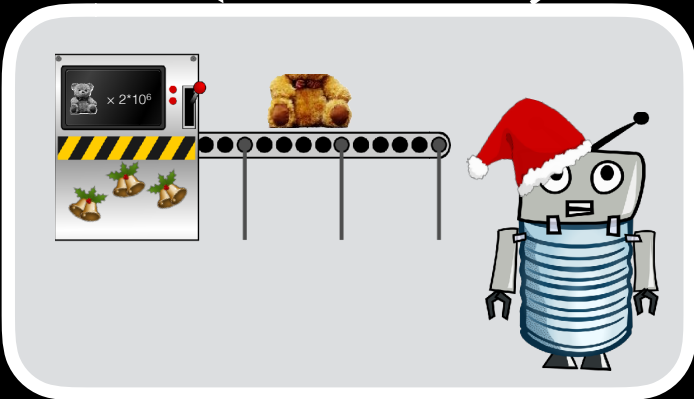


assemble!

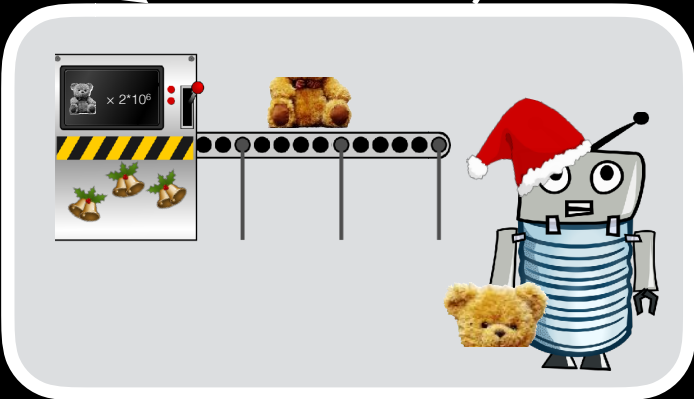




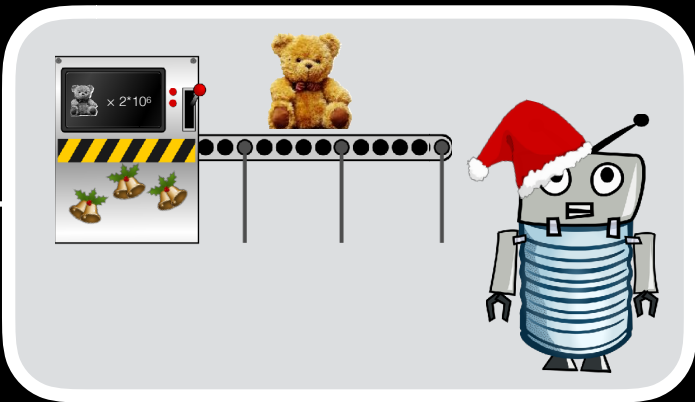
produce!



grab!

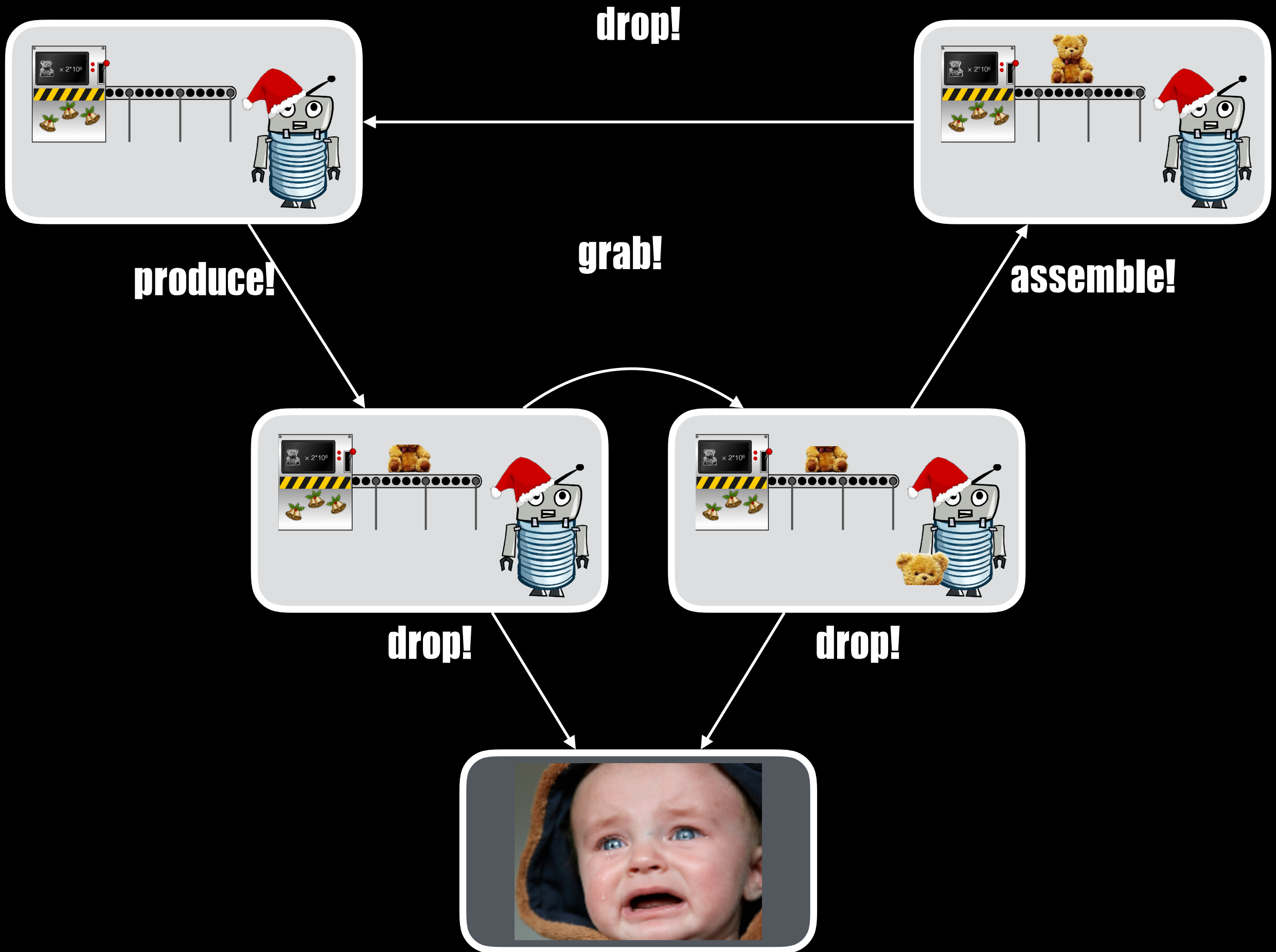


assemble!



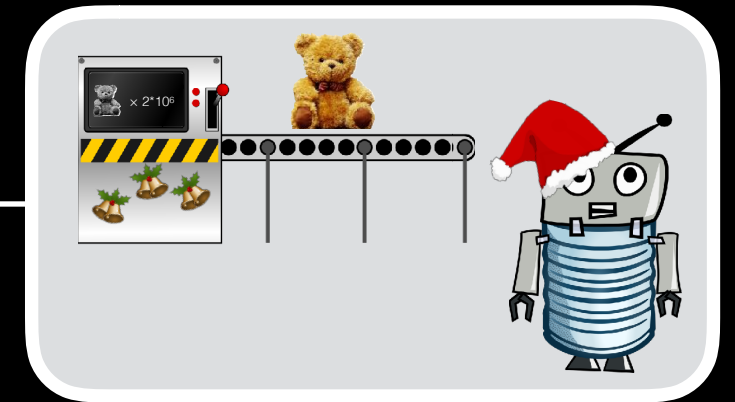
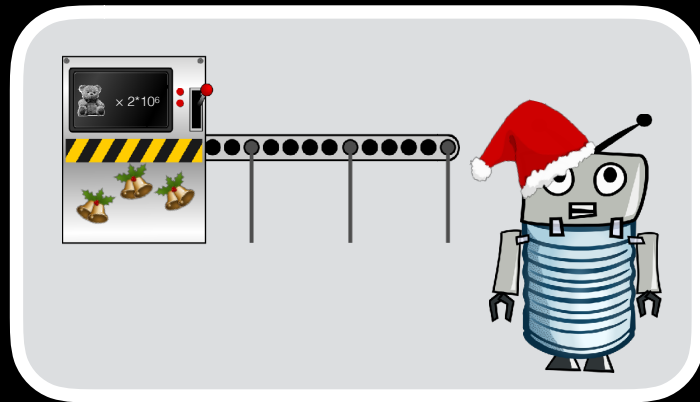
drop!





drop!
 $\text{line} = 8$

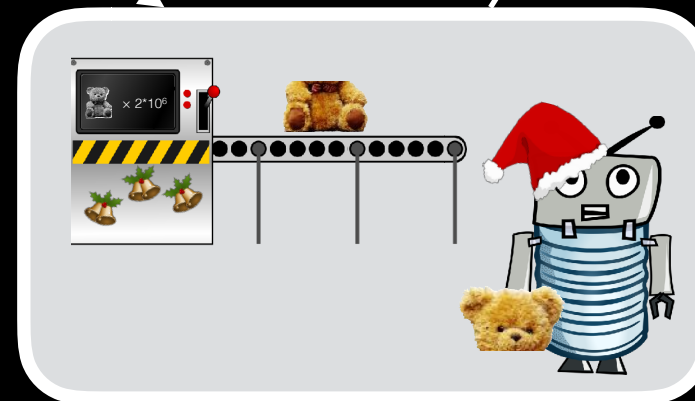
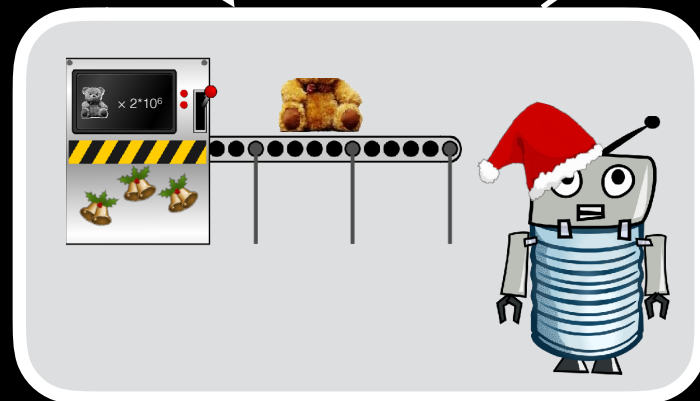
$\text{line} \leq 8$



produce!

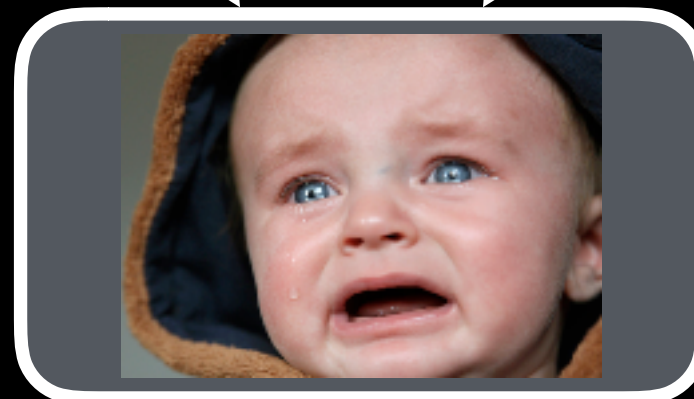
grab!

assemble!



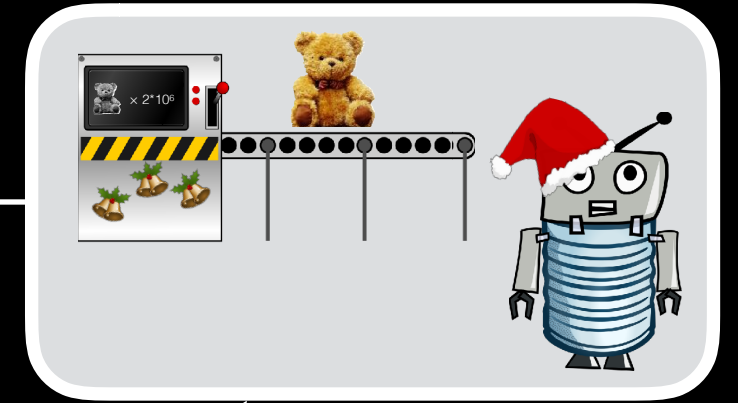
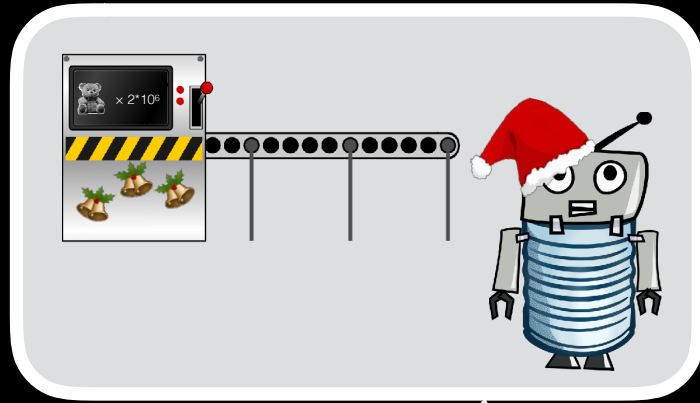
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$



drop!
 $\text{line} = 8$

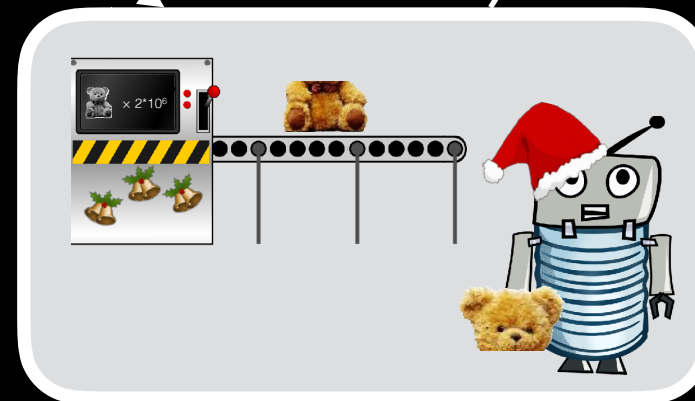
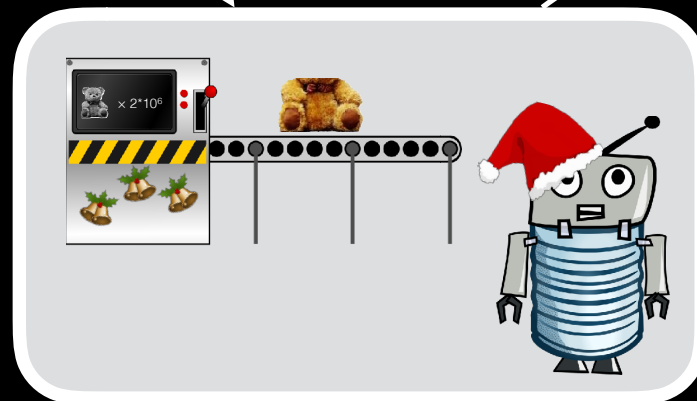
$\text{line} \leq 8$



produce!

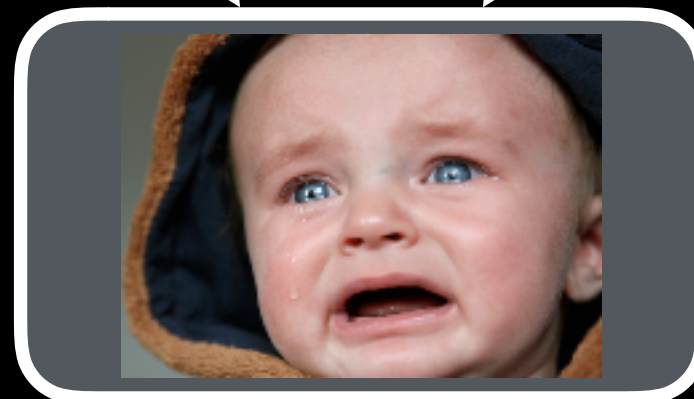
grab!
 $\text{bot} \geq 2$

assemble!



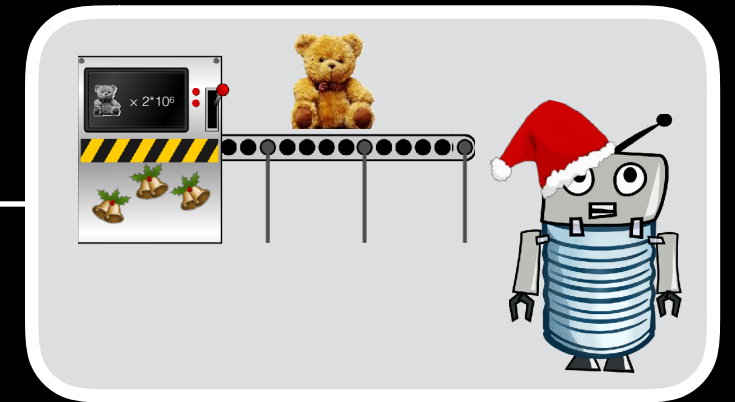
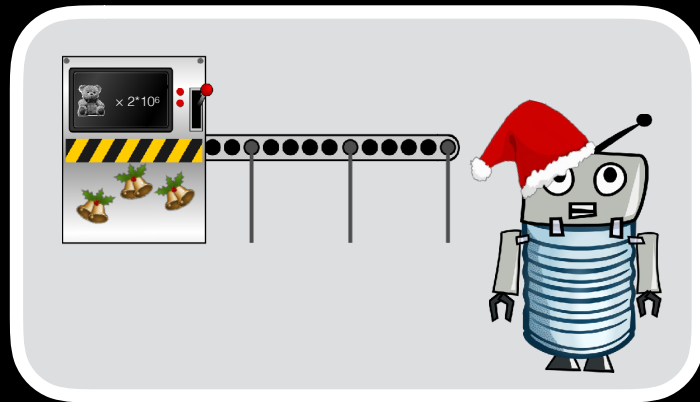
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$



drop!
 $\text{line} = 8$

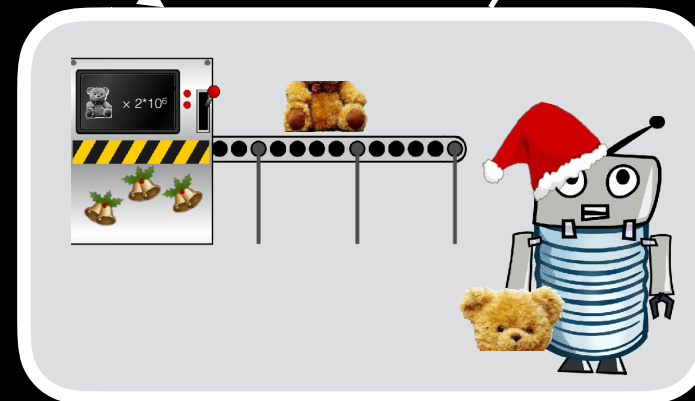
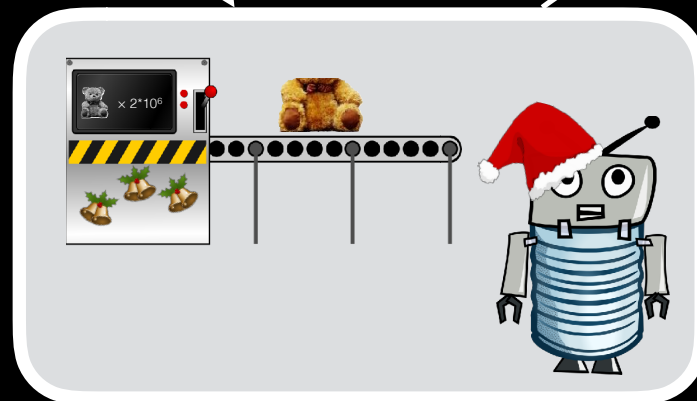
$\text{line} \leq 8$



produce!

