

Viterbi-Algorithmus

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Viterbi-Algorithmus

- Ziel: Finde wahrscheinlichste Sequenz von Zuständen t (z.B. **Wortarten-Tags**), wenn eine Sequenz von Beobachtungen w (z.B. **Wörter**) gegeben ist.

- Markov-Annahme:

$$P(t_i | t_1 \dots t_{i-1}) = P(t_i | t_{i-1})$$

d.h. Wortarten vor Position $i-1$, sind für Position i irrelevant.

- Idee:

- Finde beste Wortarten-Sequenz für Wort-Sequenz der Länge i
 \Leftrightarrow (s. anderer Foliensatz)

$$\text{maximiere } P(w_1 \dots w_i | t_1 \dots t_i) P(t_1 \dots t_i)$$

- Wegen der Markov-Annahme müssen wir nur alle möglichen Kombinationen von t_i und t_{i-1} durchprobieren
 - Die beste (wahrscheinlichste) Wahl von t_{i-1} maximiert:
 $P(w_1 \dots w_{i-1} | t_1 \dots t_{i-1}) P(t_1 \dots t_{i-1}) P(w_i | t_i) P(t_i | t_{i-1})$

$P(w|t)$

t \ w	Mary	cake	makes
N	0.4	0.4	0.2
V	0.1	0.1	0.8

 $P(t|t')$

t \ t'	Start	N	V
N	0.6	0.3	0.8
V	0.4	0.7	0.2

$P(w|t)$

$t \setminus w$	Mary	cake	makes
N	0.4	0.4	0.2
V	0.1	0.1	0.8

 $P(t|t')$

$t \setminus t'$	Start	N	V
N	0.6	0.3	0.8
V	0.4	0.7	0.2

N

N

N

Start

V

V

V

Mary

makes

cake

$P(w|t)$

t \ w	Mary	cake	makes
N	0.4	0.4	0.2
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 $P(t|t')$

t \ t'	Start	N	V
N	0.6	0.3	0.8
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$$P(Mary|N)P(N|Start) = 0.4 * 0.6 = 0.24$$

