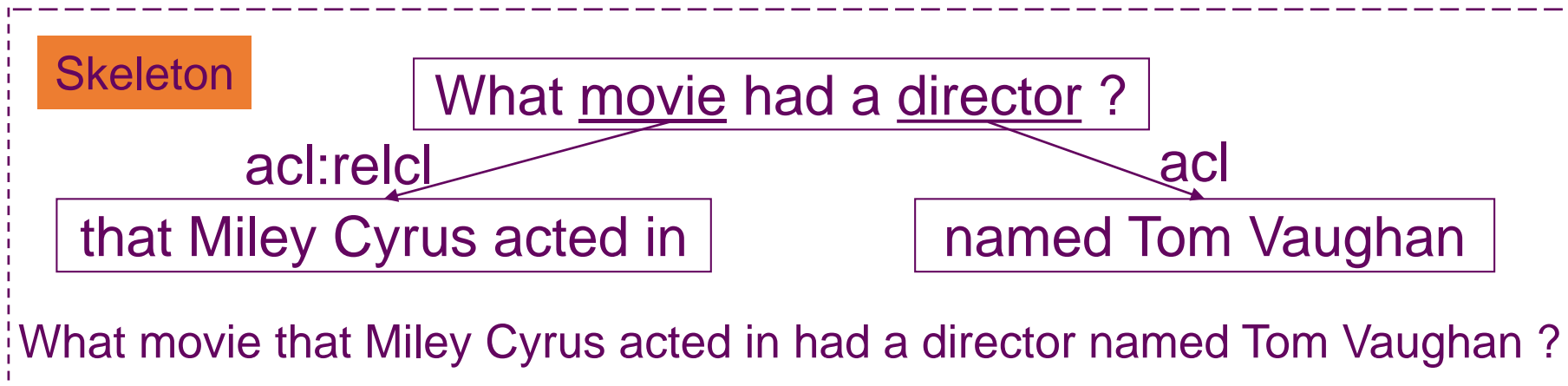# SPARQA: Skeleton-based Semantic Parsing for Complex Questions over Knowledge Bases

■ Skeleton (a coarse-grained directed tree)

● Span: minimum semantic unit

● Attachment relation: seven dependency relations

Skeleton

What <u>movie</u> had a <u>director</u> ?

acl:relcl

acl

that Miley Cyrus acted in

named Tom Vaughan

What movie that Miley Cyrus acted in had a director named Tom Vaughan ?

SPARQA: Skeleton-based Semantic Parsing for Complex Questions over Knowledge Bases
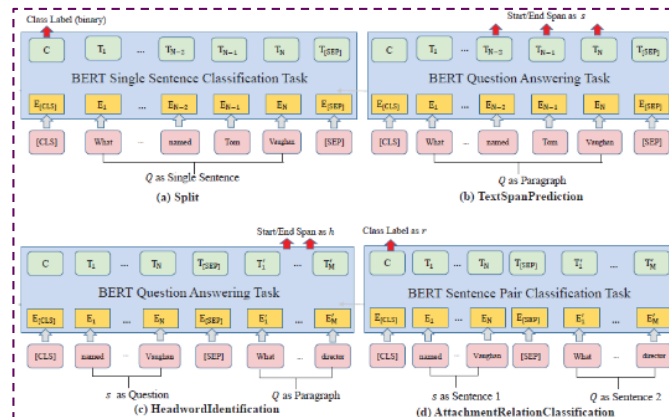
■ BERT-based Parsing

Algorithm 1 Skeleton Parsing

Require: A sentence Q
Ensure: The skeleton of Q
  $T \leftarrow$ tree with a root node Q
  while Split(Q) is true **do**
    $s \leftarrow$ TextSpanPrediction(Q)
    $h \leftarrow$ HeadwordIdentification(s, Q)
    $r \leftarrow$ AttachmentRelationClassification(s, Q)
    Remove s from Q
    Grow T with relation r from $h \in Q$ to s
  end while
  return T

(a) Split (b) TextSpanPrediction (c) HeadwordIdentification (d) AttachmentRelationClassification

Step 1 What movie that Miley Cyrus acted in had a <u>director</u> ?
  → acl → named Tom Vaughan

Step 2 What <u>movie</u> had a <u>director</u> ?
  → acl:relcl → that Miley Cyrus acted in
  → acl → named …