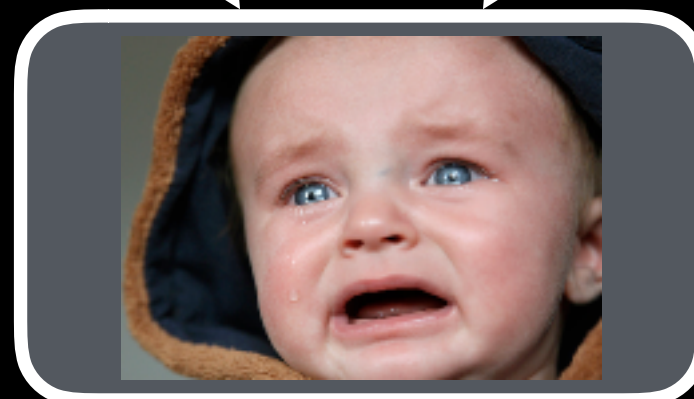
grab!
 $\text{bot} \geq 2$

assemble!
 $\text{bot} \geq 3$



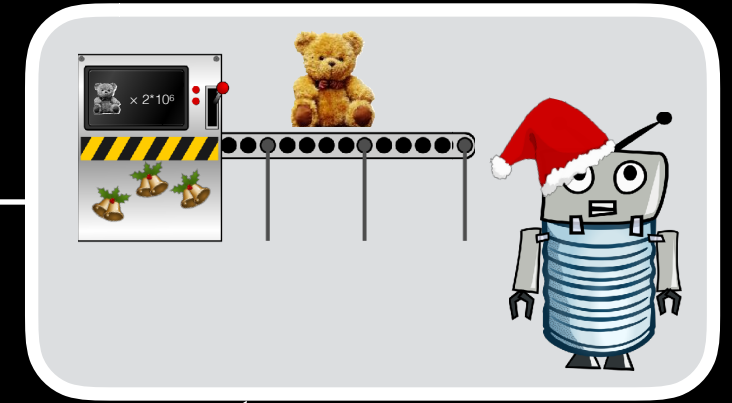
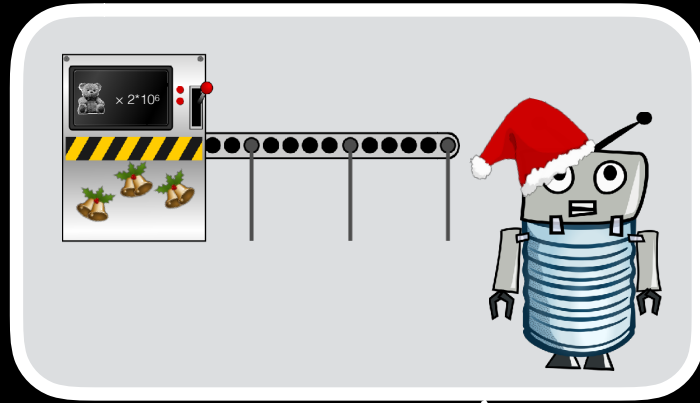
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$



drop!
 $\text{line} = 8$

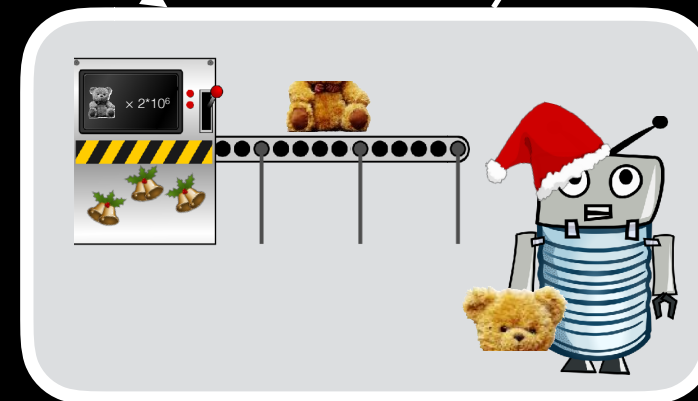
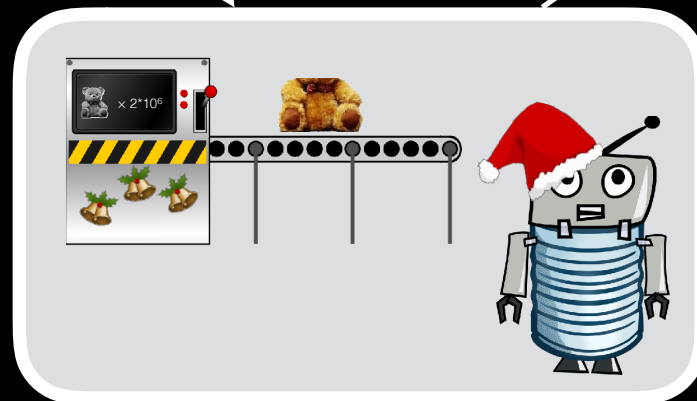
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

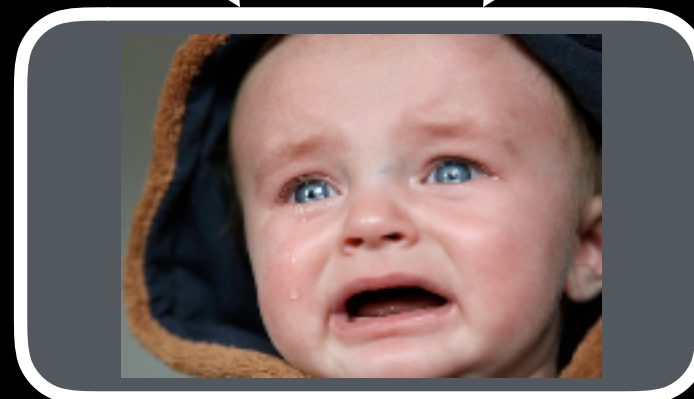
grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

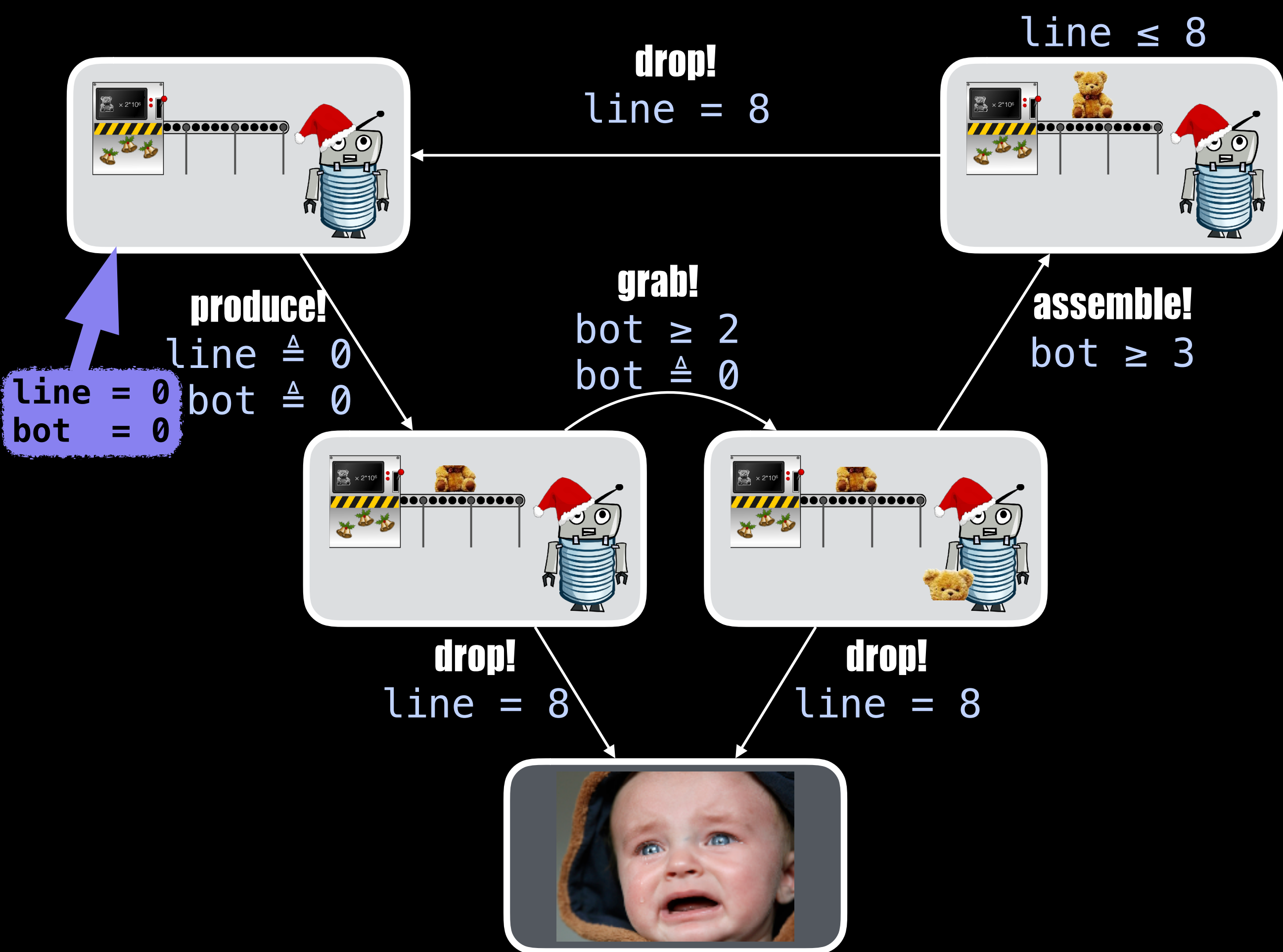
assemble!
 $\text{bot} \geq 3$

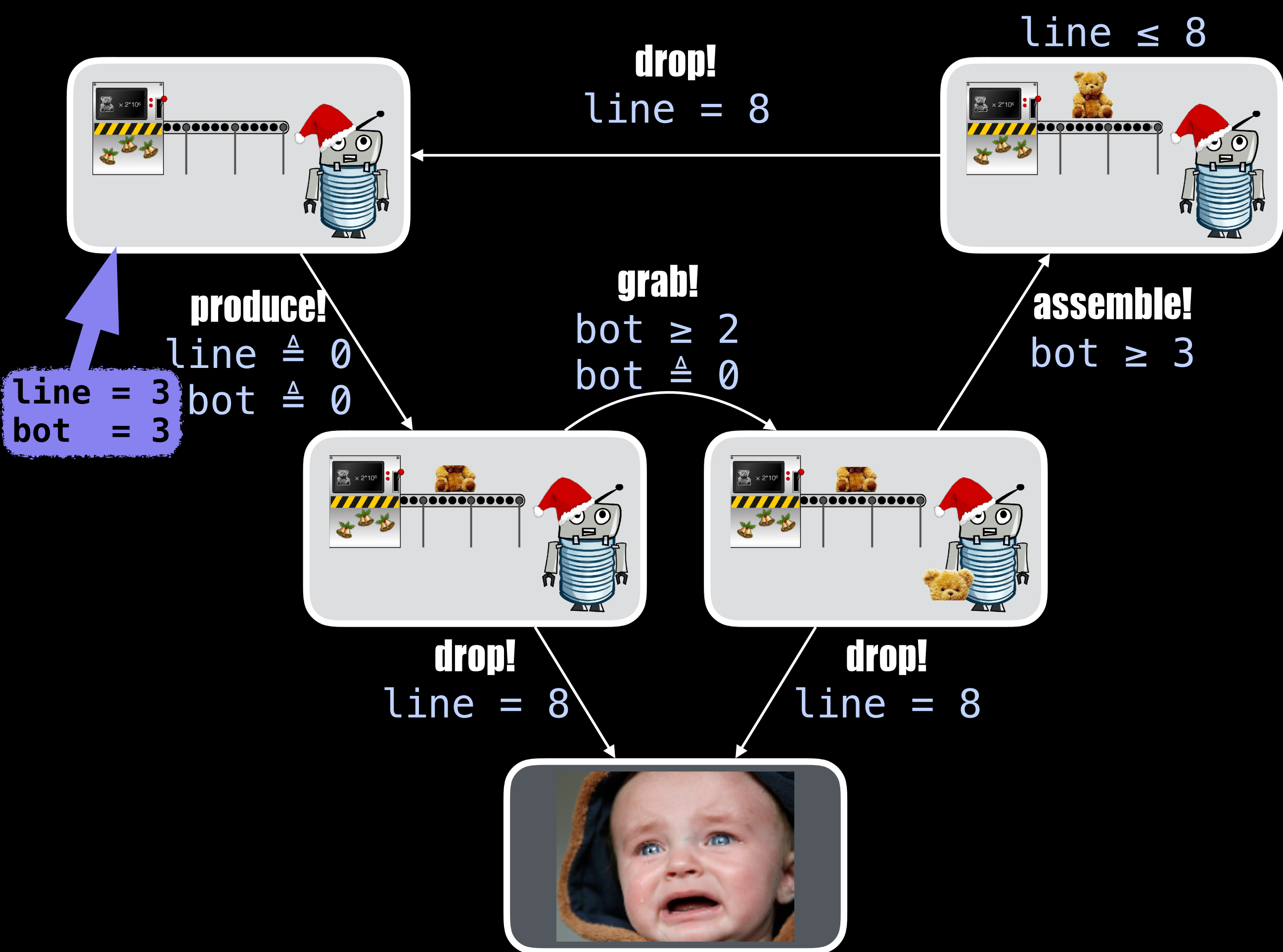


drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

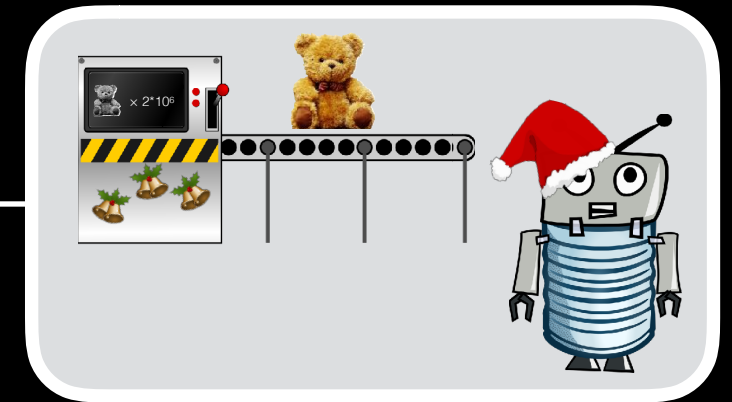
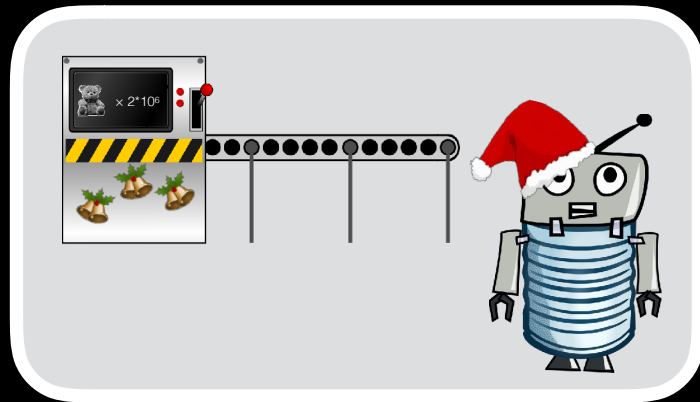






drop!
 $\text{line} = 8$

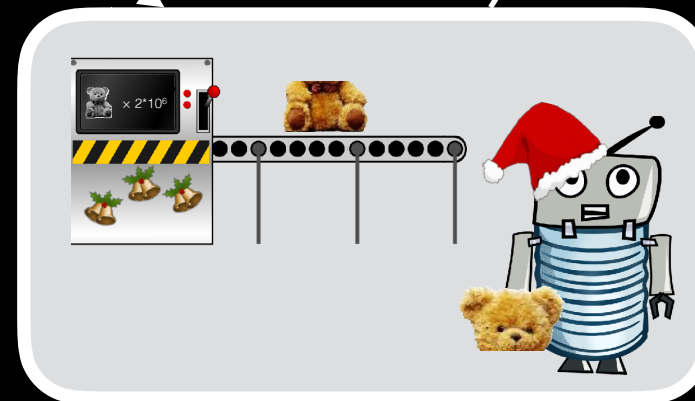
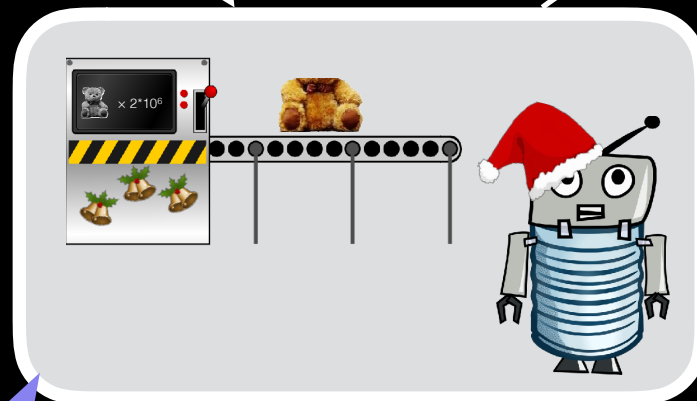
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

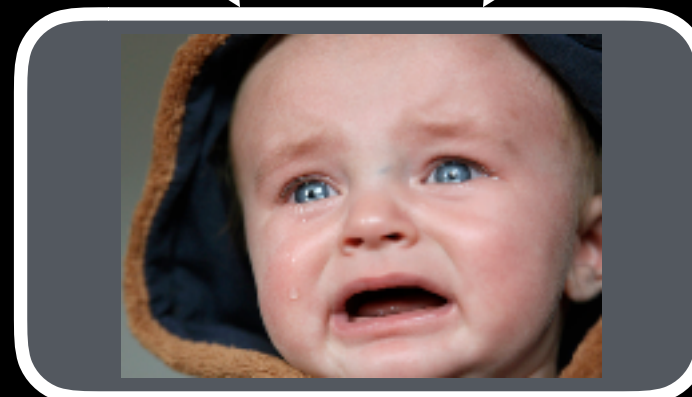
assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

