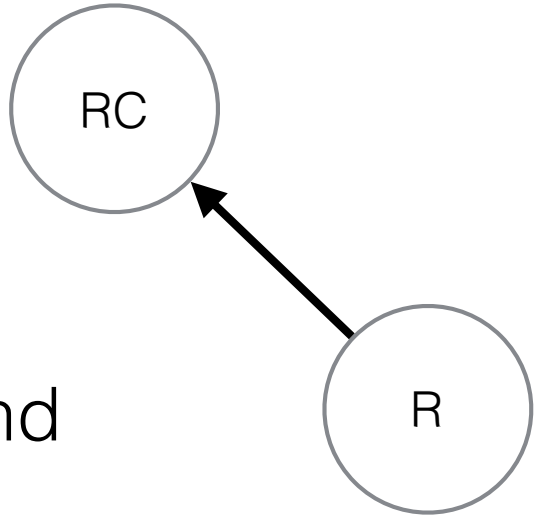
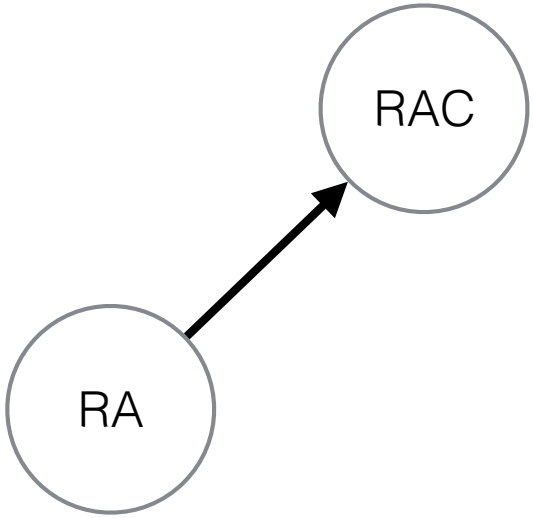
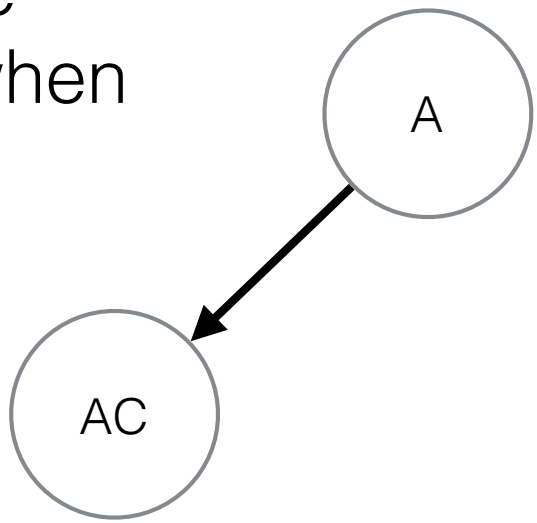
a traffic light with cars
an intersection with 2 lights

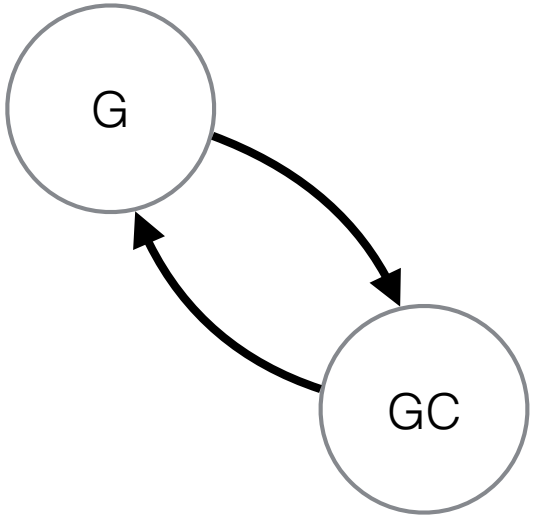
A traffic light
with lights RAG, and
a car sensor, C.