Start**V**

$$P(Mary|V)P(V|Start) = 0.1 * 0.4 = 0.04$$

N**V****N****V****Mary****makes****cake**

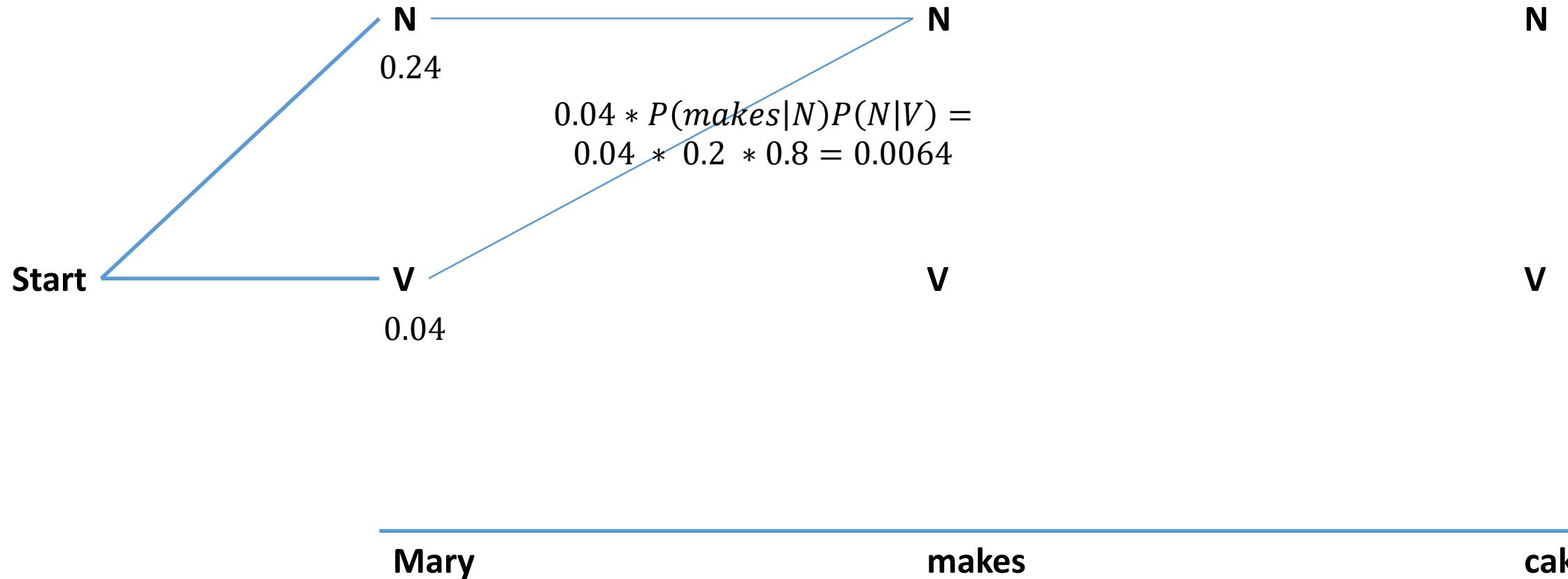
$P(w|t)$

$t \setminus w$	Mary	cake	makes
N	0.4	0.4	0.2
V	0.1	0.1	0.8

 $P(t|t')$

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N	0.6	0.3	0.8
V	0.4	0.7	0.2

