

# Grammar and Automaton

Andrew Huang and John Rader

May 2025

## 1. Grammar for the Language

Move Name for each State (Paired together for general buttons/functionality):

S is the initial variable for the beginning of a combo

State	Name
$S$	Neutral State
$q_{ss}$	Side Smash
$q_{os1}$	Overhead Smash I
$q_{os2}$	Overhead Smash II
$q_u$	Upswing
$q_{bb1}$	Big Bang I
$q_{bb2}$	Big Bang II
$q_{bb3}$	Big Bang III
$q_{bb4}$	Big Bang IV
$q_{bbf}$	Big Bang Finisher
$q_{sb1}$	Spinning Bludgeon (Time 1)
$q_{sb2}$	Spinning Bludgeon (Time 2)
$q_{sb3}$	Spinning Bludgeon (Time 3)
$q_{sss}$	Spinning Side Smash
$q_{sfu}$	Spinning Follow Up
$q_{ssu}$	Spinning Strong Upswing
$q_{c1}$	Charge (Time 1)
$q_{c2}$	Charge (Time 2)
$q_{c3}$	Charge (Time 3)
$q_{csb}$	Charged Side Blow
$q_{cu}$	Charged Upswing
$q_{cbb}$	Charged Big Bang
$q_{cfu}$	Charged Follow-up
$q_{mc1}$	Mighty Charge (Time 1)
$q_{mc2}$	Mighty Charge (Time 2)
$q_{mcu}$	Mighty Charge Upswing
$q_{mcs}$	Mighty Charge Slam
$q_{fben}$	Focus Blow: Earthquake (No Wound)
$q_{fbew1}$	Focus Blow: Earthquake (Wound Option 1)
$q_{fbew2}$	Focus Blow: Earthquake (Wound Option 2)

$$\begin{aligned}
S &\rightarrow yq_{os1} \mid bq_{bb1} \mid rq_{c1} \mid fq_{fben} \mid fq_{fbew1} \mid yq_{ss} \mid \lambda \\
q_{ss} &\rightarrow yq_{os2} \mid bq_b b1 \mid rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_{os1} &\rightarrow yq_{os2} \mid bq_b b1 \mid rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_{os2} &\rightarrow yq_u \mid bq_b b1 \mid rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_u &\rightarrow bq_{bb1} \mid rq_{c1} \mid cq_{sb1} \mid dq_{mc1} \mid \lambda \\
q_{bb1} &\rightarrow bq_{bb2} \mid rq_{c1} \mid \lambda \\
q_{bb2} &\rightarrow bq_{bb3} \mid rq_{c1} \mid \lambda \\
q_{bb3} &\rightarrow bq_{bb4} \mid rq_{c1} \mid \lambda \\
q_{bb4} &\rightarrow bq_{bbf} \mid dq_{mc1} \mid rq_{c1} \mid \lambda \\
q_{bbf} &\rightarrow rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_{sb1} &\rightarrow q_{sb2} \mid yq_{sss} \\
q_{sb2} &\rightarrow q_{sb3} \mid yq_{sfu} \\
q_{sb3} &\rightarrow \lambda \mid yq_{ssu} \\
q_{sss} &\rightarrow yq_{os2} \mid bq_{bb1} \mid rq_{c1} \mid \lambda \\
q_{sfu} &\rightarrow yq_{os1} \mid bq_{bb1} \mid rq_{c1} \mid \lambda \\
q_{ssu} &\rightarrow yq_{os1} \mid bq_{bb1} \mid rq_{c1} \mid dq_{mc1} \mid \lambda \\
q_{c1} &\rightarrow q_{c2} \mid rq_{csb} \mid yq_{csb} \mid fq_{fben} \mid fq_{fbew1} \\
q_{c2} &\rightarrow q_{c3} \mid rq_{csu} \mid yq_{csu} \mid fq_{fben} \mid fq_{fbew1} \\
q_{c3} &\rightarrow rq_{cbb} \mid yq_{cbb} \mid cq_{mc1} \mid fq_{fben} \mid fq_{fbew1} \\
q_{csb} &\rightarrow yq_{cfu} \mid bq_{ss} \mid rq_{c1} \mid \lambda \\
q_{cu} &\rightarrow yq_{cfu} \mid bq_{bb1} \mid rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_{cbb} &\rightarrow rq_{c1} \mid cq_{sb1} \mid yq_{os1} \mid bq_{bb1} \mid yq_{ss} \mid \lambda \\
q_{cfu} &\rightarrow yq_{os1} \mid bq_{bb1} \mid rq_{c1} \mid cq_{sb1} \mid \lambda \\
q_{mc1} &\rightarrow q_{mc2} \mid rq_{mcu} \mid yq_{mcu} \\
q_{mc2} &\rightarrow rq_{mcs} \mid yq_{mcs} \\
q_{mcu} &\rightarrow yq_{os1} \mid yq_{ss} \mid bq_{bb1} \mid cq_{sb1} \mid \lambda \\
q_{mcs} &\rightarrow cq_{sb1} \mid yq_{os1} \mid yq_{ss} \mid bq_{bb1} \mid \lambda \\
q_{fben} &\rightarrow bq_{bb1} \mid rq_{c1} \mid \lambda \\
q_{fbew1} &\rightarrow rq_{c1} \mid q_{fbew2} \\
q_{fbew2} &\rightarrow rq_{c1} \mid yq_{os2} \mid \lambda
\end{aligned}$$