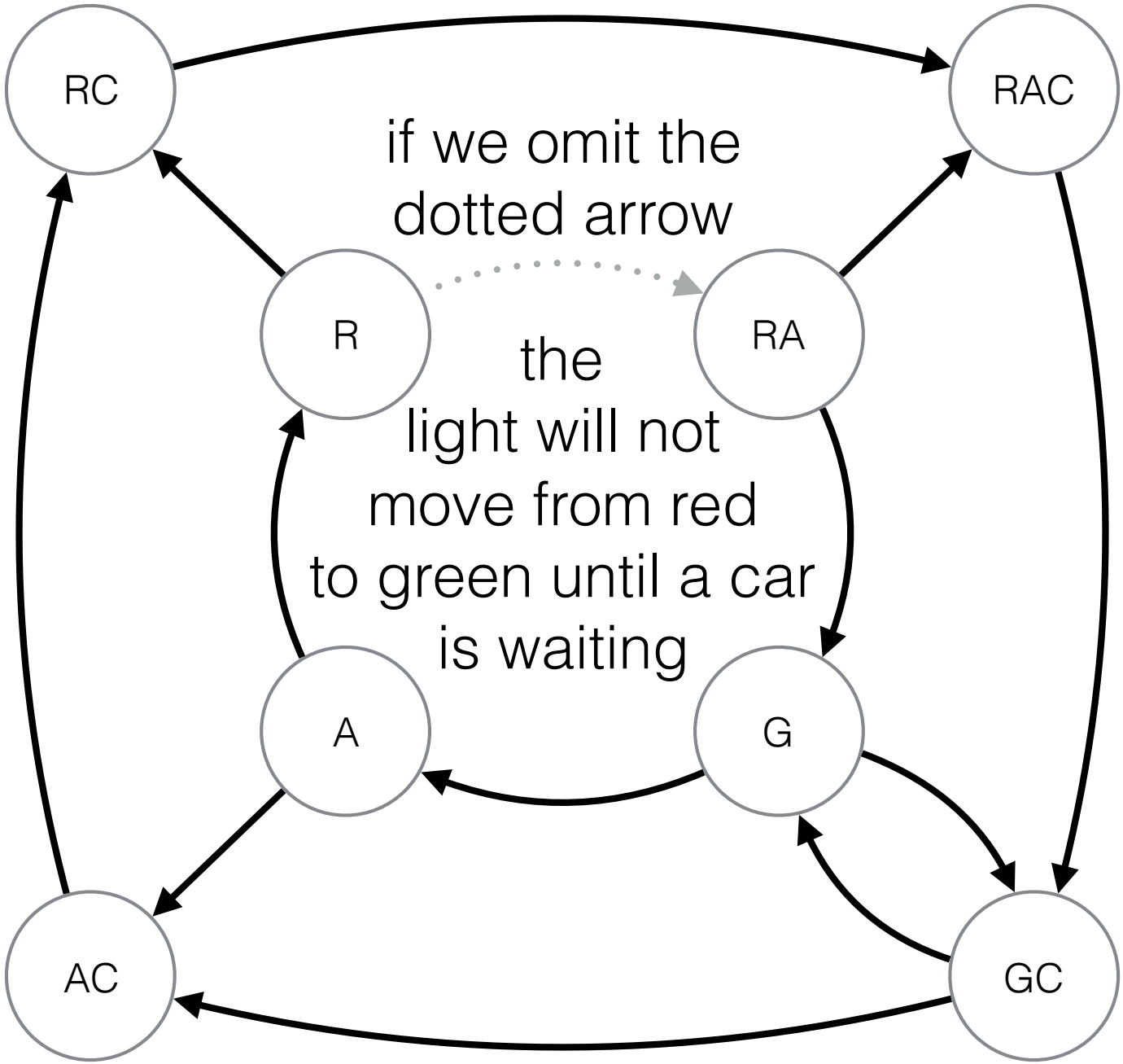




The transitions here show cars
arriving at any time
and leaving only when
the light is green.