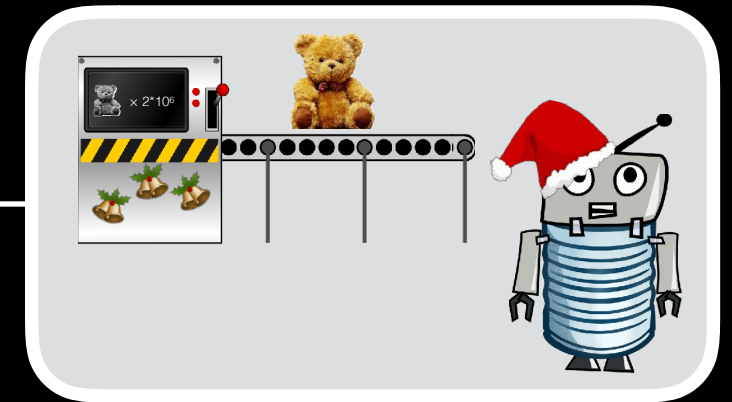
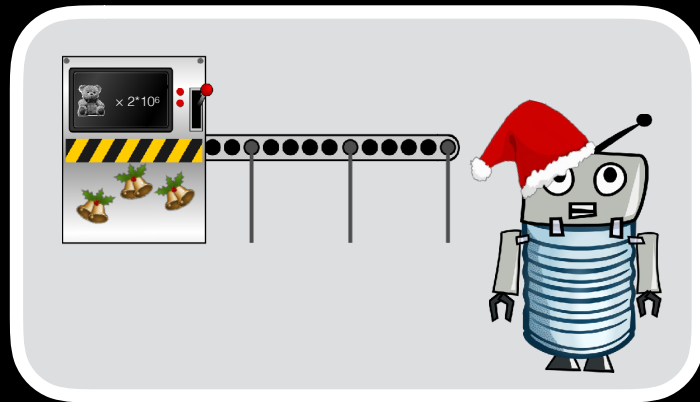
drop!
 $\text{line} = 8$

$\text{line} = 0$
 $\text{bot} = 0$



drop!
 $\text{line} = 8$

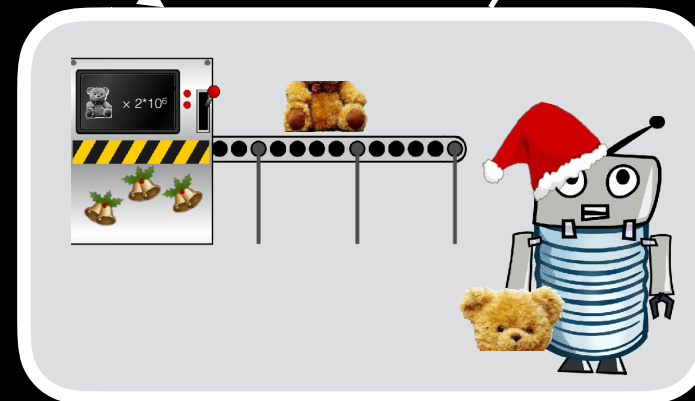
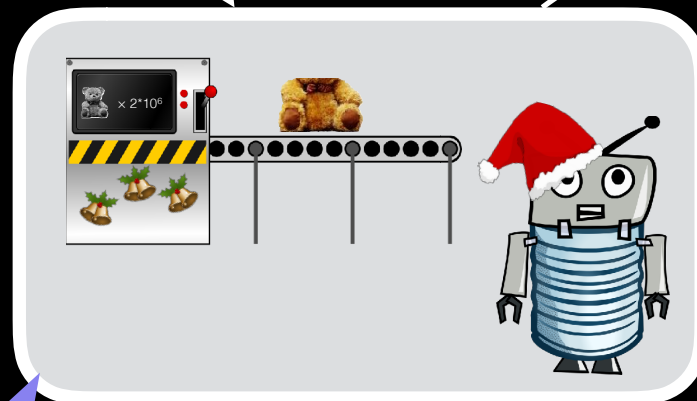
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

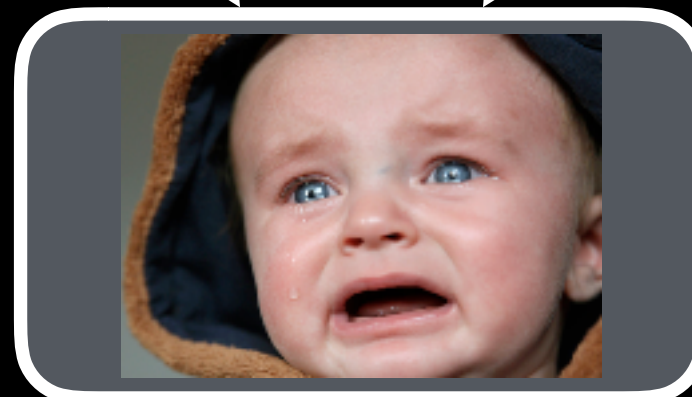
assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

$\text{line} = 2$
 $\text{bot} = 2$

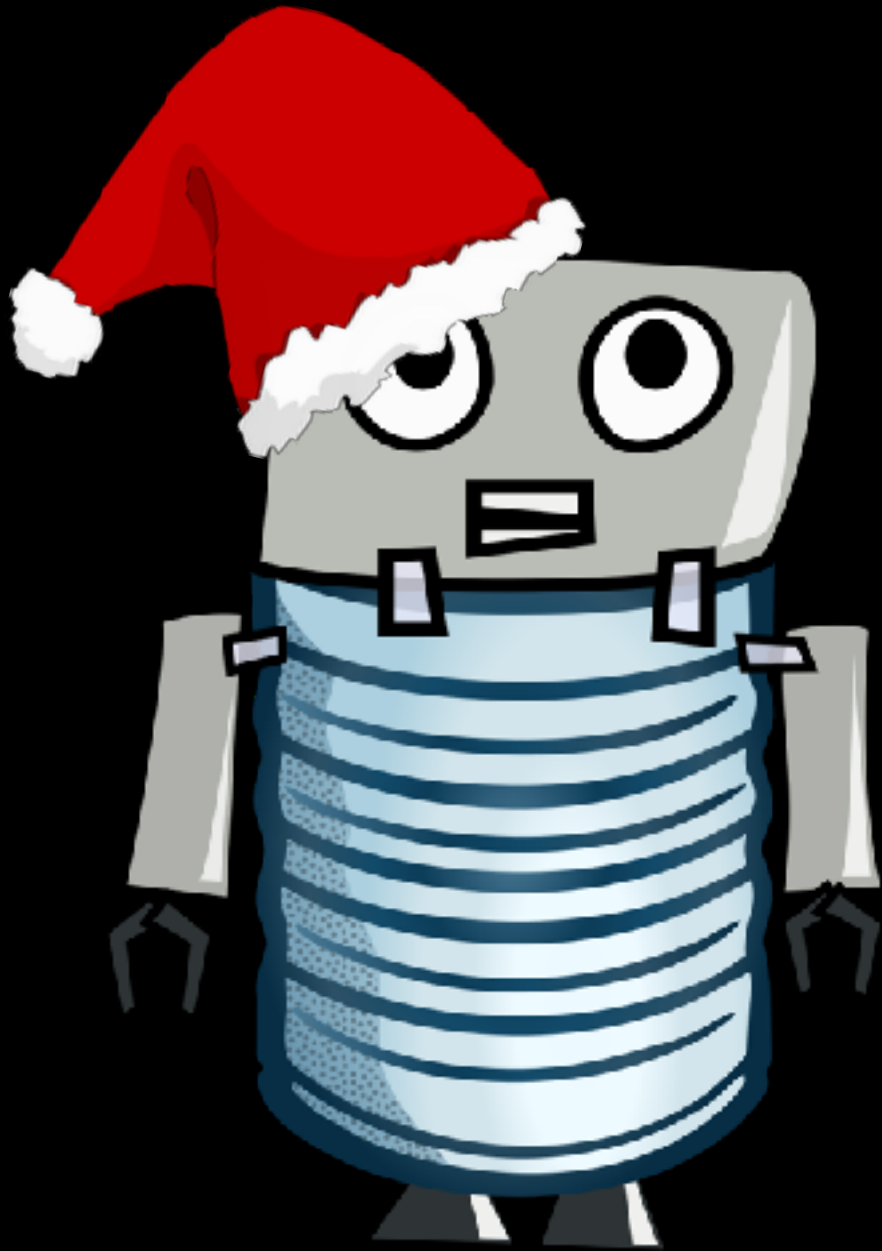


Spiele

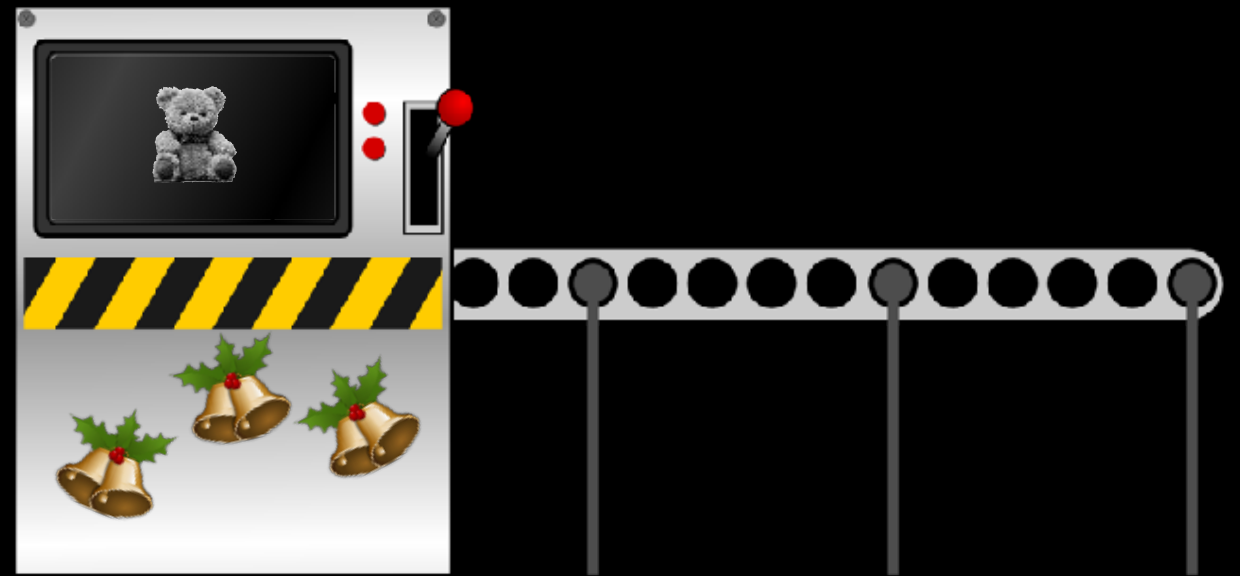


Weihnachtsmann vs Knecht Ruprecht

Spiele



Roboter

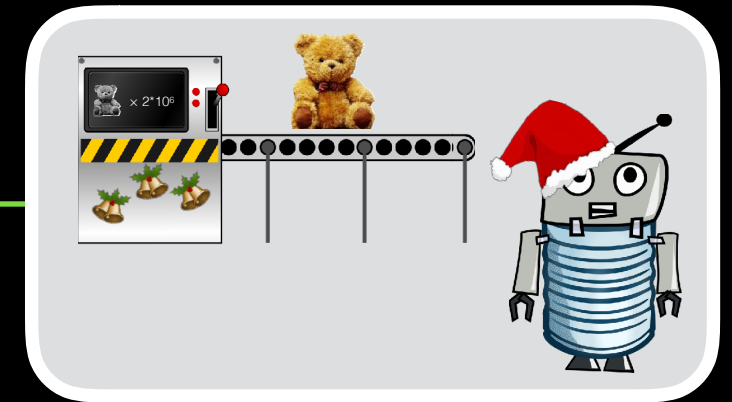
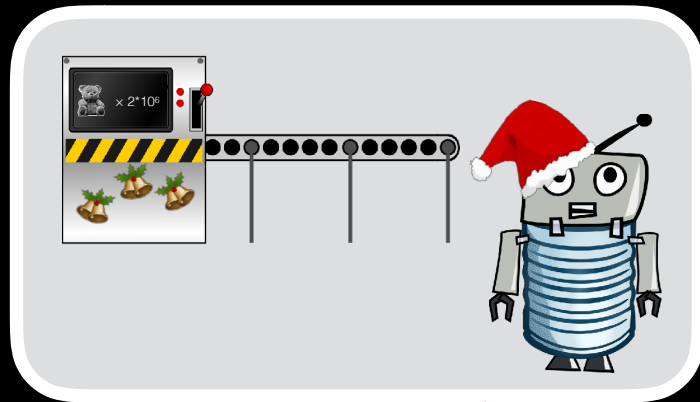


vs

Fließband

drop!
 $\text{line} = 8$

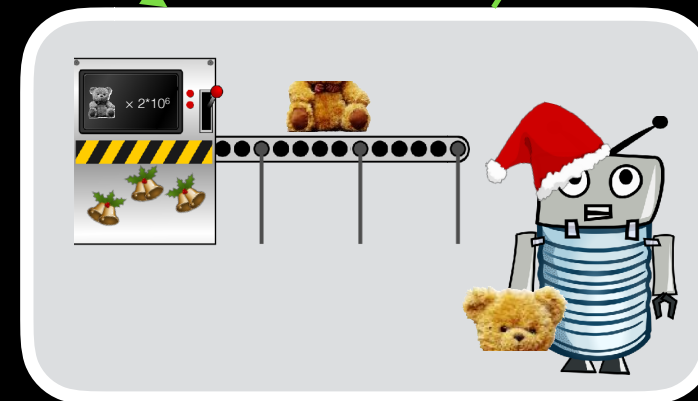
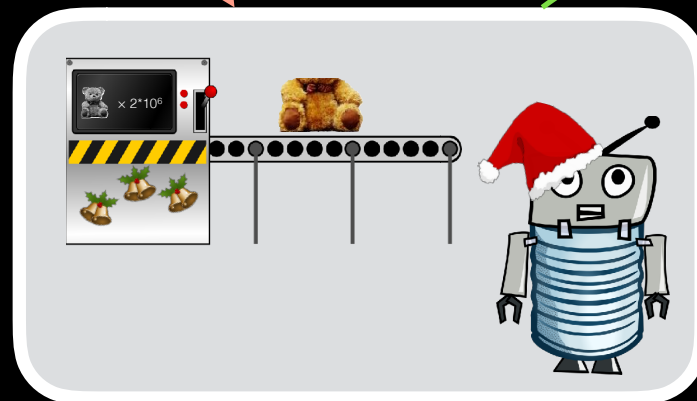
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

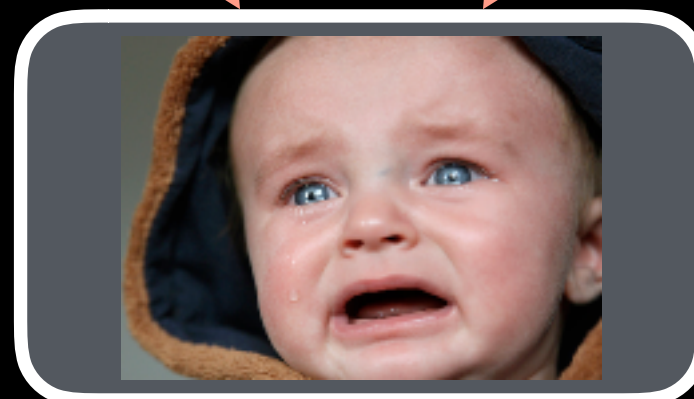
grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$



Gewinnbedingungen

Gewinnbedingungen

1) *Erreichbarkeit (Reachability)*

Erreiche einen Zustand!

Gewinnbedingungen

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Erreiche einen Zustand!

2) *Sicherheit (Safety)*

Vermeide einen Zustand!

Gewinnbedingungen

1) Erreichbarkeit (Reachability)

Erreiche einen Zustand!

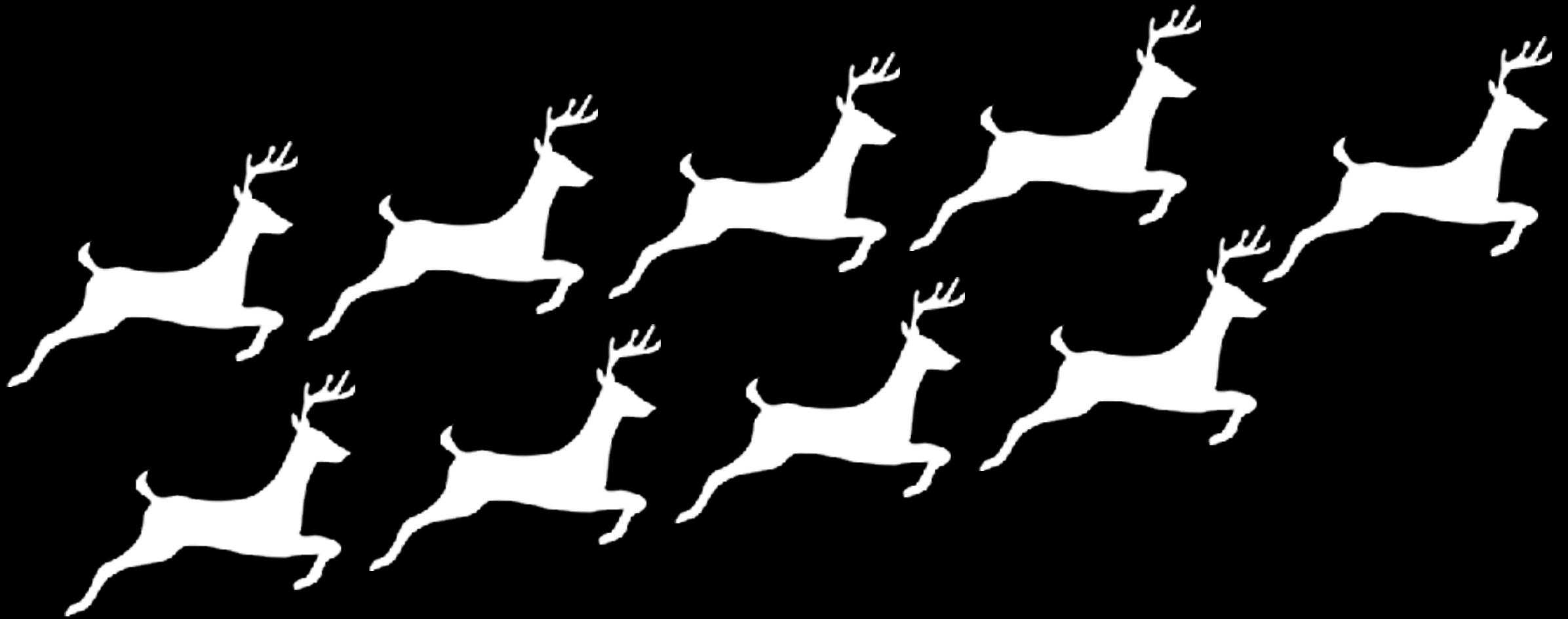
2) Sicherheit (Safety)

Vermeide einen Zustand!