$$0.24 * P(makes|N)P(N|N) = \\ 0.24 * 0.2 * 0.3 = 0.0144$$

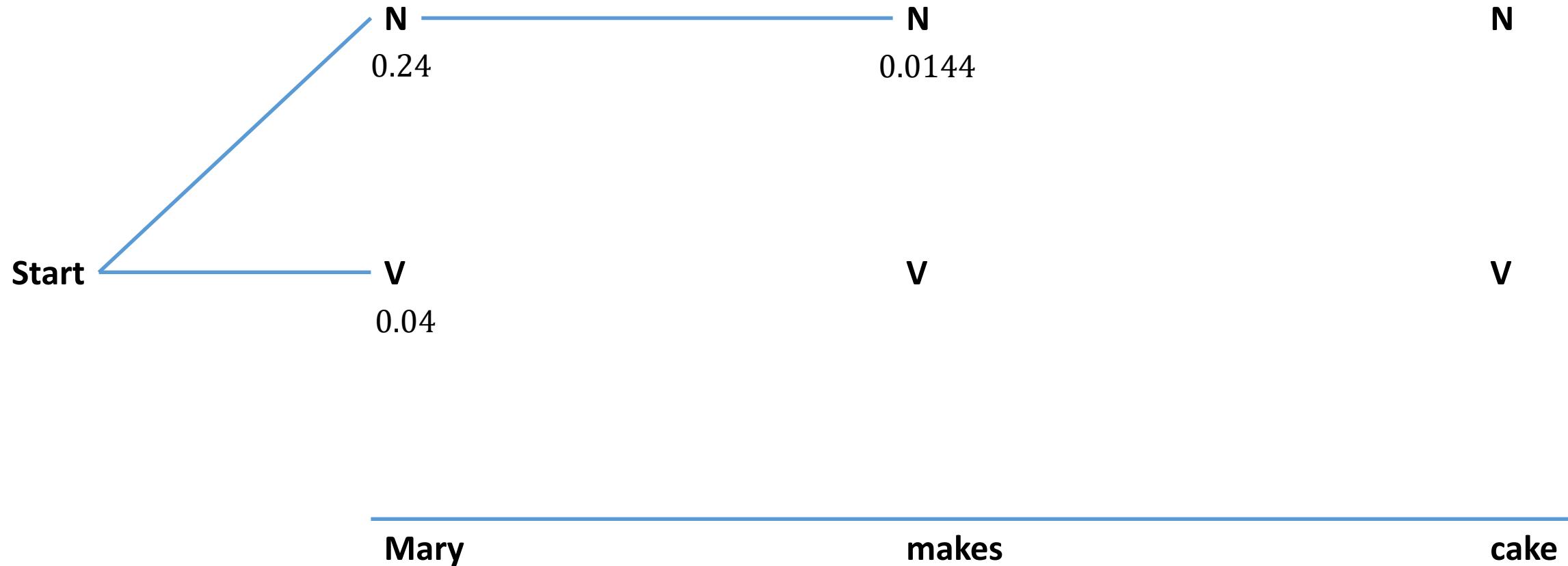


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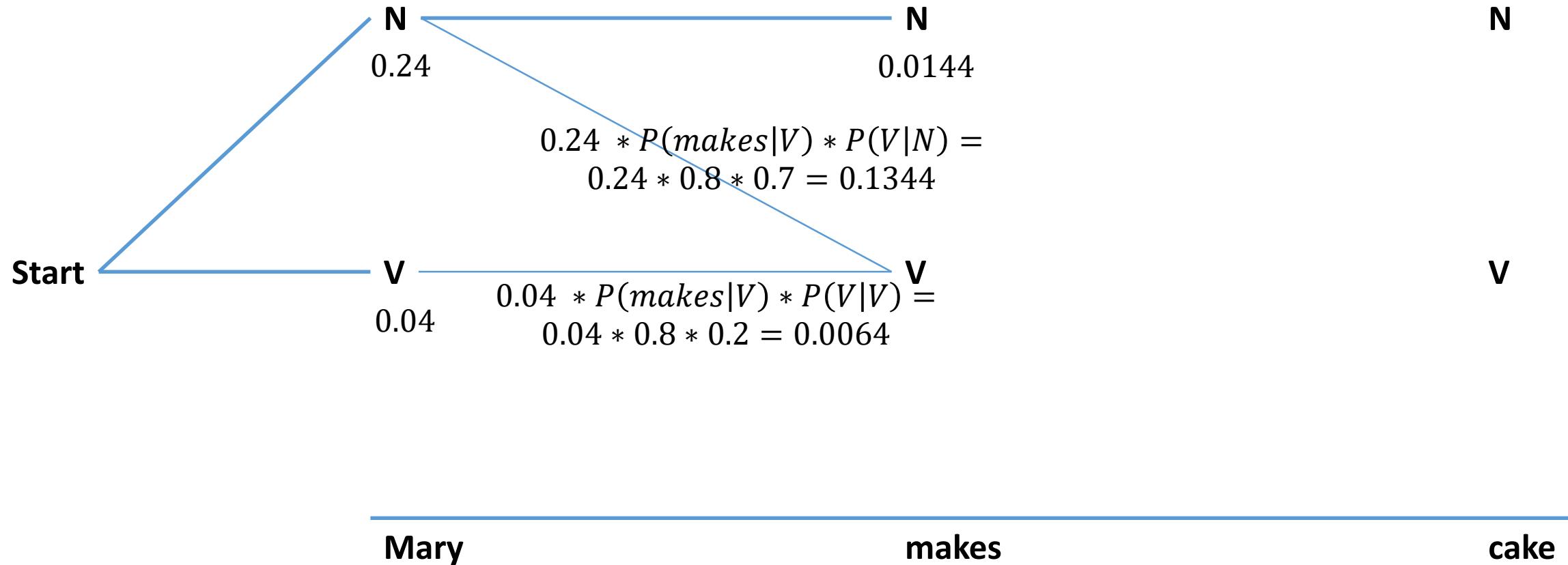


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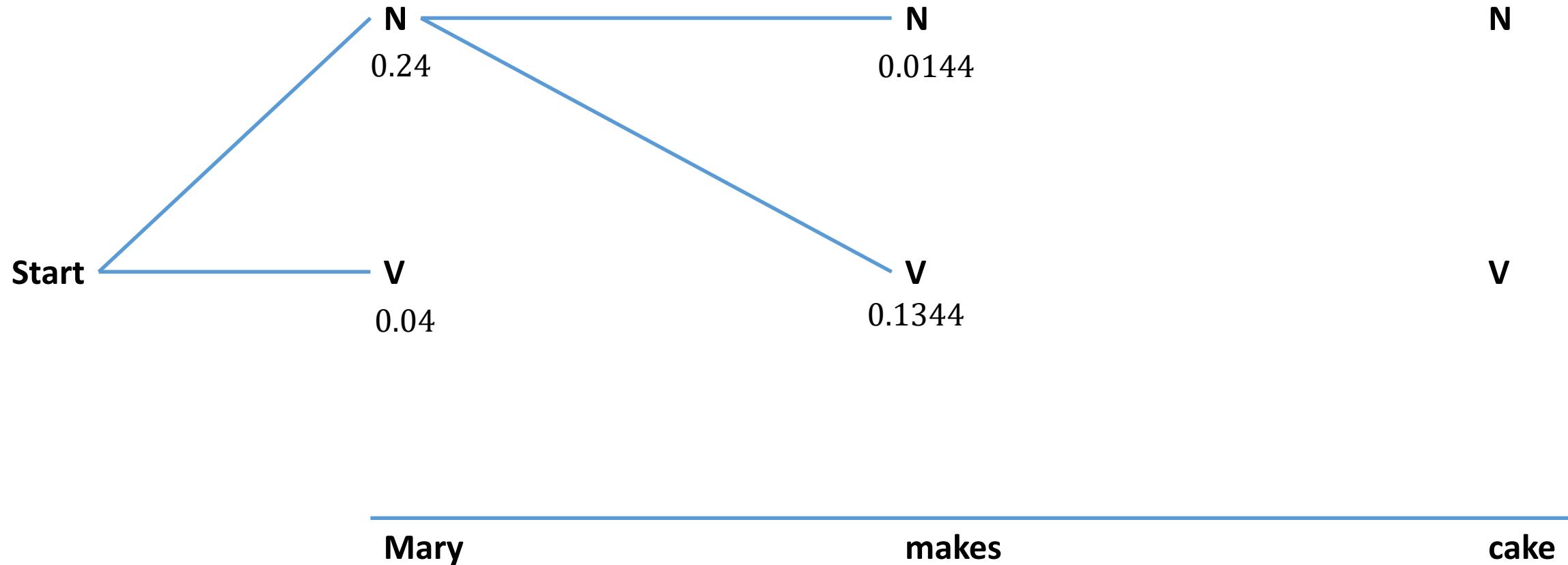