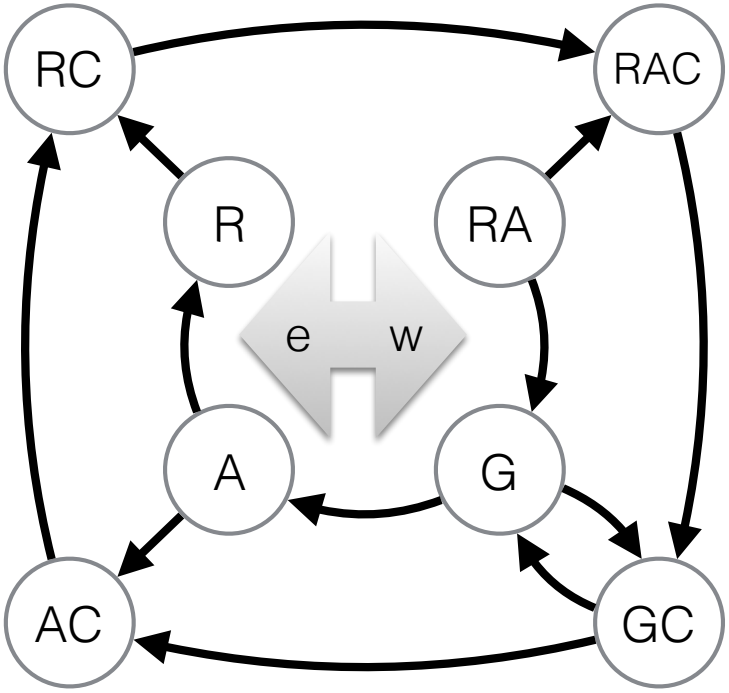


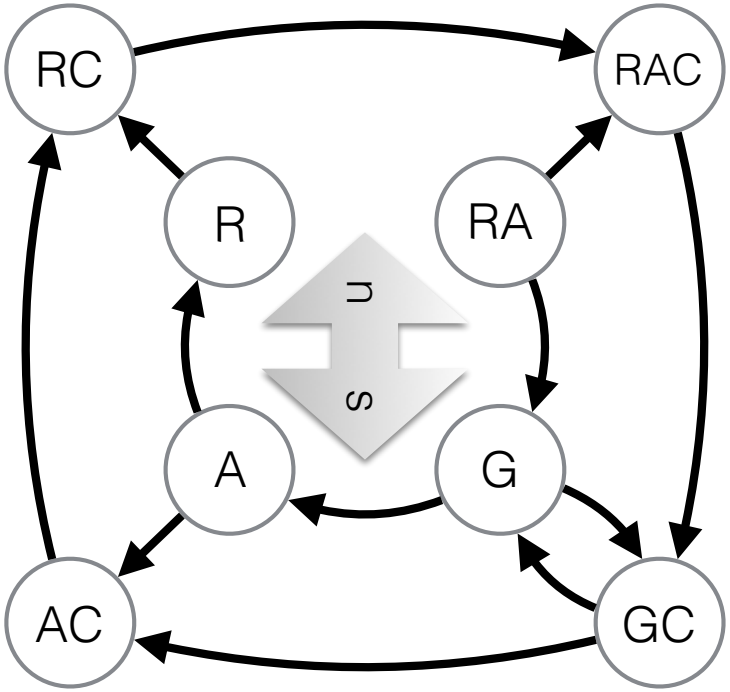


Should we also model drivers that break the rules?

How should we combine two sets of lights?

Which combinations of states should we avoid/allow?





We certainly don't want both lights green.