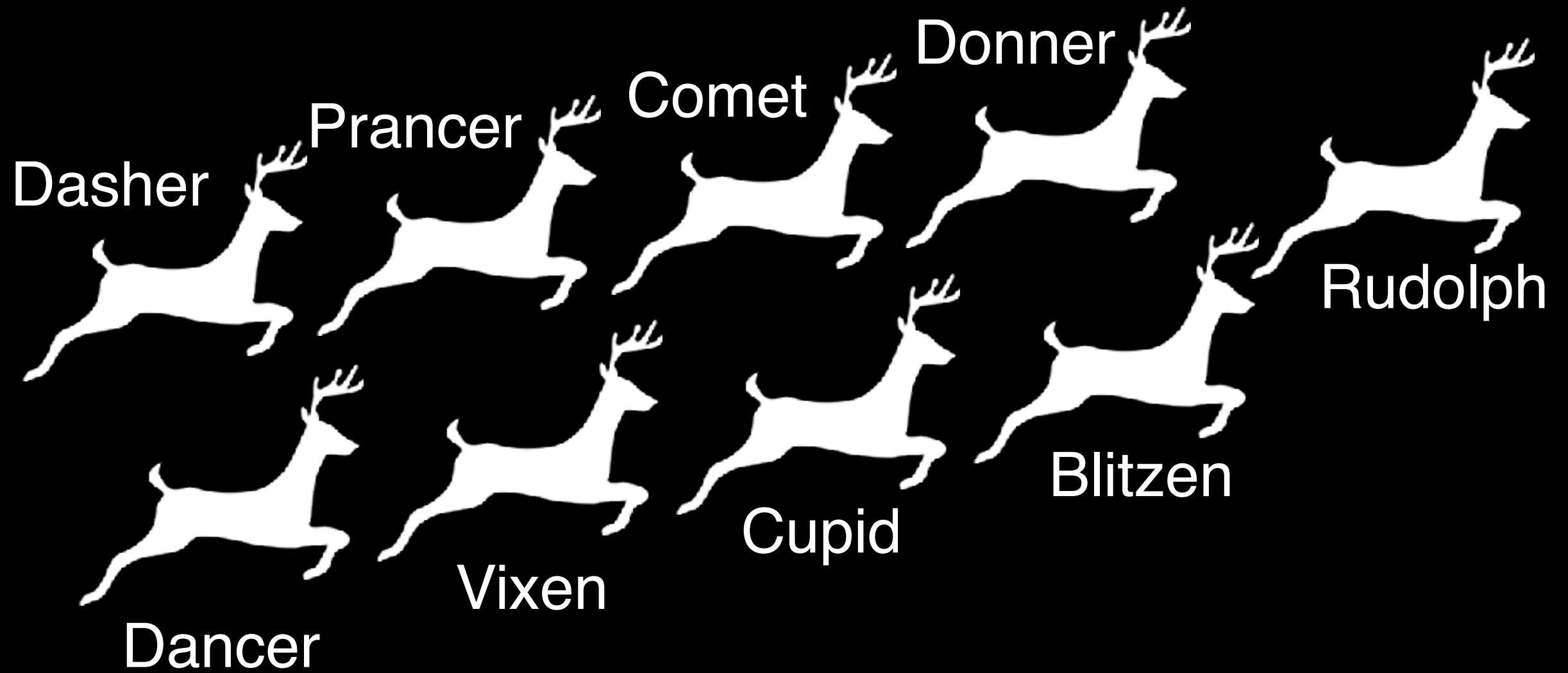
3) Parität (Parity)

Kleinste unendlich oft erreichte

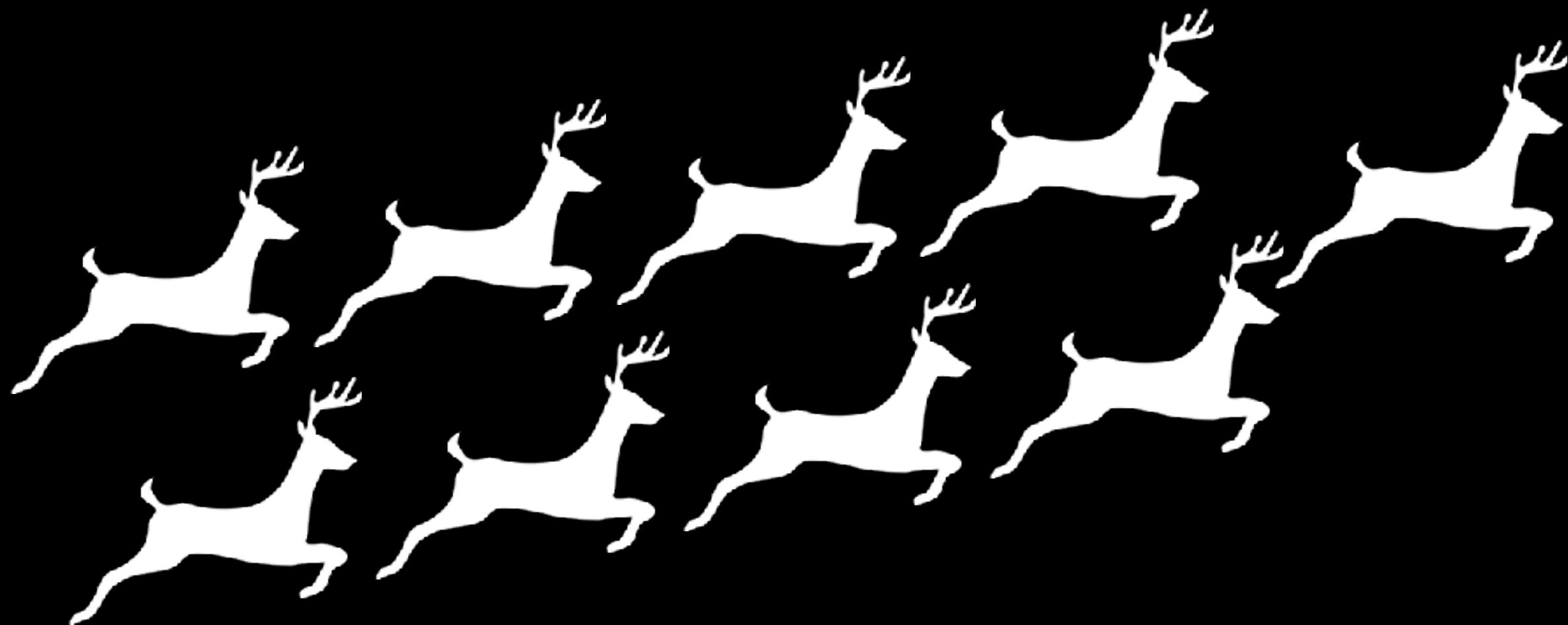
Farbe muss gerade sein!

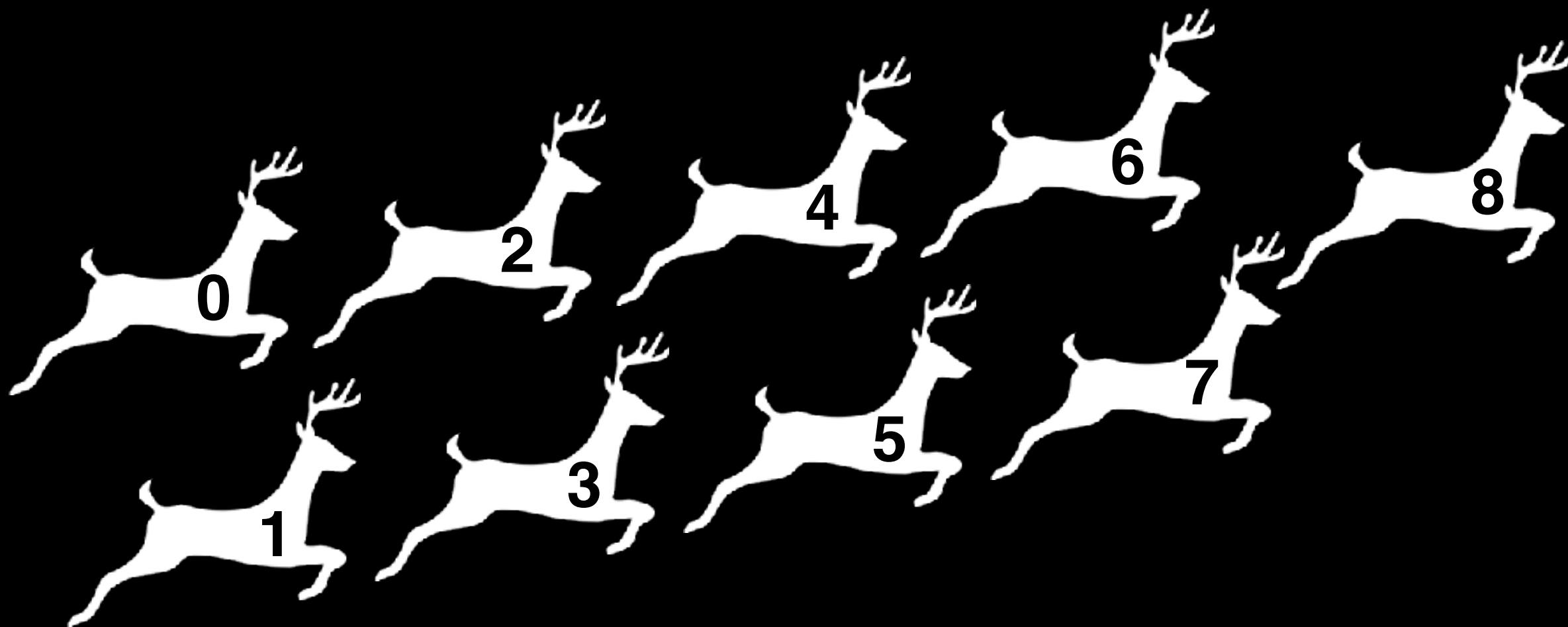


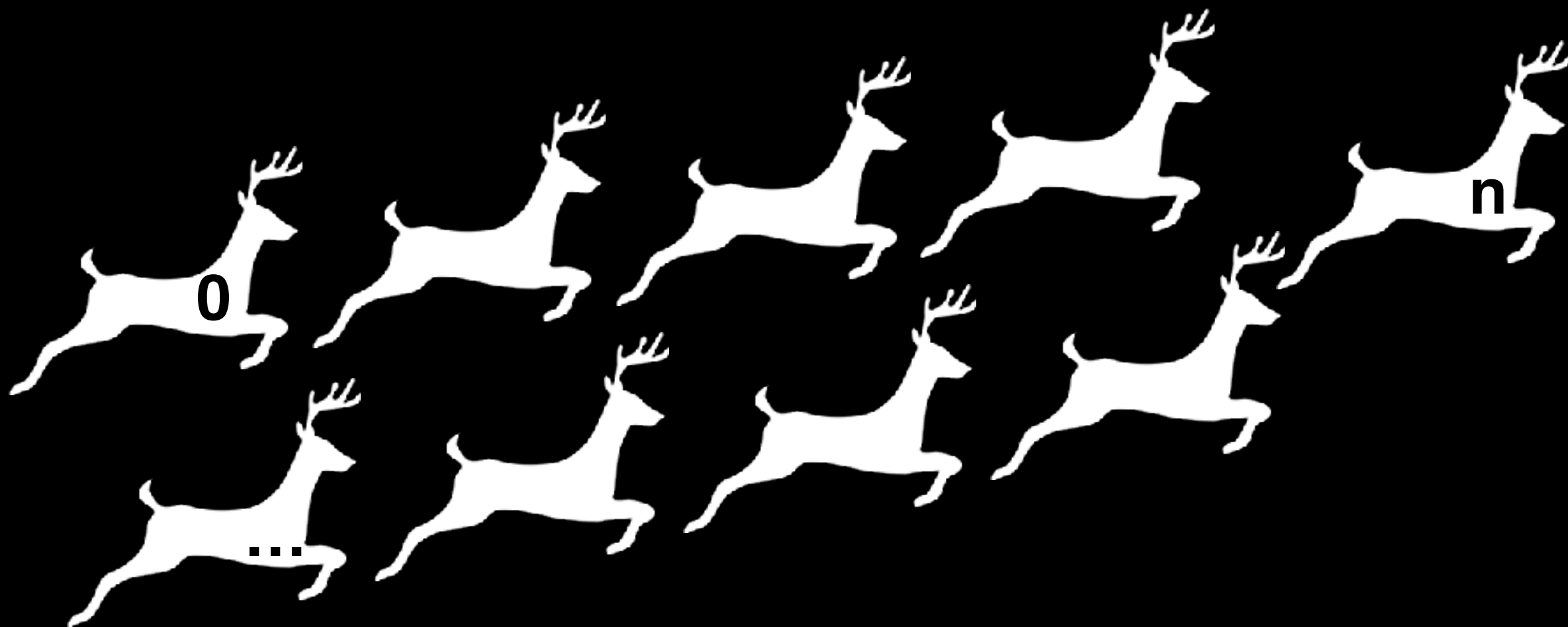
[Nach *The Night before Christmas* (Author unklar) und *Rudolph, the Red-Nosed Reindeer* (Johnny Marks)]



[Nach *The Night before Christmas* (Author unklar) und *Rudolph, the Red-Nosed Reindeer* (Johnny Marks)]







Gewinnbedingungen

1) Erreichbarkeit (Reachability)

Erreiche einen Zustand!

2) Sicherheit (Safety)

Vermeide einen Zustand!

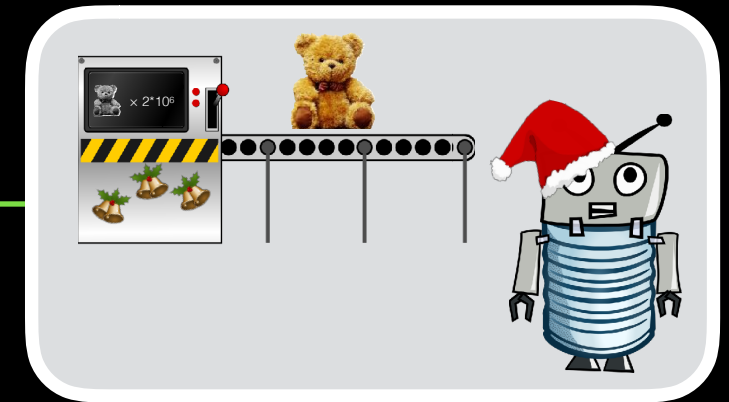
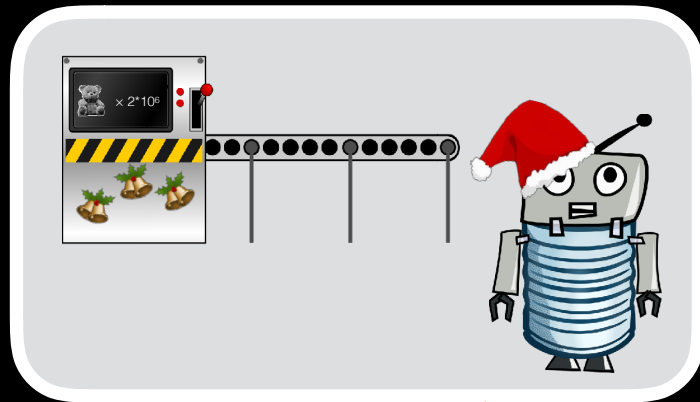
3) Parität (Parity)

Kleinste unendlich oft erreichte

Farbe muss gerade sein!

drop!
 $\text{line} = 8$

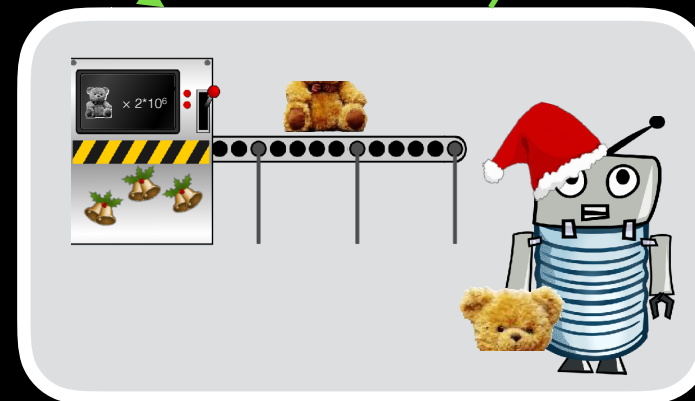
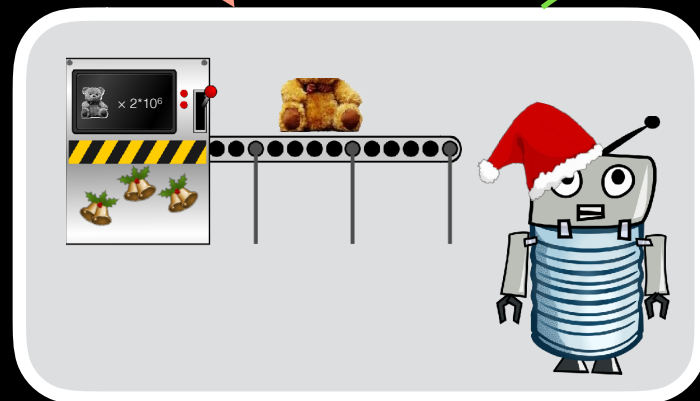
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

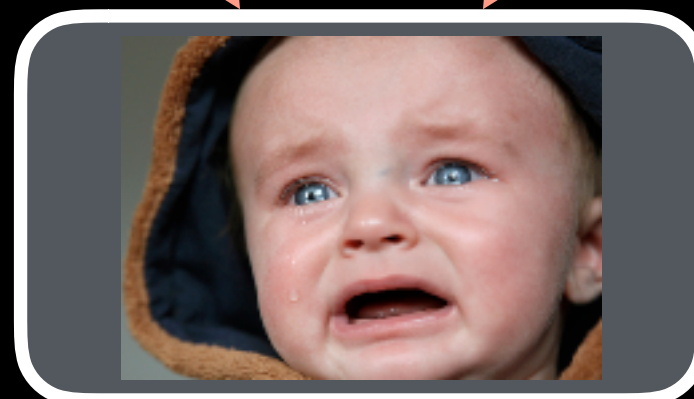
grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$