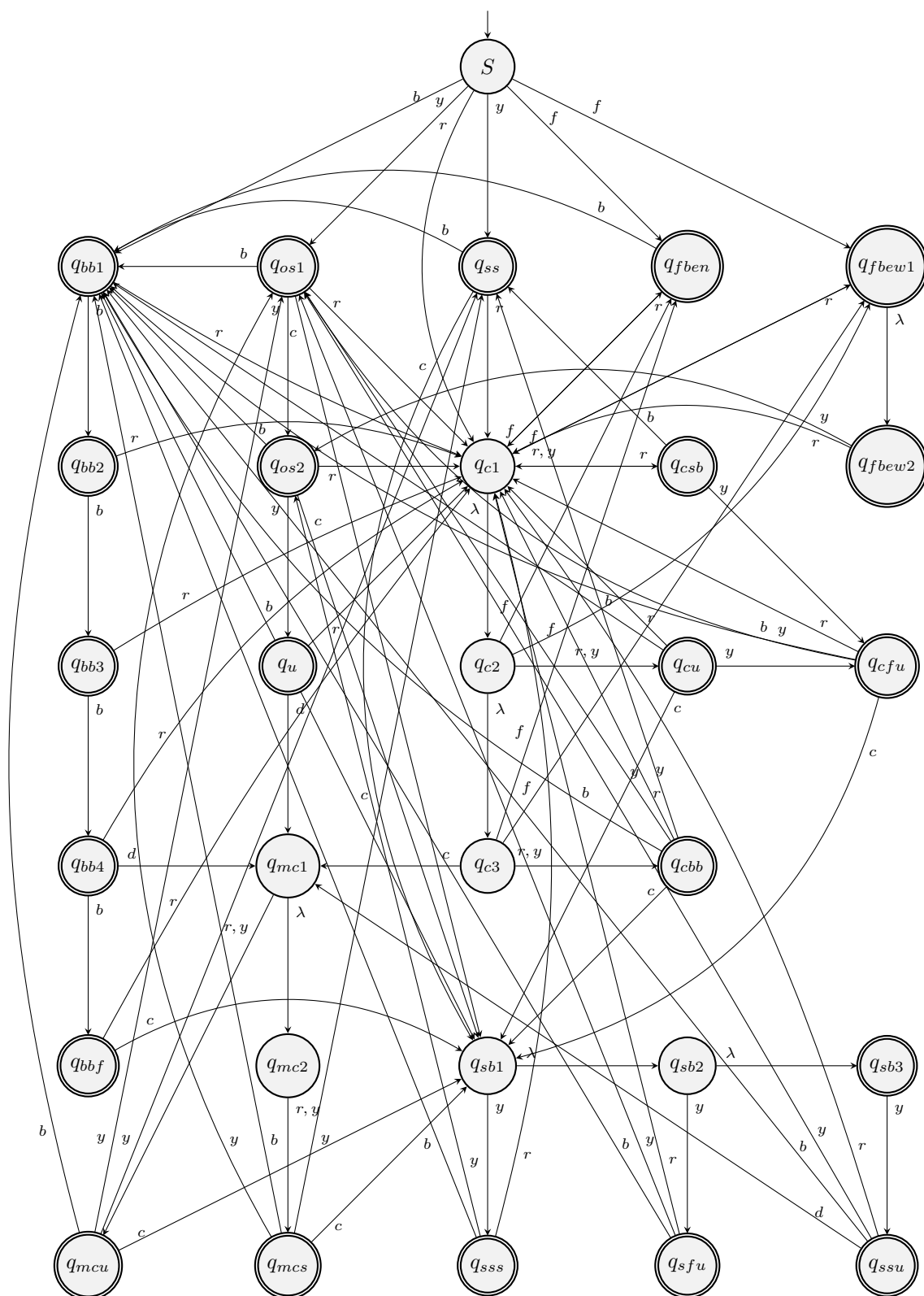


Figure 1: Automaton for Language