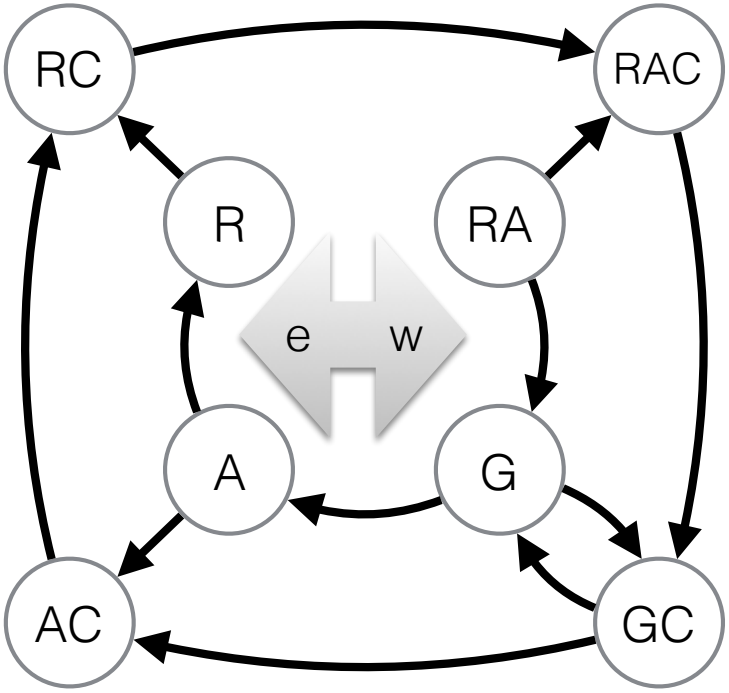
¬ewG ∨ ¬nsG

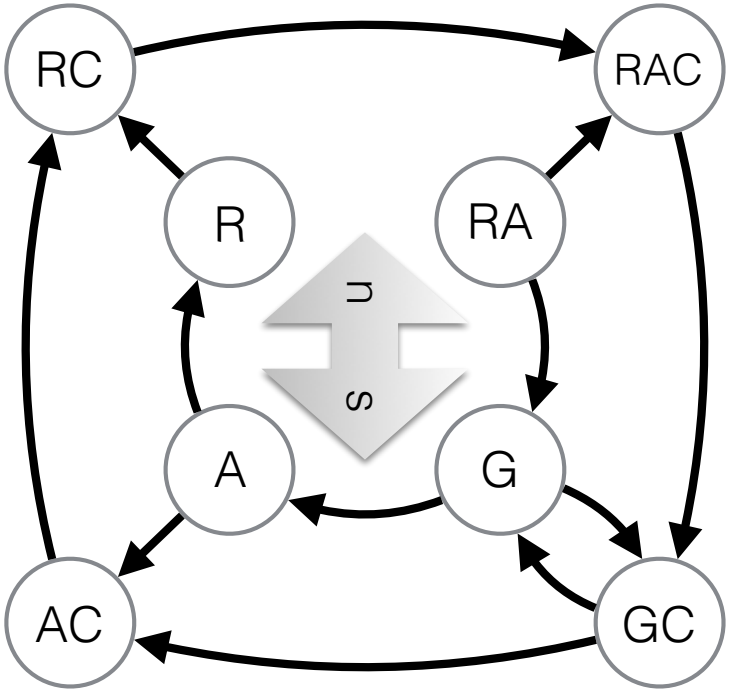
Is this enough?

We certainly don't want both lights green.

¬ewG ∨ ¬nsG

Is this enough?





A safer idea?

ewA ∨ ewG → nsR

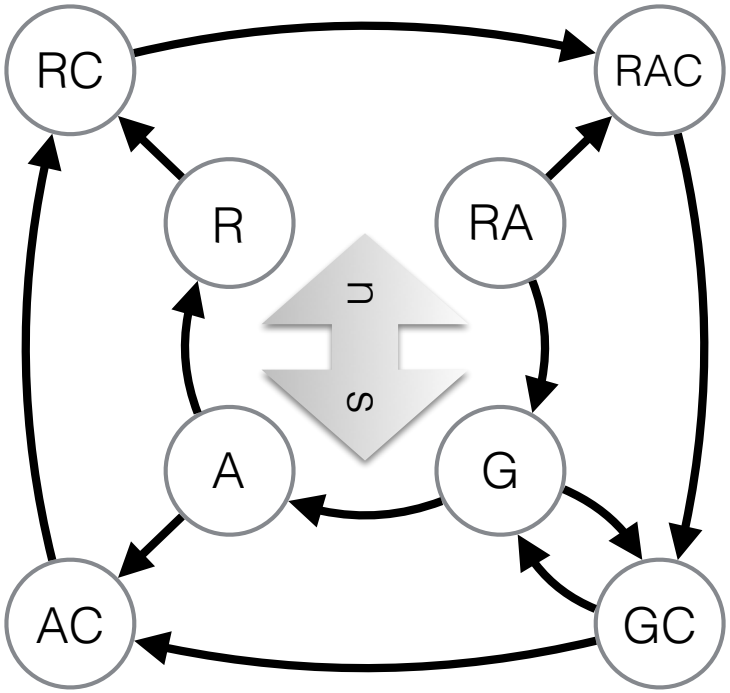
nsA ∨ nsG → ewR

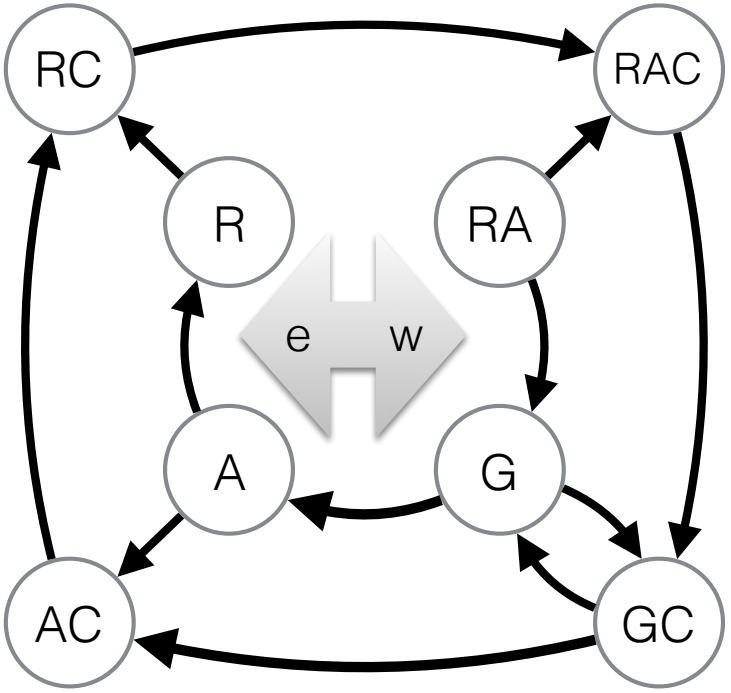
A safer idea?

ewA ∨ ewG → nsR

nsA ∨ nsG → ewR

What about transitions?
synchronous v. asynchronous





synchronous:
take one step
in each machine

asynchronous:
interleave steps
each choosing a
transition from one
or other machine

A safer idea?