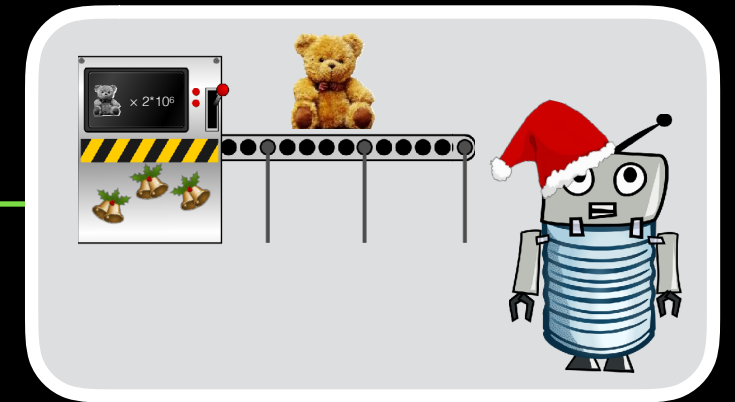
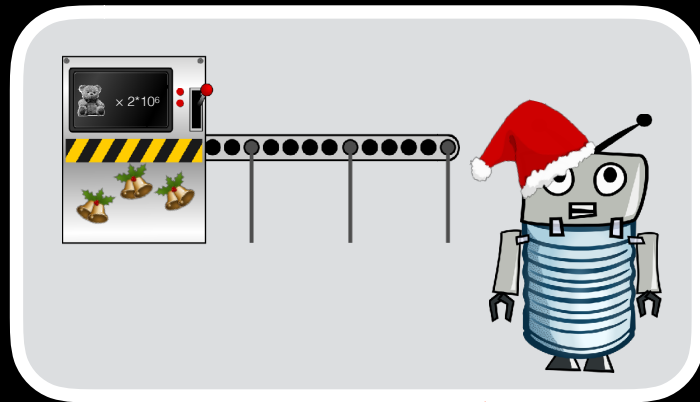
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$



drop!
 $\text{line} = 8$

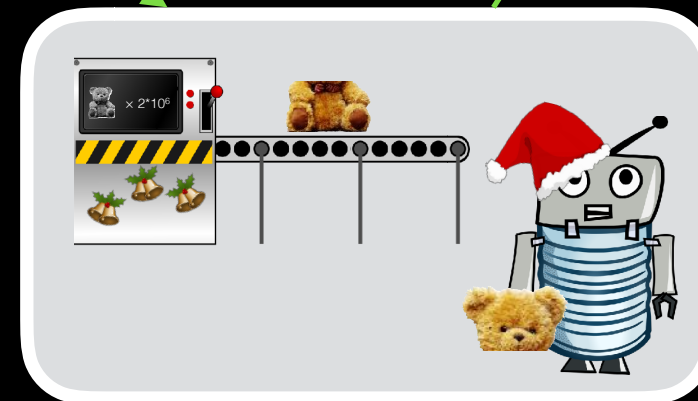
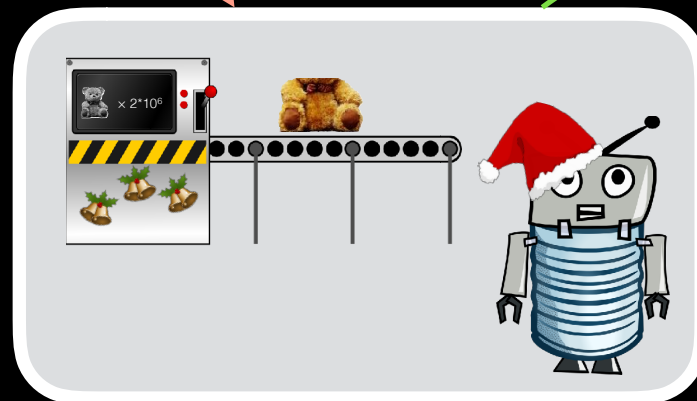
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

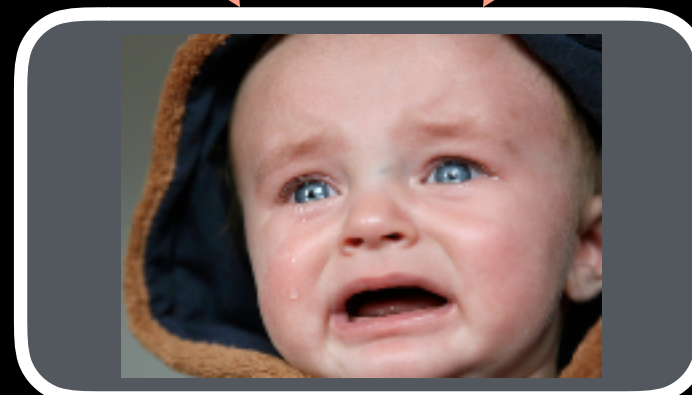
assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

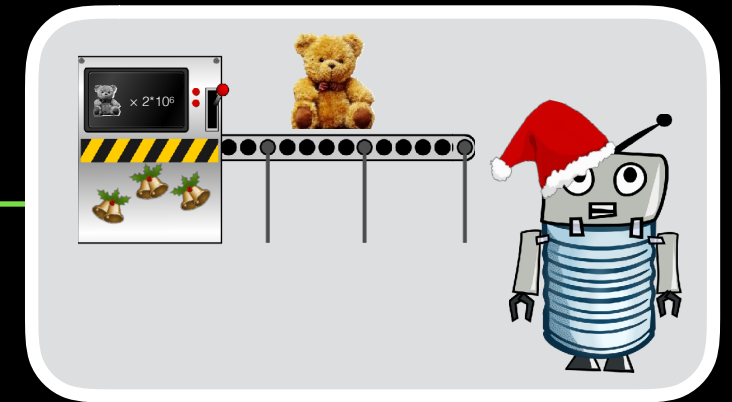
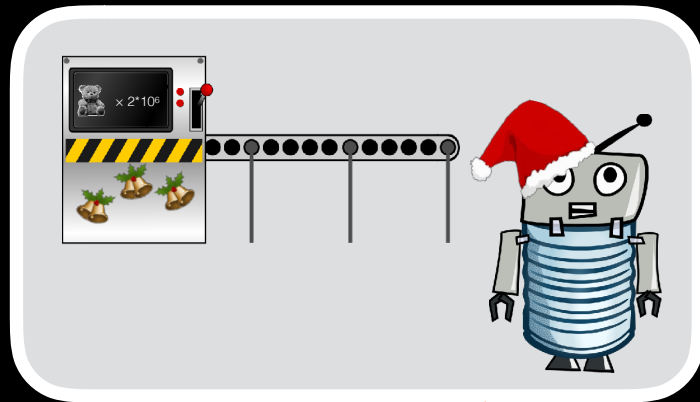
drop!
 $\text{line} = 8$

Erreichbarkeit
gegen
Sicherheit



drop!
 $\text{line} = 8$

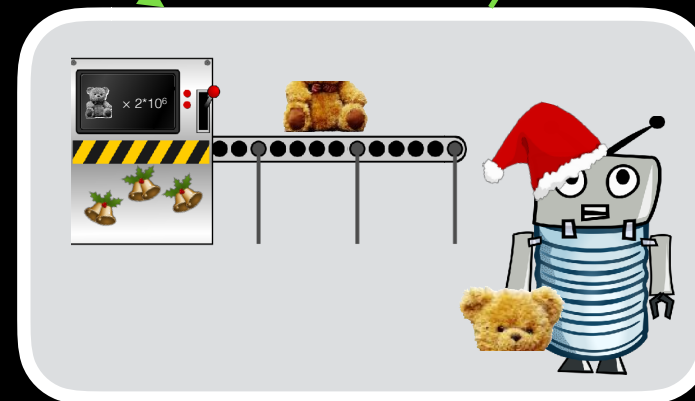
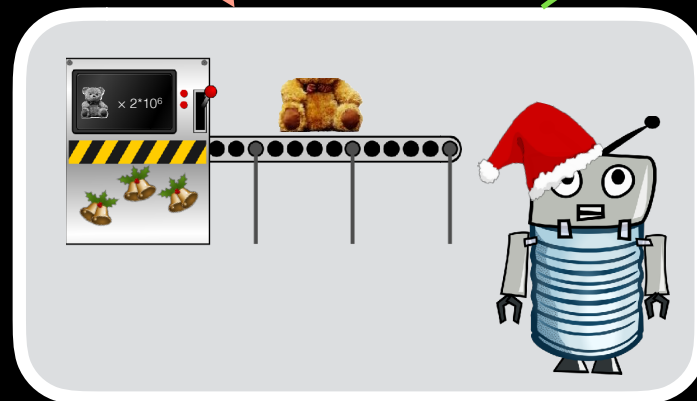
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

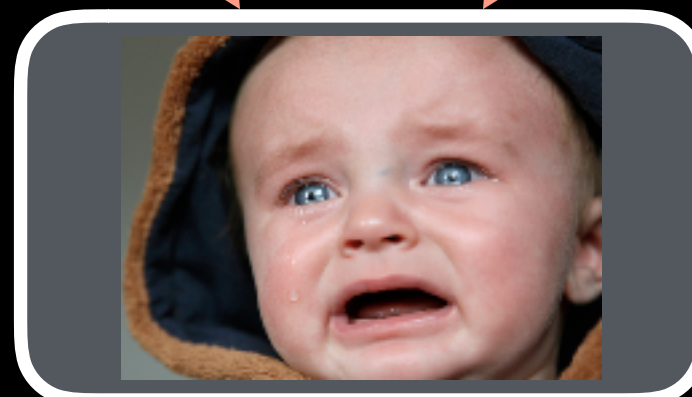
assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

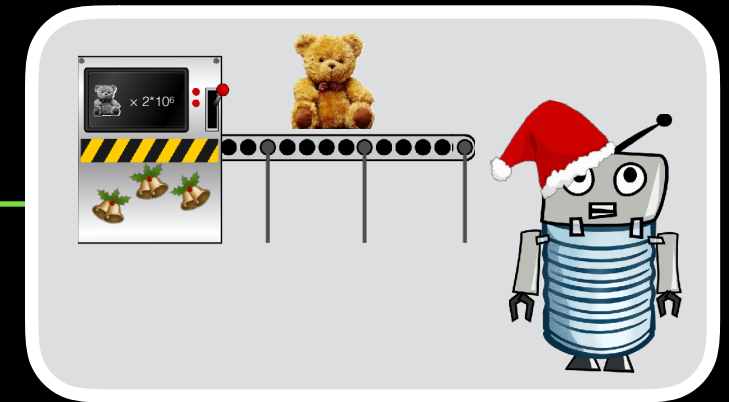
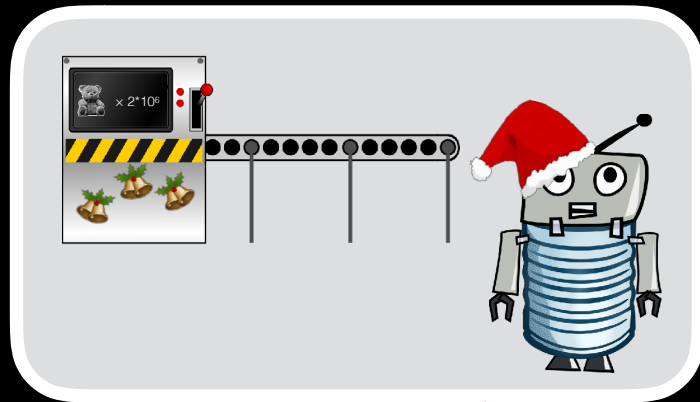
drop!
 $\text{line} = 8$

gewinnen
=
nicht verlieren



drop!
 $\text{line} = 8$

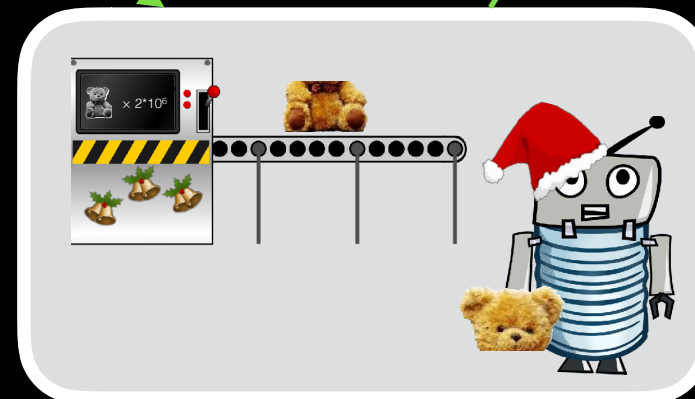
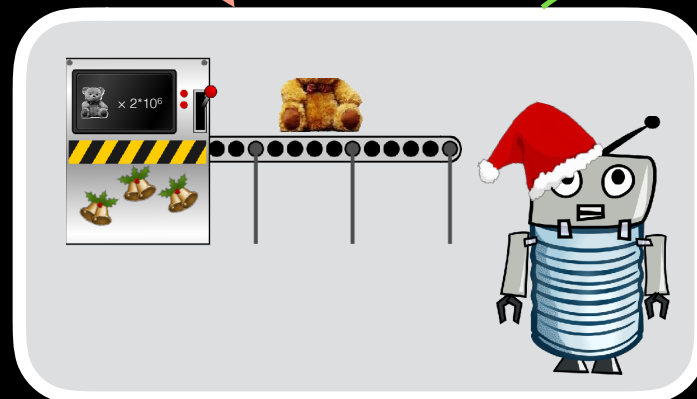
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$

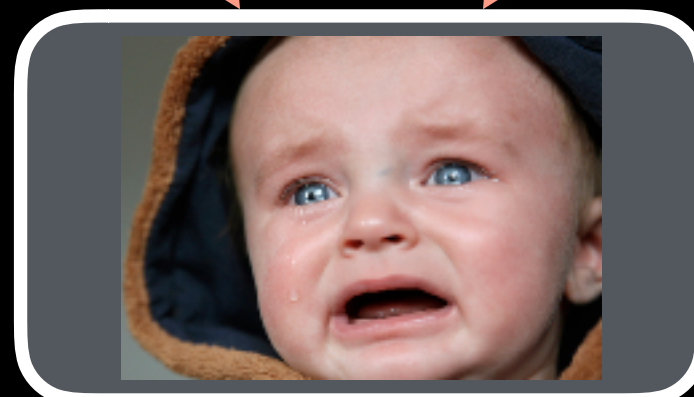


drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

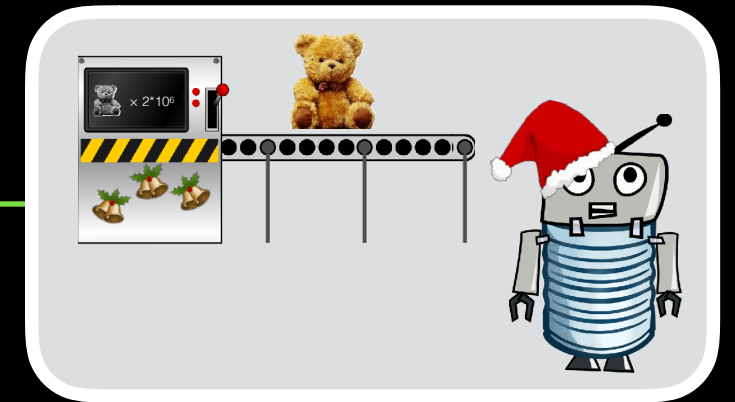
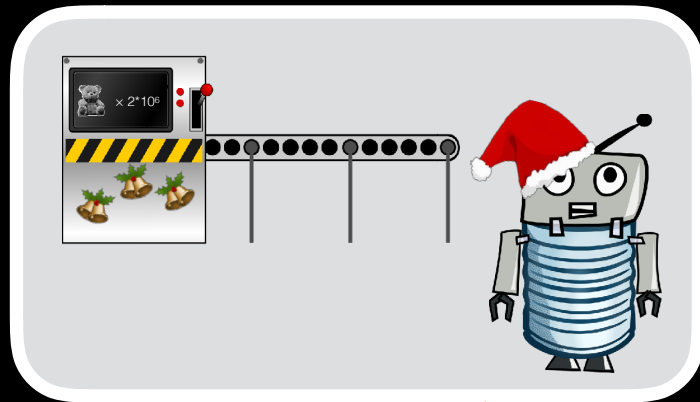
Strategie:

gewinnen
=
nicht verlieren



drop!
 $\text{line} = 8$

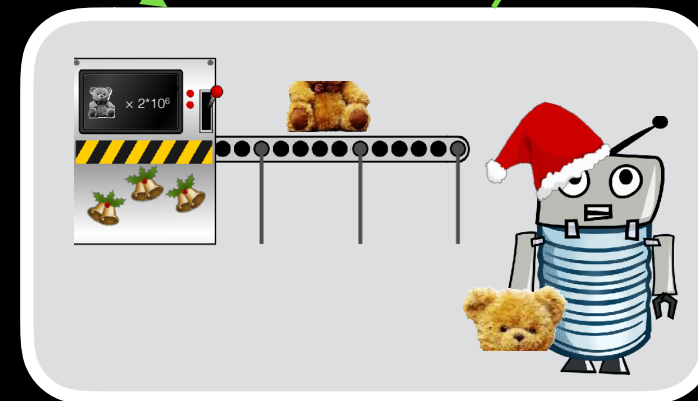
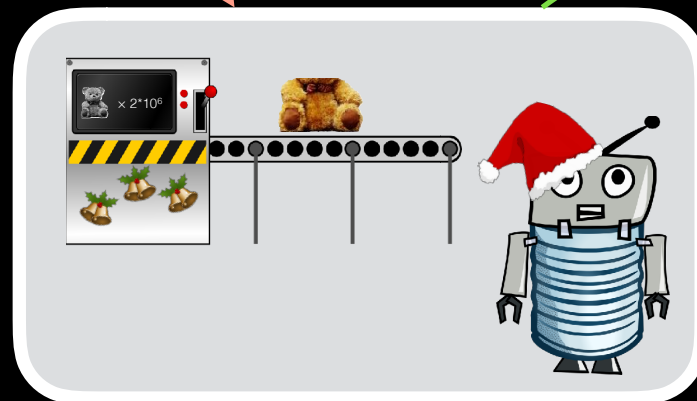
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$

