The formula states that if \( \delta(q, x) = 0 \), then \( \delta(q, xy) = \delta \left( \delta(q, x), y \right) \). This means that for any state \( q \), input letter \( x \), and output letter \( y \), the new state \( \delta(q, xy) \) is equal to the state \( \delta \left( \delta(q, x), y \right) \) which is defined recursively.

Causal:

1. Given a formal language \( L \) and a string \( x \) in \( L \), the string \( x \) is accepted by the automaton if there exists a path from the start state to a final state.
2. Given a formal language \( L \) and a string \( x \) in \( L \), the string \( x \) is accepted by the automaton if there exists a path from the start state to a final state.

The proof is by induction on the length of the string \( y \).

Base Case:
- For \( |y| = 0 \), the string is the empty string \( \epsilon \).
- The formula \( \delta(q, x\epsilon) = \delta(q, x) \) holds.

Inductive Step:
- Assume the formula holds for strings of length \( n \).
- Let \( y = y_1\sigma \), where \( \sigma \) is a single letter.
- The formula \( \delta(q, xy) = \delta \left( \delta(q, x), y \right) \) holds.

This completes the proof of the formula for all strings of any length.