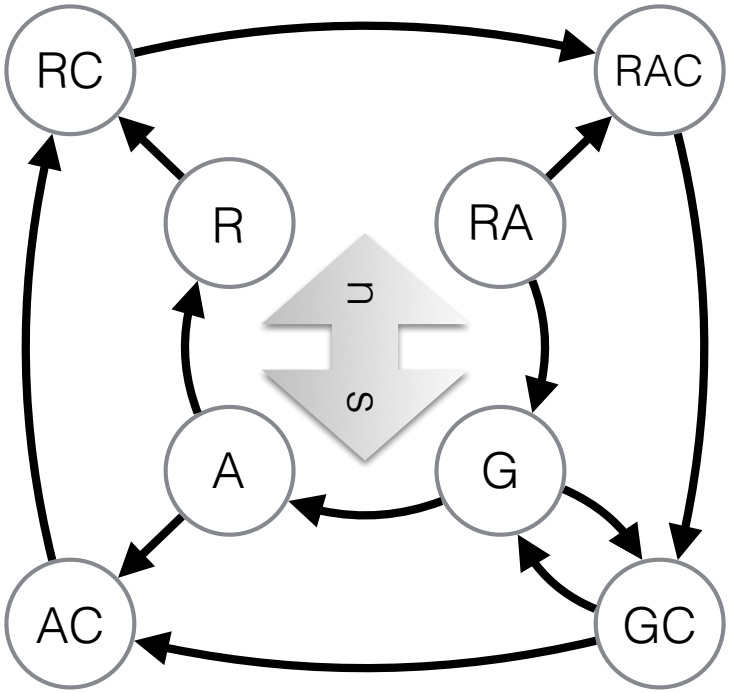
ewA ∨ ewG → nsR

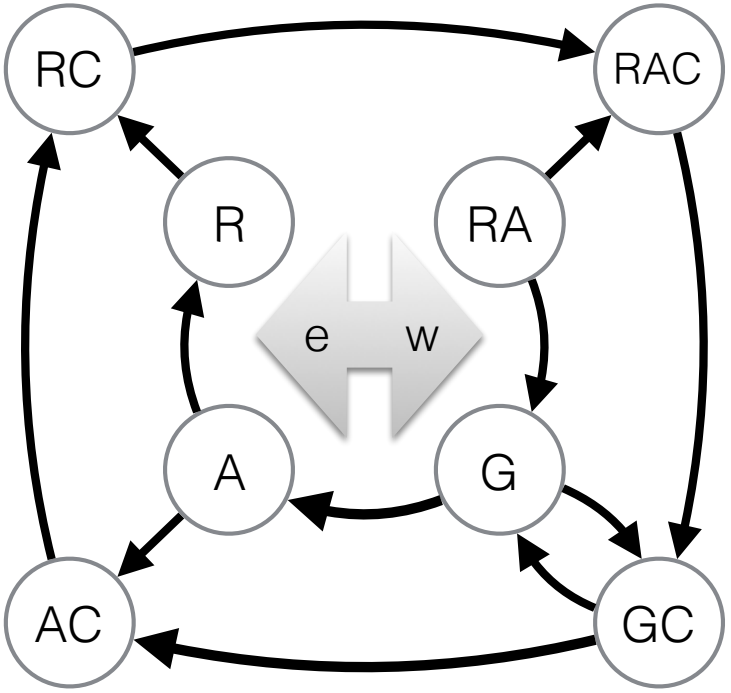
nsA ∨ nsG → ewR

What about transitions?

asynchronous

interleaving





Our machines take turns.