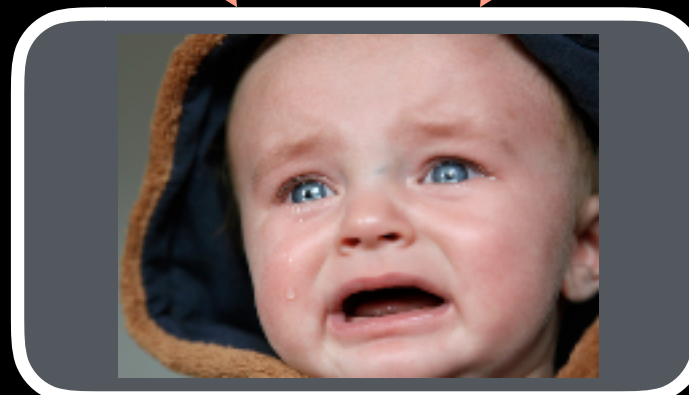


drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

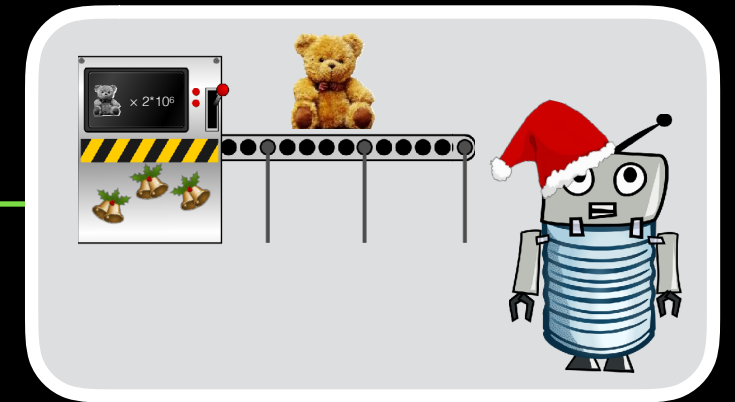
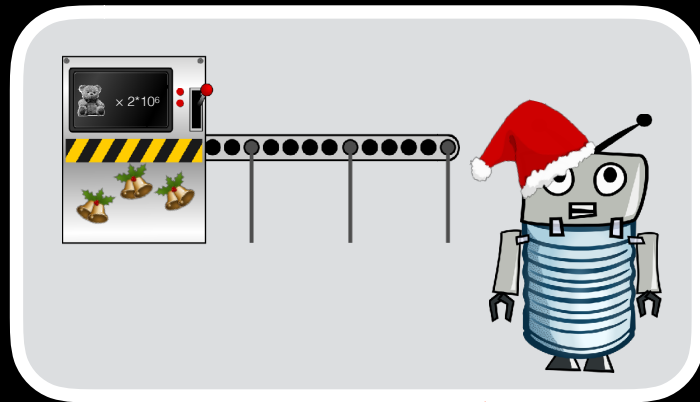
Strategie:
1) **assemble!**
vor
 $\text{line} = 8$

gewinnen
=
nicht verlieren



drop!
 $\text{line} = 8$

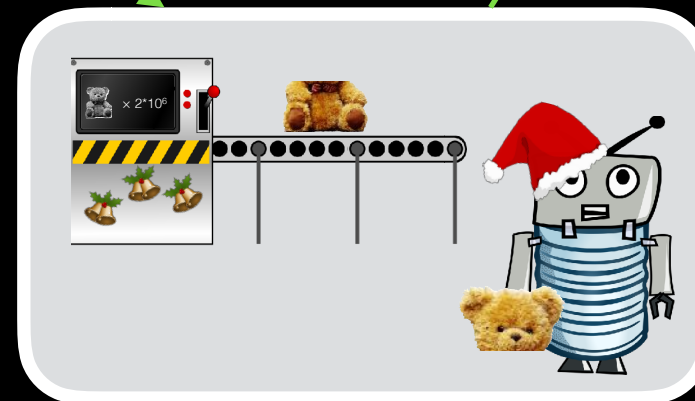
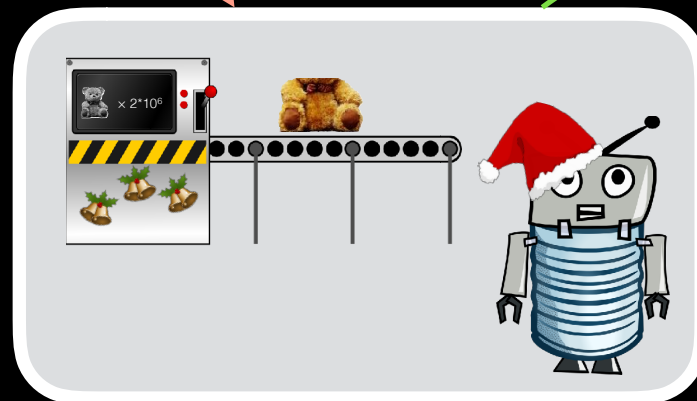
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$



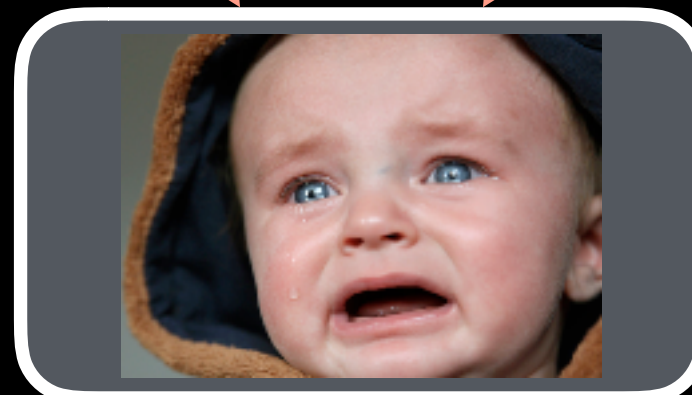
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

Strategie:

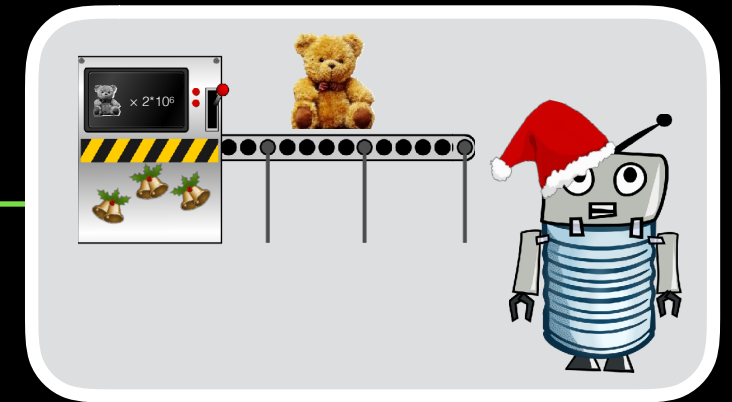
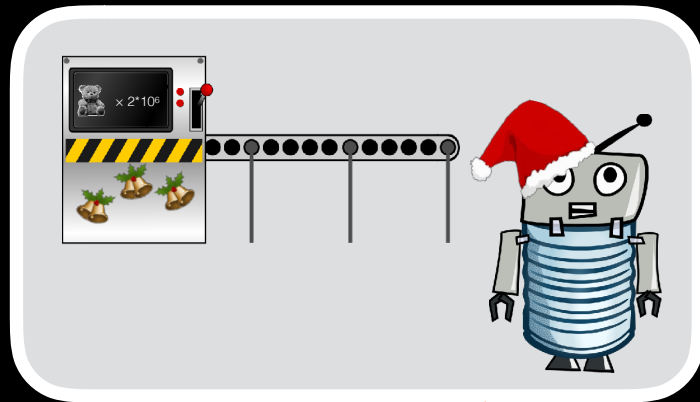
- 1) **assemble!**
vor
 $\text{line} = 8$
- 2) **grab!**
vor
 $\text{line} = 5$

gewinnen
=
nicht verlieren



drop!
 $\text{line} = 8$

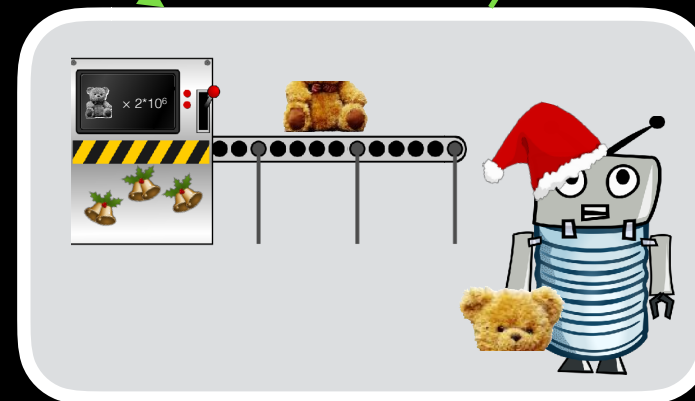
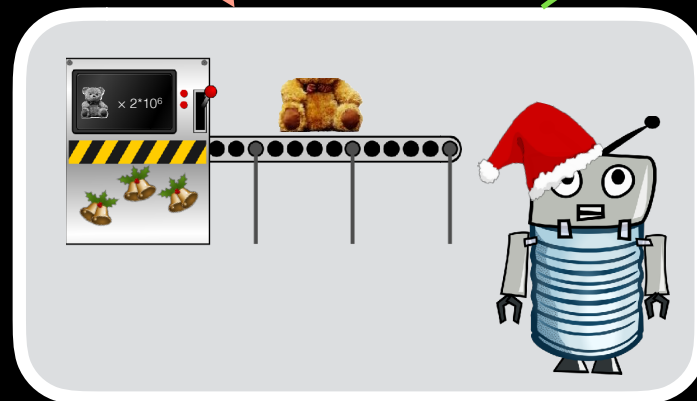
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$



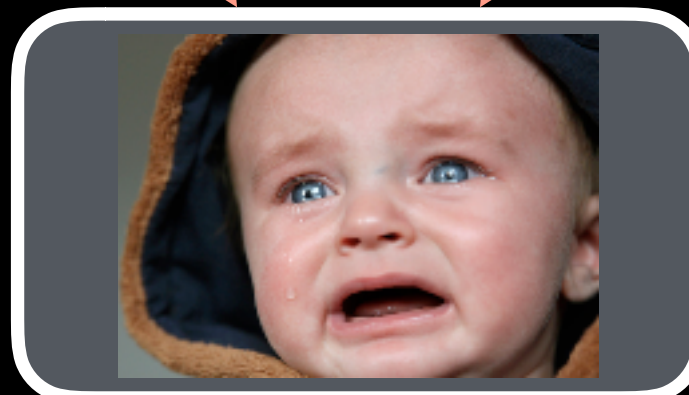
drop!
 $\text{line} = 8$

drop!
 $\text{line} = 8$

Strategie:

- 1) **assemble!**
vor
 $\text{line} = 8$
- 2) **grab!**
vor
 $\text{line} = 5$
- 3) **drop!**
wenn
 $\text{line} = 8$

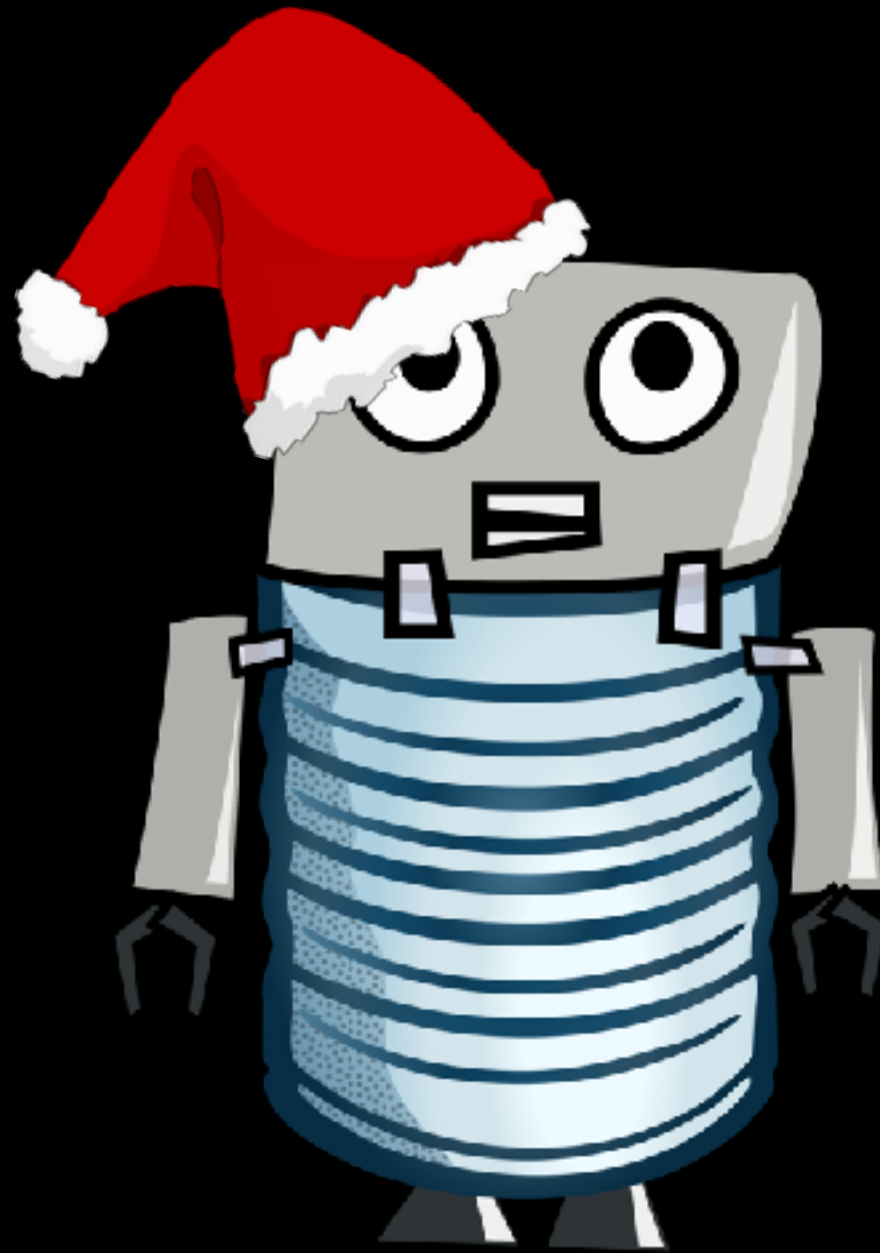
gewinnen
=
nicht verlieren



Easy Peasy!



Easy Peasy!