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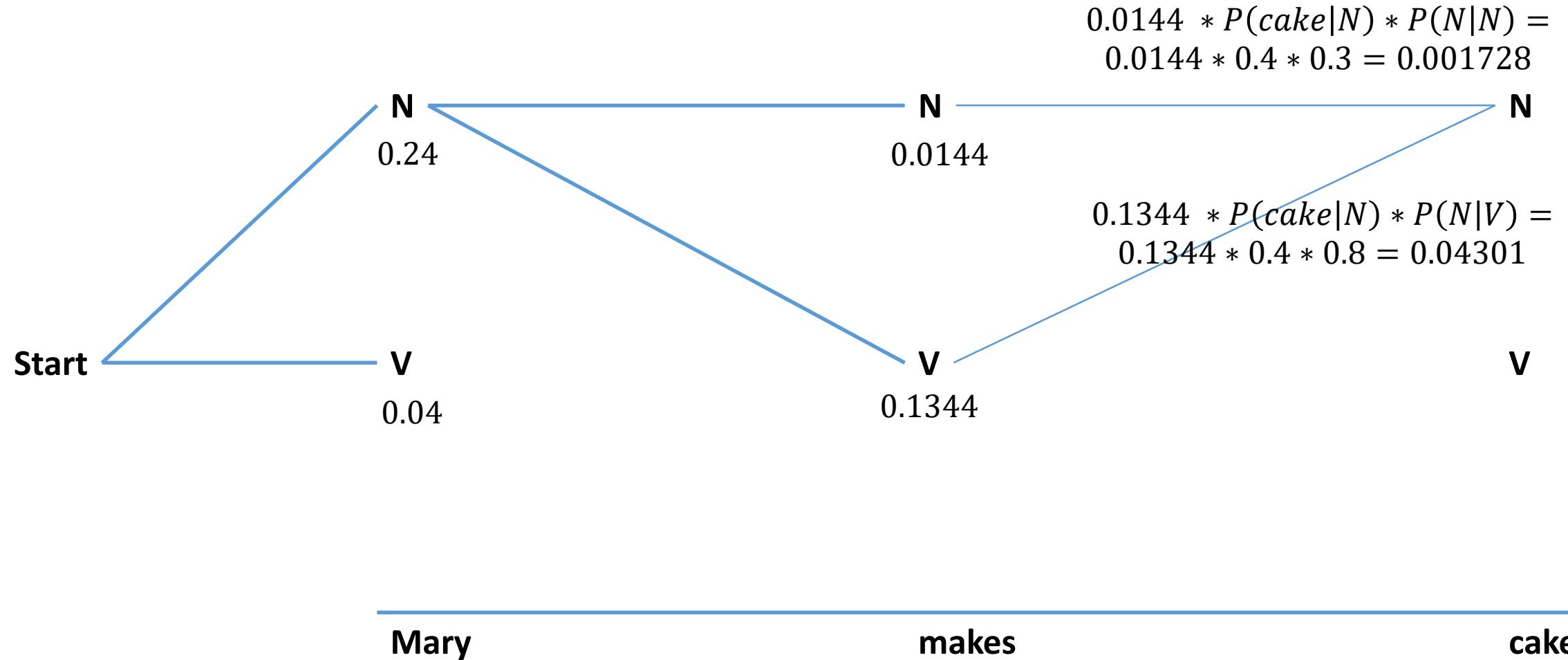