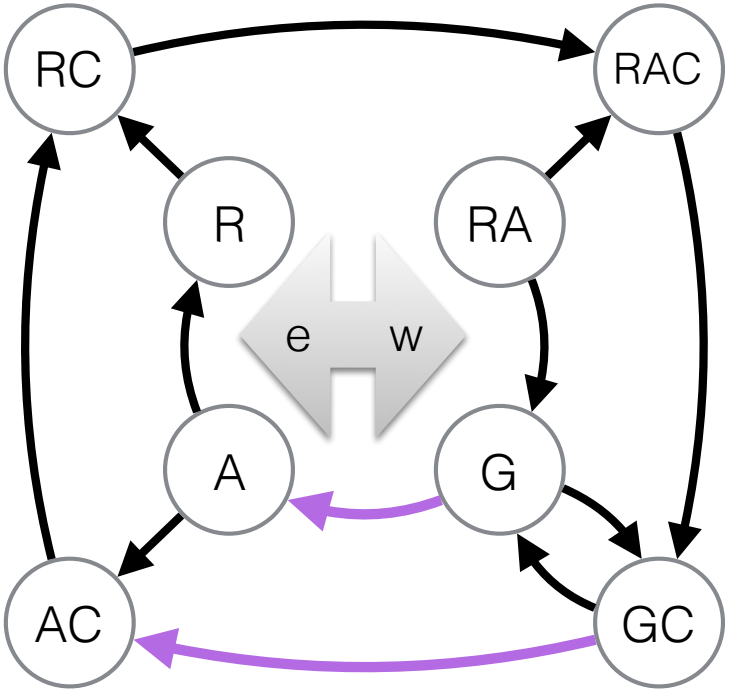
The only times we have a choice of whose turn is next are when both lights are red.

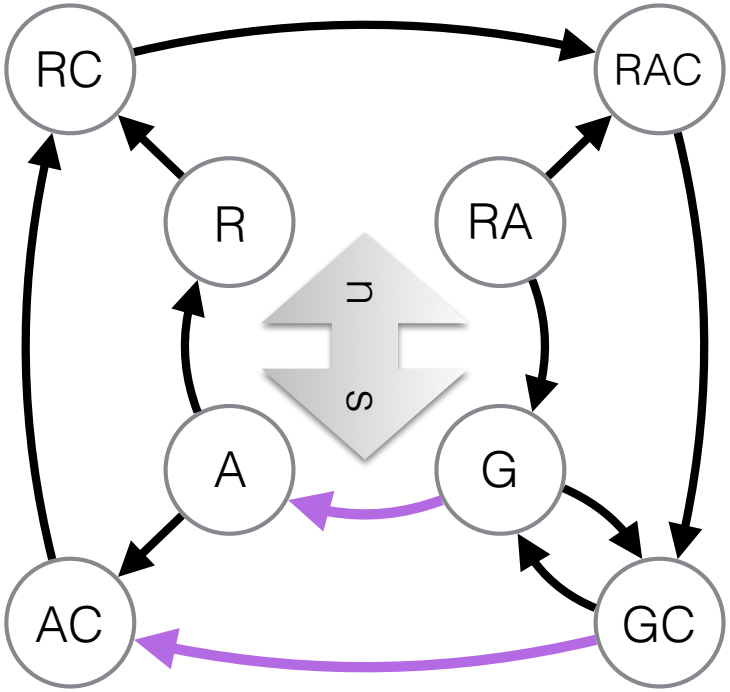
A safer idea?

ewA ∨ ewG → nsR

nsA ∨ nsG → ewR

How should we interleave the transitions?





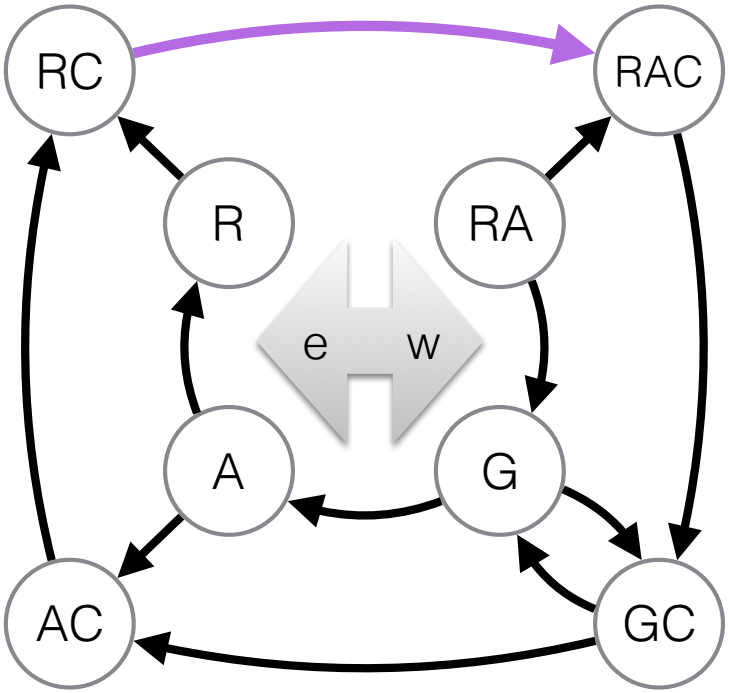
Maybe these transitions should only happen when there is car waiting at the **other** light.