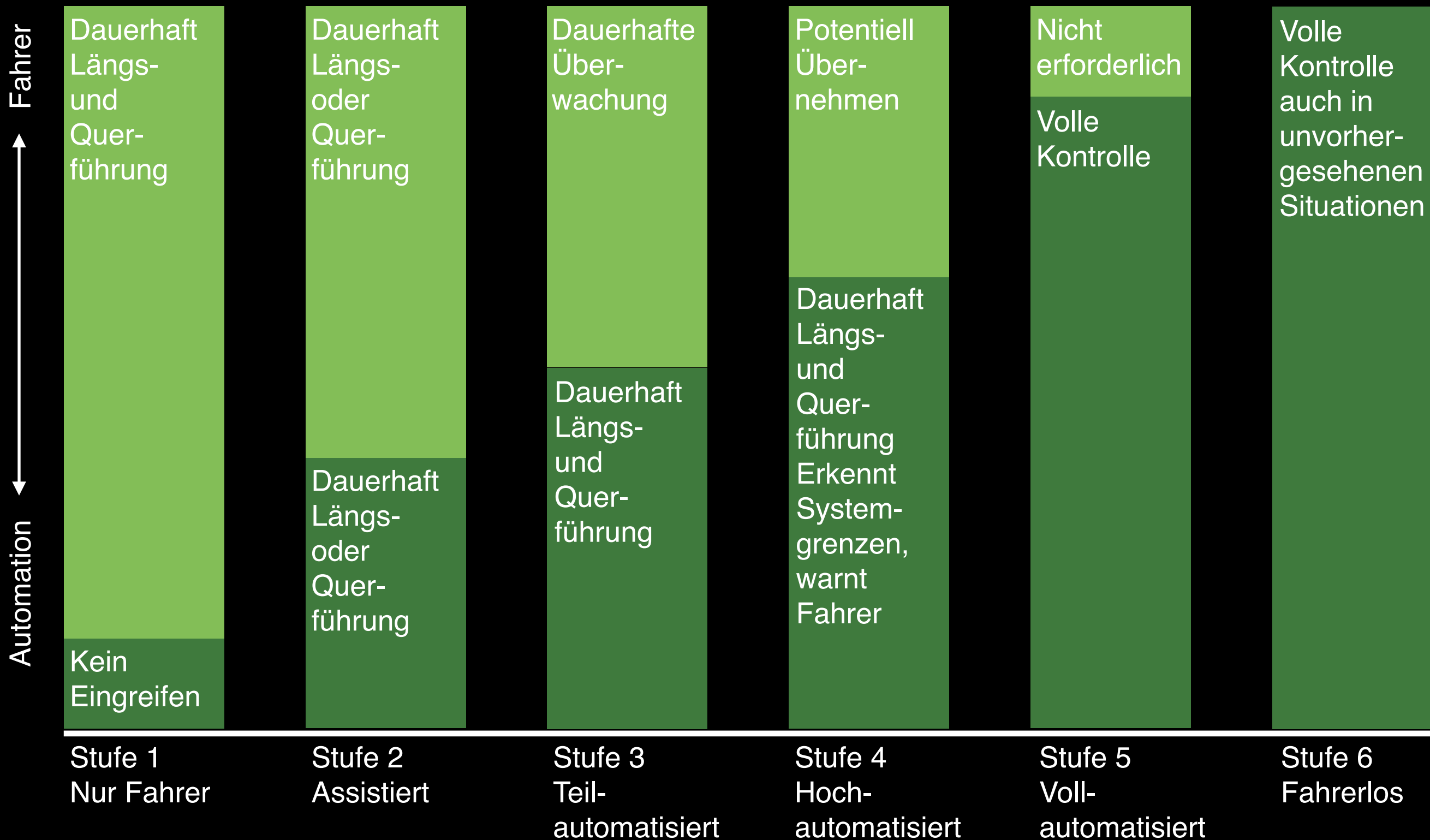


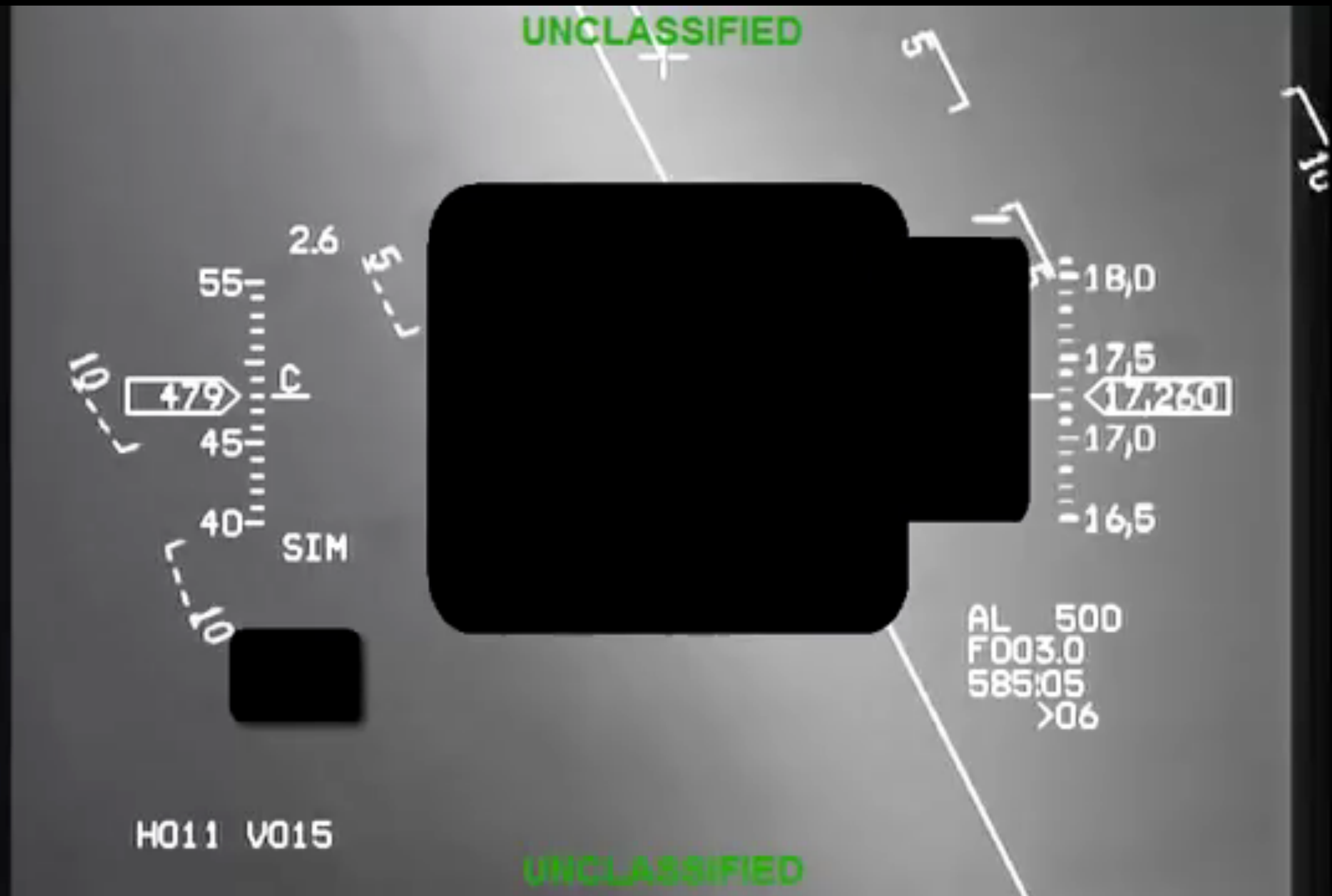




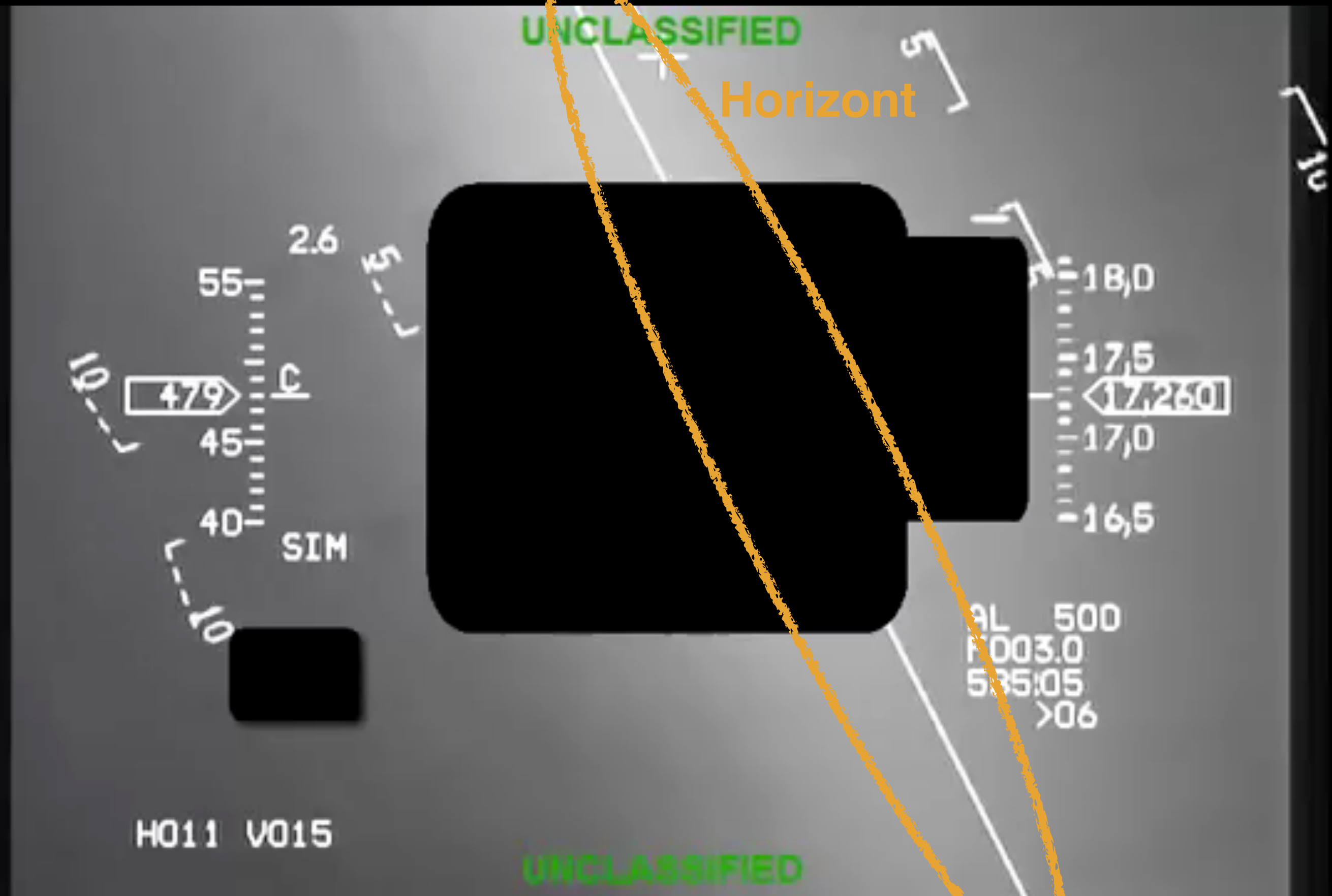




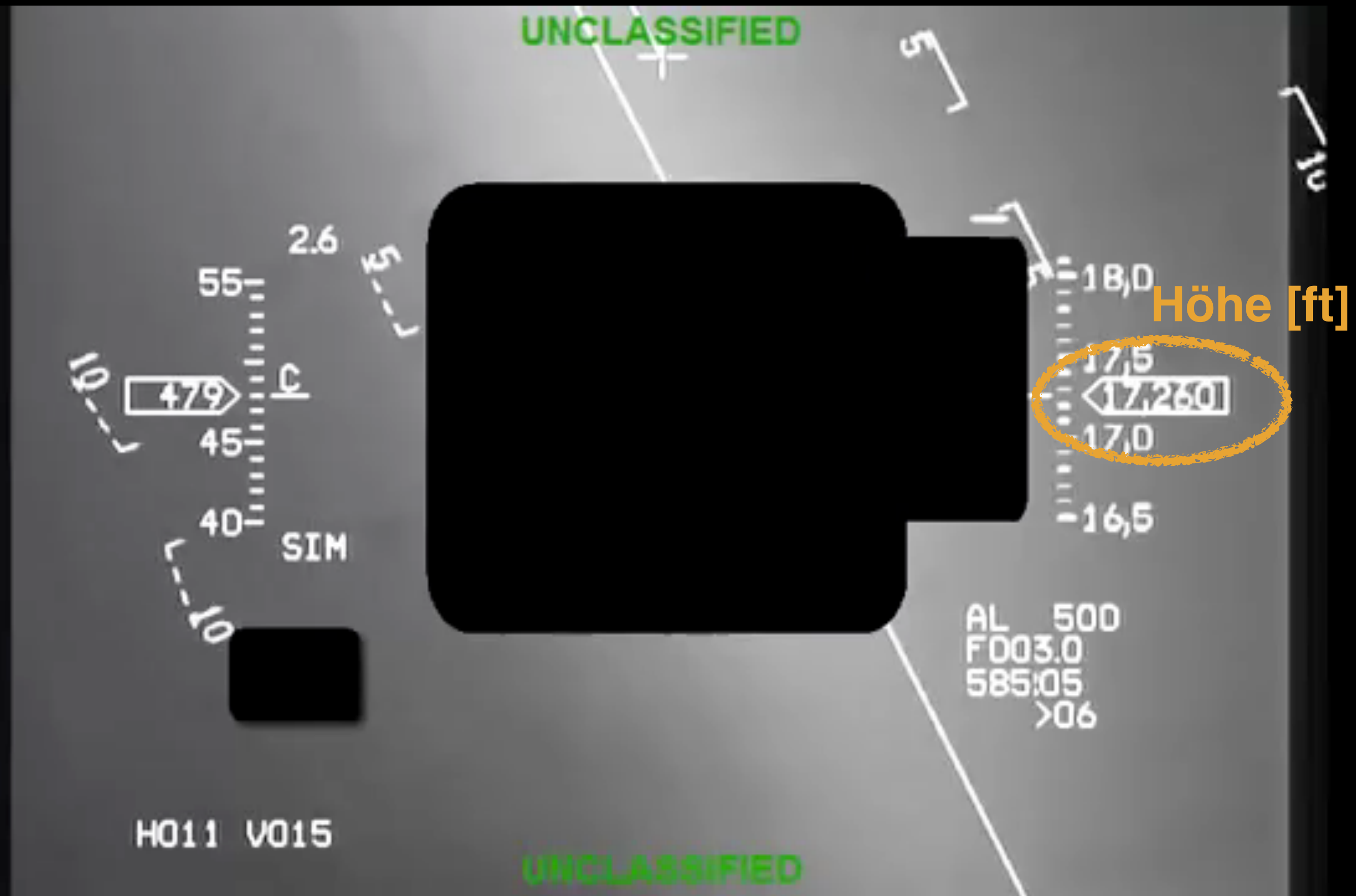




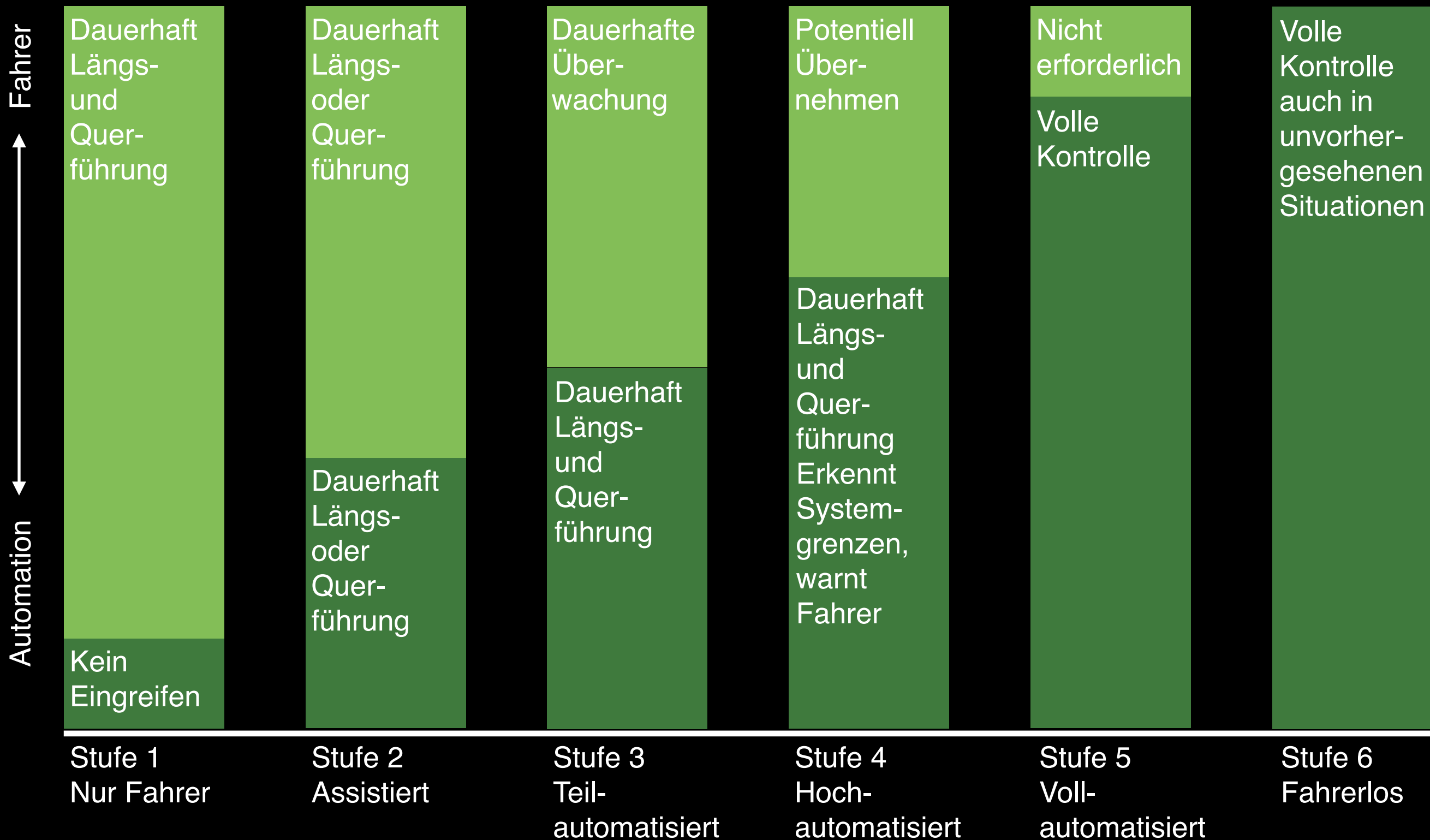
Thanks to Aviation Week *"Auto-GCAS Saves Unconscious F-16 Pilot—Declassified USAF Footage"*
<http://aviationweek.com/air-combat-safety/auto-gcas-saves-unconscious-f-16-pilot-declassified-usaf-footage>

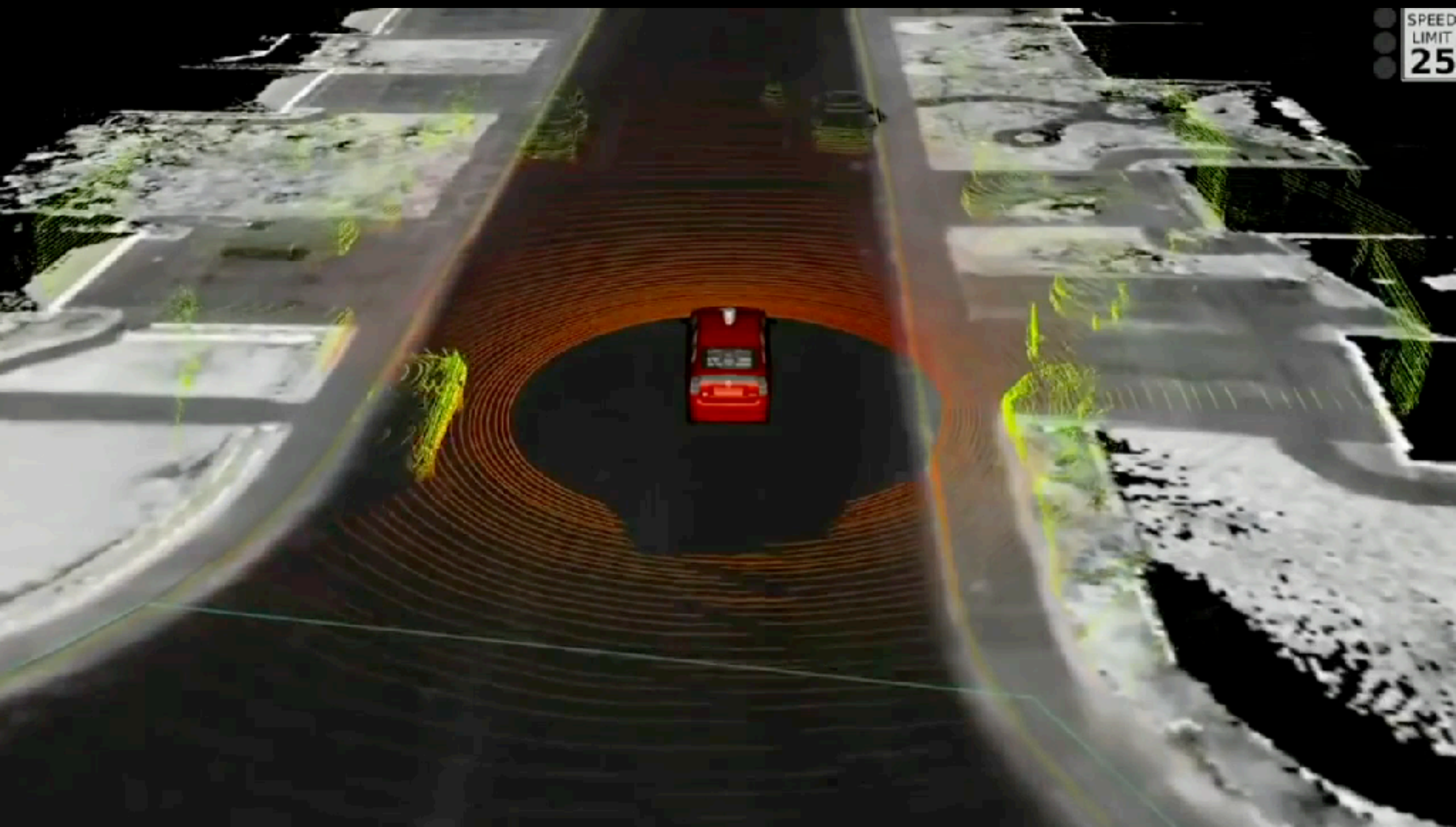


Thanks to Aviation Week *"Auto-GCAS Saves Unconscious F-16 Pilot—Declassified USAF Footage"*
<http://aviationweek.com/air-combat-safety/auto-gcas-saves-unconscious-f-16-pilot-declassified-usaf-footage>