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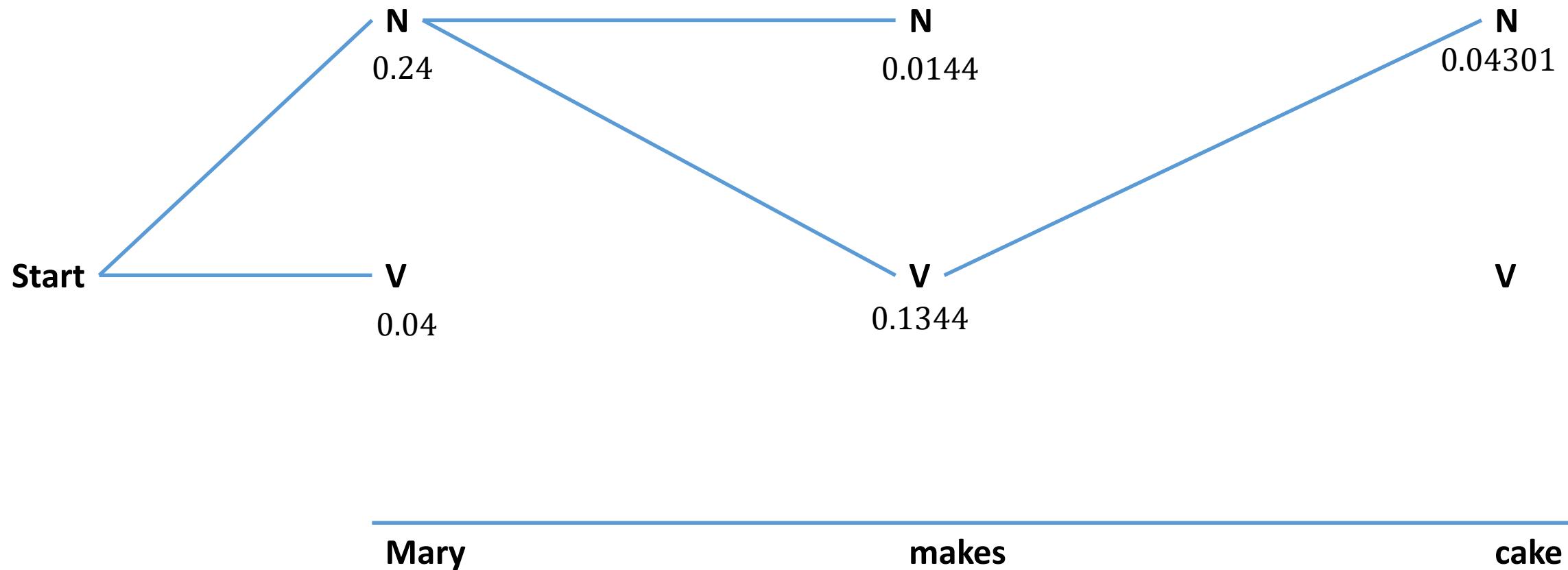