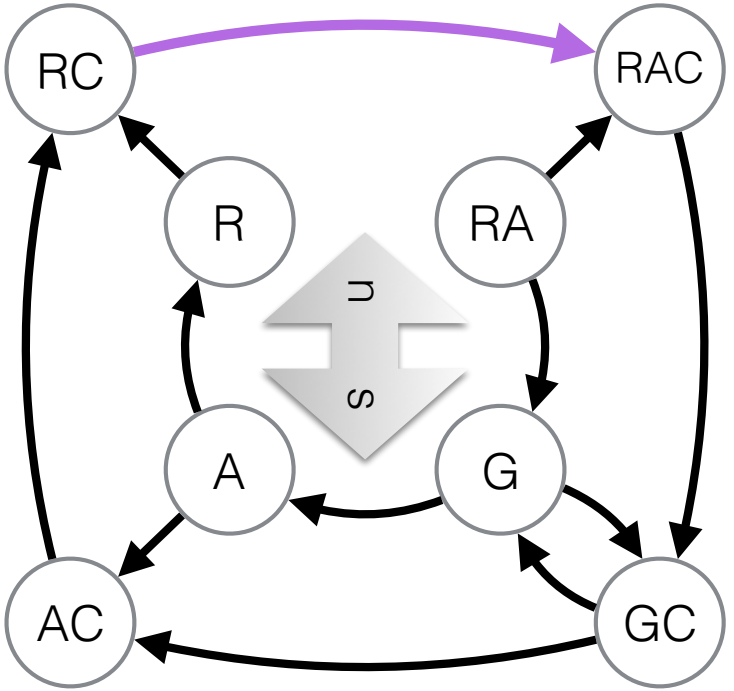
A safer idea?

ewA ∨ ewG → nsR

nsA ∨ nsG → ewR

The only times we have a choice of whose turn is next are when both lights are red.





When both lights are red we can only make one of these transitions.

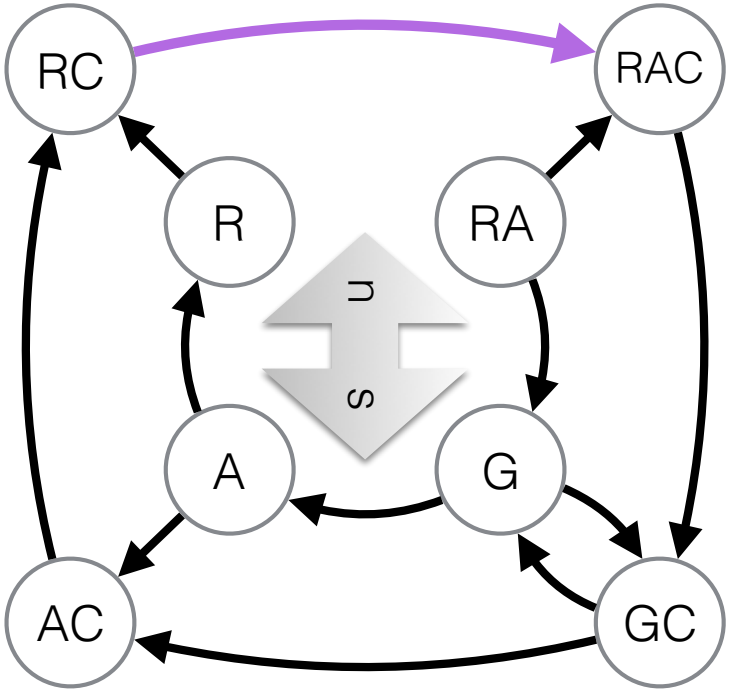
How do we decide which one?

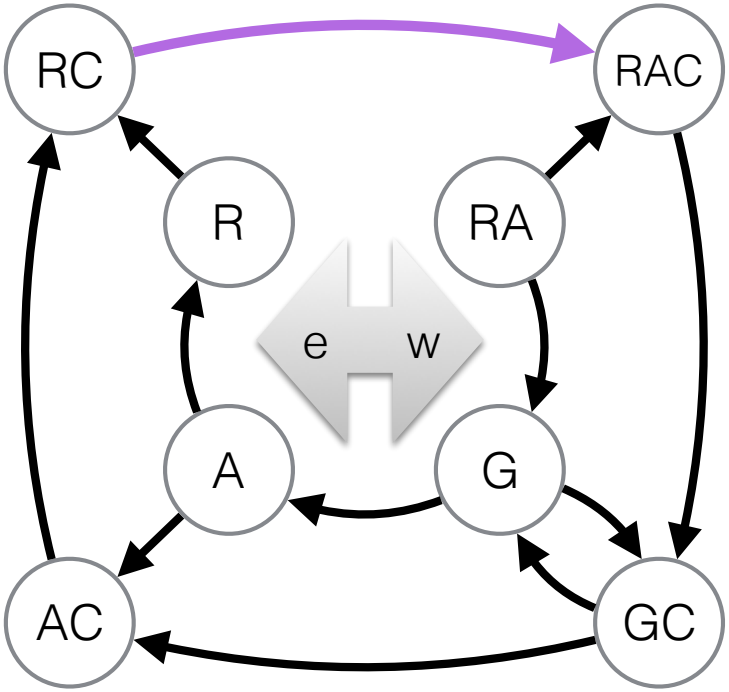
Is the system fair?
What might that question mean?