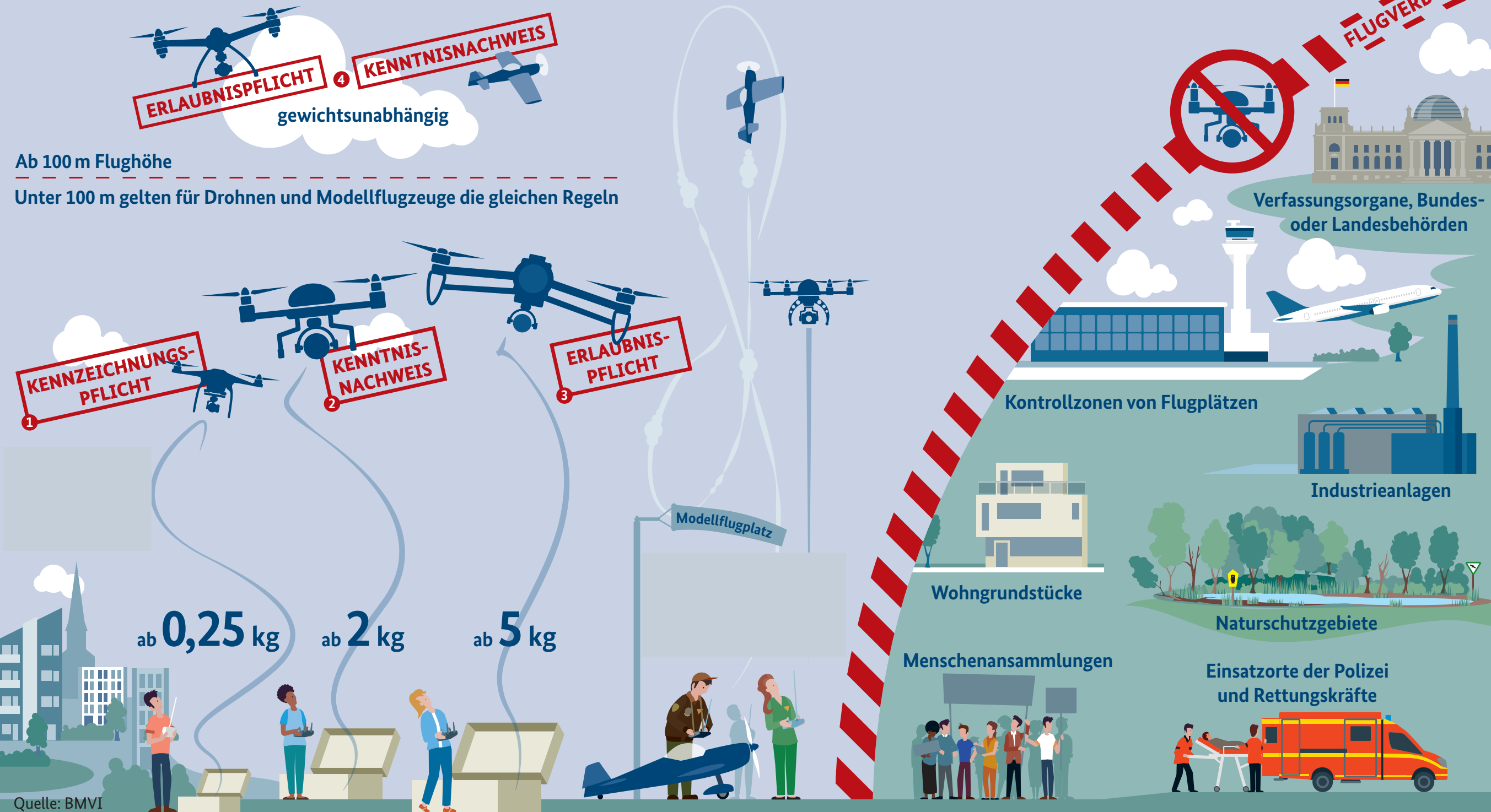
Thanks to Aviation Week *"Auto-GCAS Saves Unconscious F-16 Pilot—Declassified USAF Footage"*
<http://aviationweek.com/air-combat-safety/auto-gcas-saves-unconscious-f-16-pilot-declassified-usaf-footage>





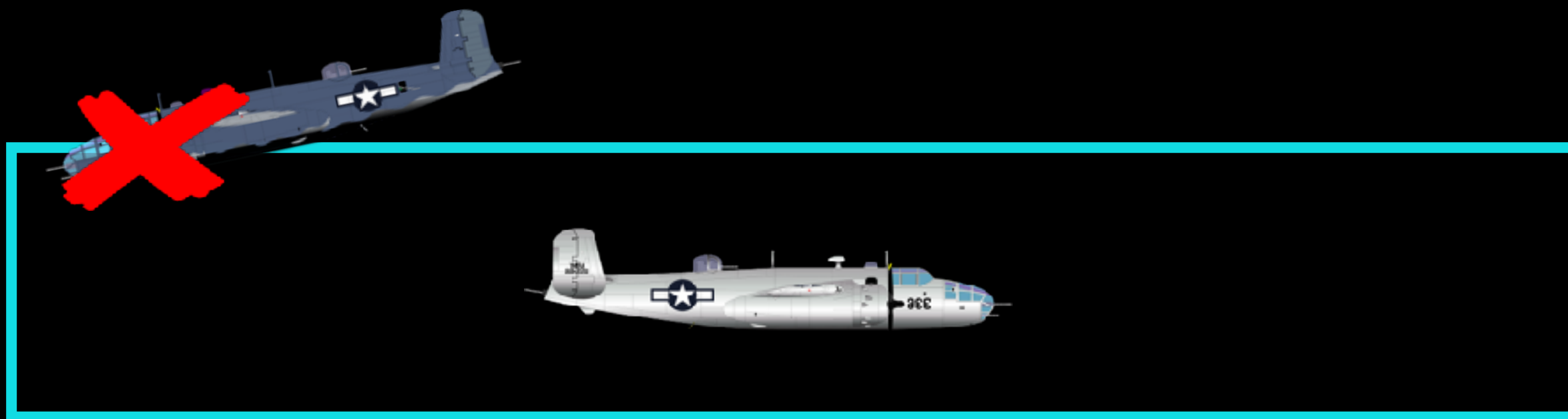
<https://www.youtube.com/watch?v=AQkMu8eBDQg>

Die neue Drohnen-Verordnung



**Vollautonome
Schlitten?**







ca 300m / 1000ft

ca 9km / 5 nmi

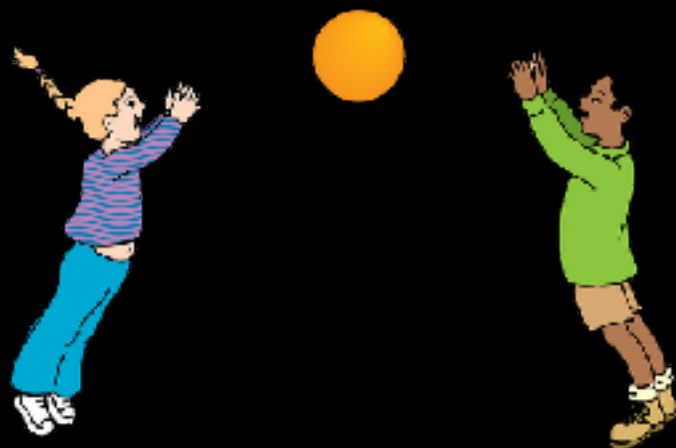




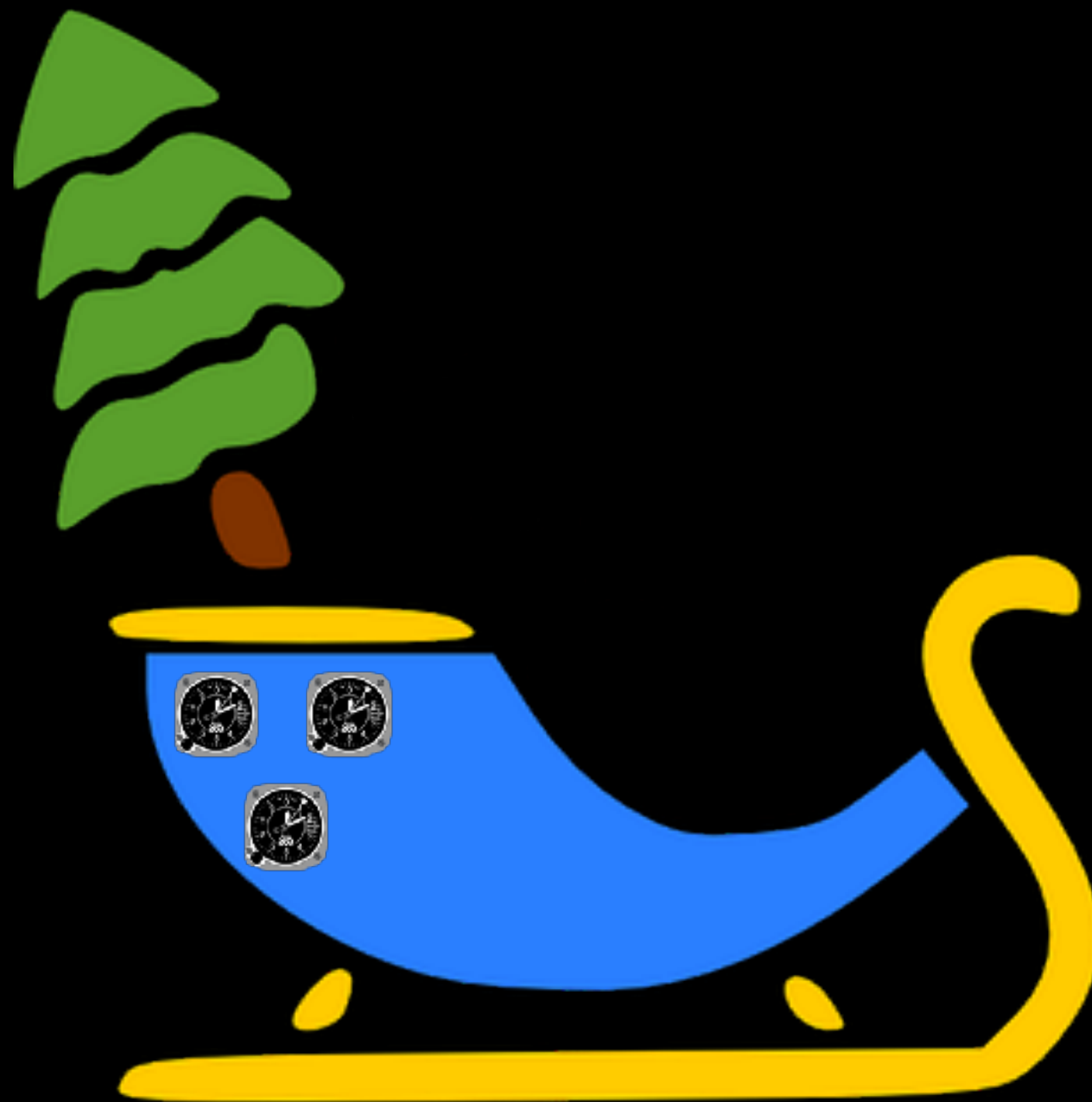


















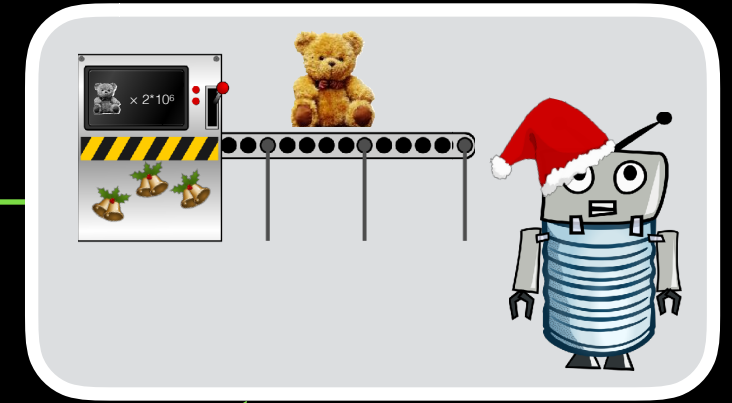
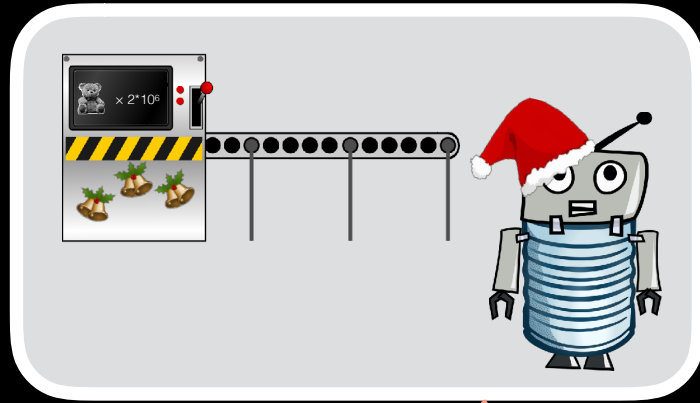






drop!
 $\text{line} = 8$

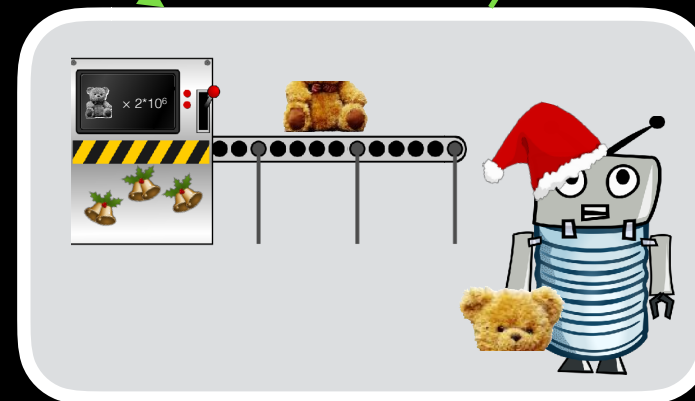
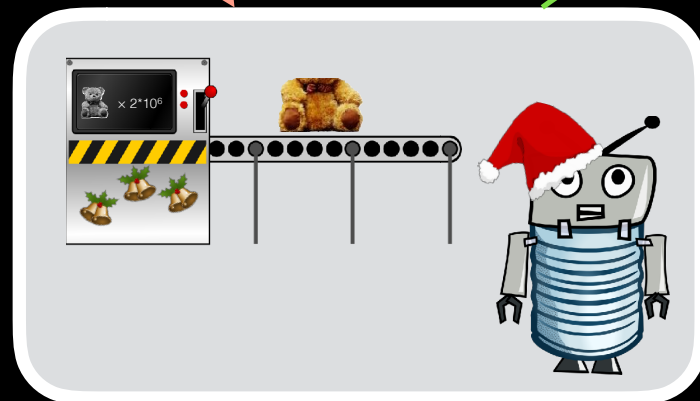
$\text{line} \leq 8$



produce!
 $\text{line} \triangleq 0$
 $\text{bot} \triangleq 0$

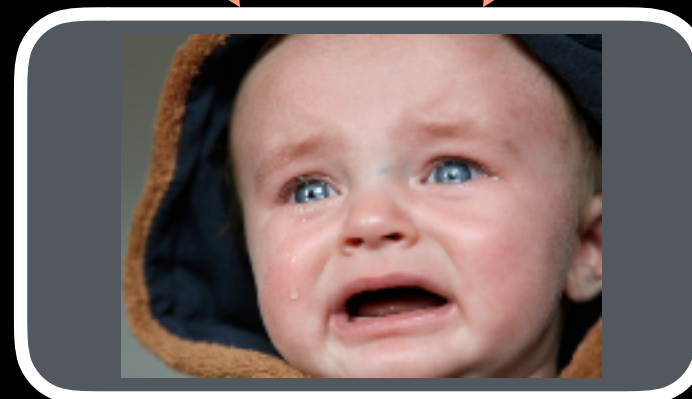
grab!
 $\text{bot} \geq 2$
 $\text{bot} \triangleq 0$

assemble!
 $\text{bot} \geq 3$



drop!
 $\text{line} = 8$

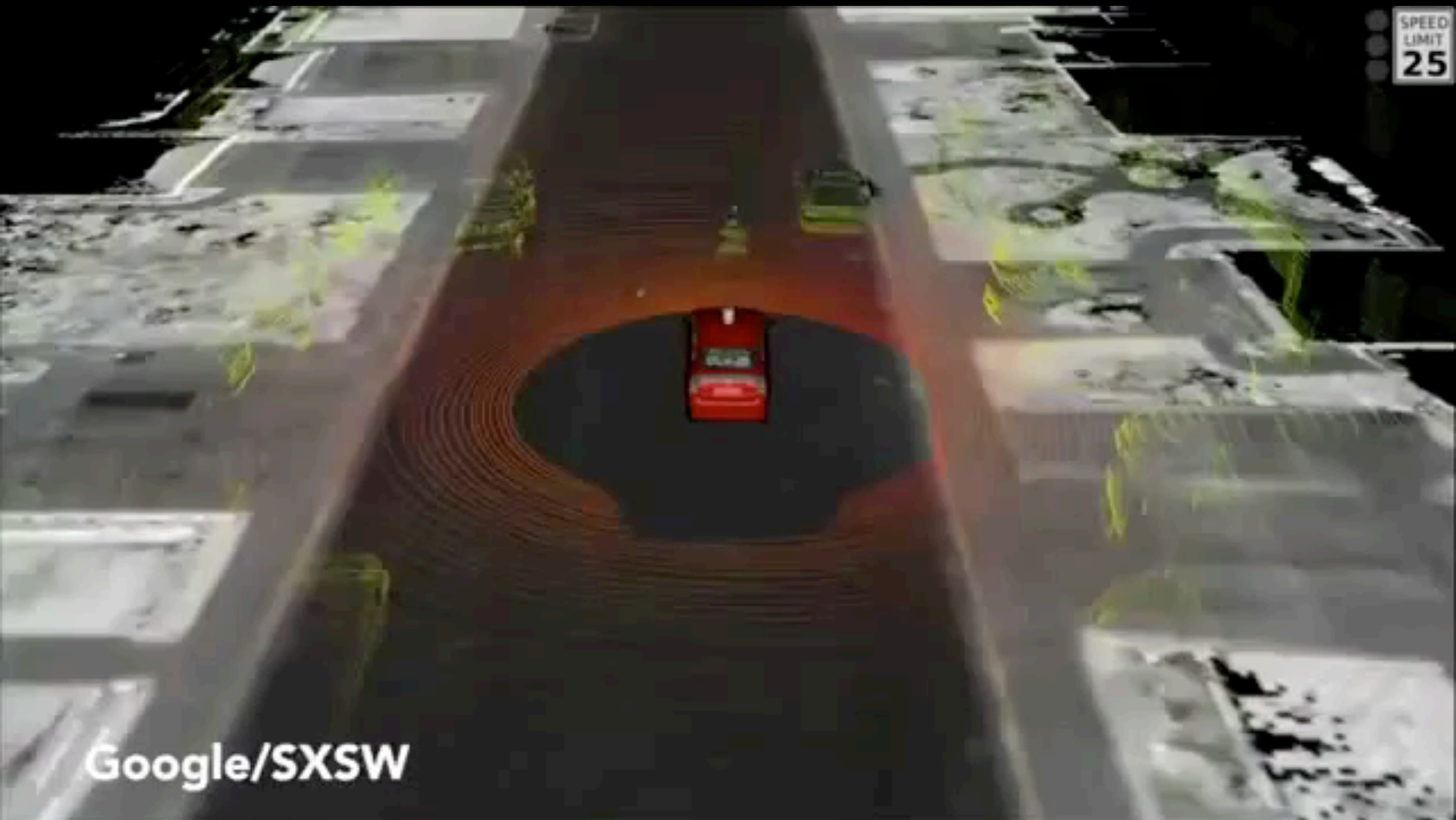
drop!
 $\text{line} = 8$





Mein besonderer Dank an Hanna Kullack für die Hilfe beim Vorbereiten der Slides!

Wait — There's more!



<https://www.youtube.com/watch?v=AQkMu8eBDQg>