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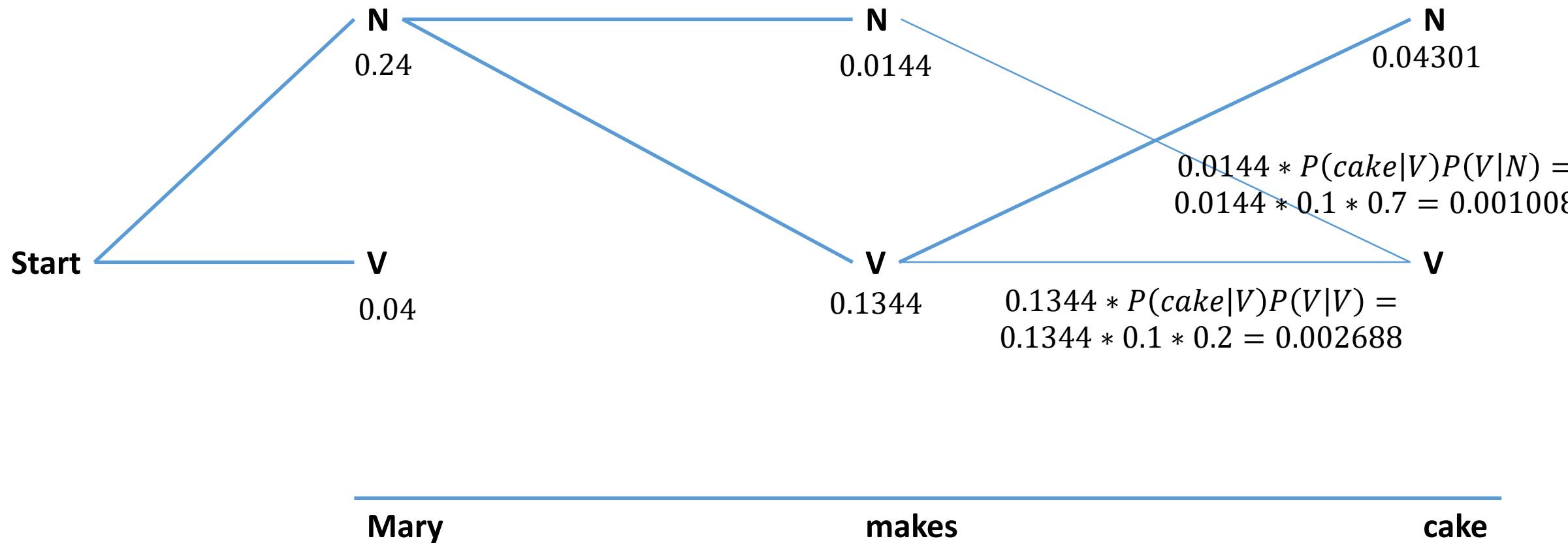


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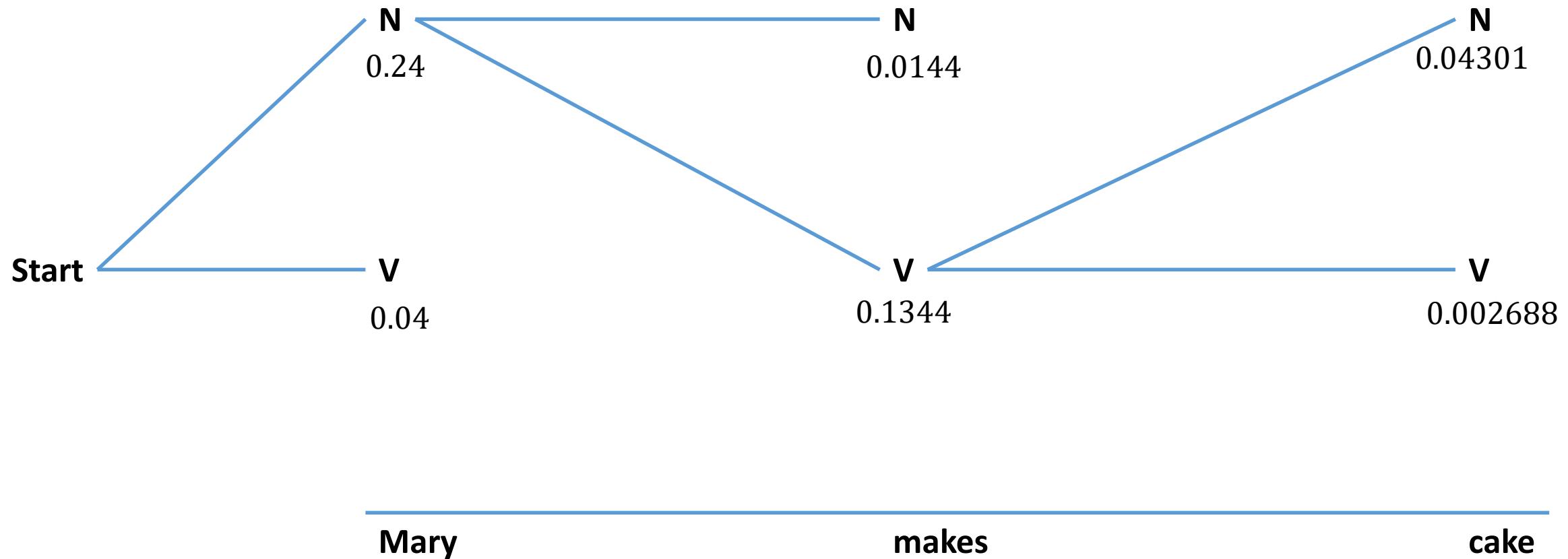


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wahrscheinlichste Wortarten-Folge