A safer idea?

$$ewA \vee ewG \rightarrow nsR$$
$$nsA \vee nsG \rightarrow ewR$$

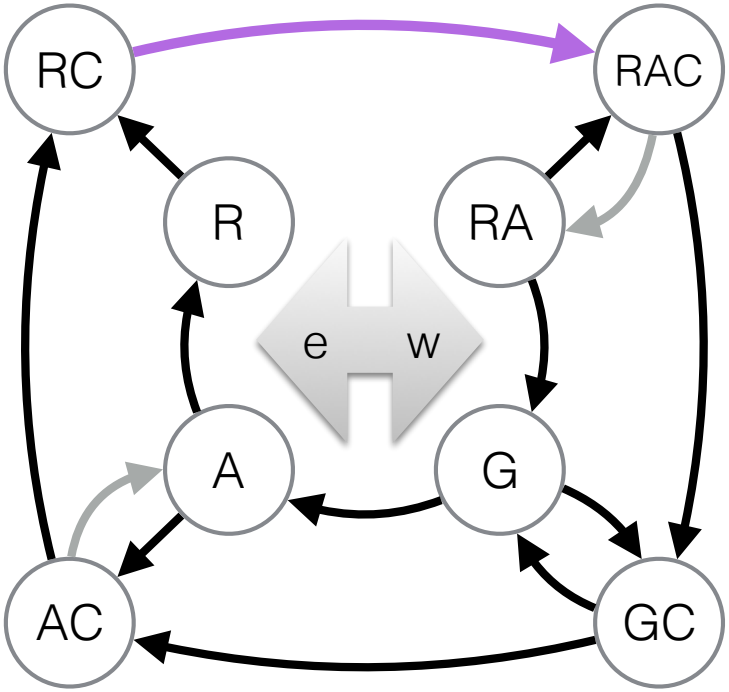
The only times we have a choice of whose turn is next are when both lights are red.

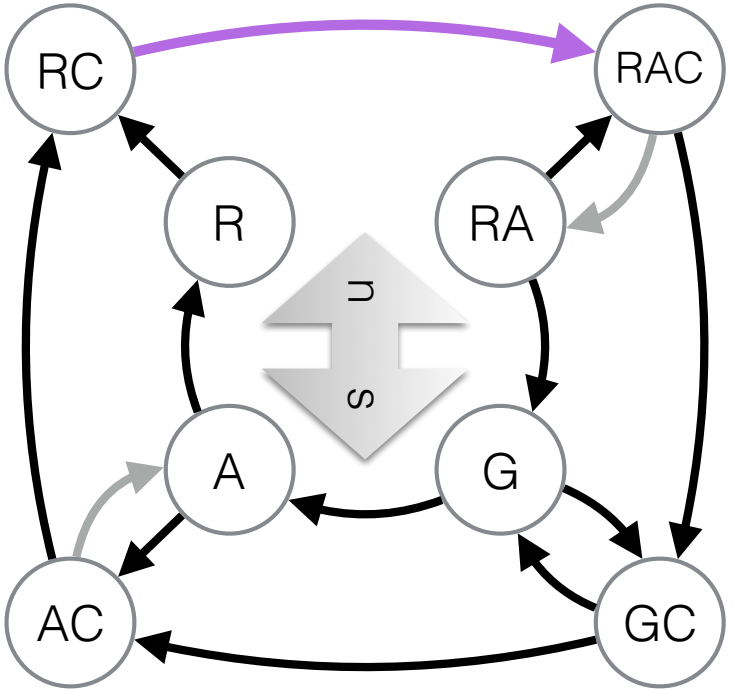




Can you argue that, however we make this choice, this system is safe, assuming drivers follow the rules?

Should we
also model
drivers that break
the rules?





Will this system still be safe if
some drivers leave on amber
as shown in grey?