Recall generative linguistic knowledge (knowl. of a language) consists of:

- a **lexicon**: a set of elementary signs (morphemes) with assoc. meanings
- a **grammar**: a set of rules for composing signs and meanings

Each elementary sign (morpheme) in the lexicon consists of:

1. a **form**: spoken pronunciation (/kæt/) or written form (‘cat’)
2. a **meaning**: what the sign signifies
   - **referent**: instance/token in memory/imagination (e.g. ‘my cat’ → Kiki)
   - **sense**: concept/class/type of instance (Cat); not set, can be hypothetical
     (note, this class can also be a referent: ‘cats’ (class) ‘are mammals’)

Senses are often associated with dictionary definitions, but problematic:

- **Bachelor**: applies to monks?
- **Game**: includes pretending to be a princess? (has rules, like improv...)
Evidence for Lexical Structure

Solution: treat word senses as collection of associated concepts

Collins & Quillian ’69: does lexicon have structure?

▶ stimuli: ‘a canary can sing?’ / ‘... can fly?’ / ‘... has skin?’ / ‘a canary can swim?’ / ...
‘a canary is a canary?’ / ‘... a bird?’ / ‘... an animal?’ / ‘a canary is a fish?’ / ...

▶ measure: → ‘yes’/‘no’ reaction time

▶ results: ‘... is a canary’ < ‘... is a bird’ < ‘... is a animal’ < ‘... can sing’ < ‘... can fly’ < ‘... has skin’

C&Q conclude lexicon has network structure, facts attach to concepts

Semantic Network orig. in Artificial Intelligence / Translation: Richens’56

C&Q add spreading activation (simple representation of neuron behavior):
▶ originates at terms in stimulus
▶ propagates in parallel along paths or relations (connectivity facilitates)
▶ automatic
▶ diminishes / decays
Evidence for Lexical Structure

Collins & Quillian ’70: deduction requires network traversal
- stimuli: ‘a canary can fly’/‘... can sing’; ‘a canary is a bird?’
- measure: → ‘yes’/‘no’ reaction time
- results: facilitation for en-route proposition

Reaction times may differ by familiarity (Collins & Loftus ’74):
- stimuli: ‘a canary is a bird?’ / ‘an ostrich is a bird?’
- measure: → ‘yes’/‘no’ reaction time
- results: ‘canary ...’ is faster b/c ostrich is weird (...or just rare?)
Suggest network has weights: low weight → delay, high weight → quick
Experimental Tasks and Effects

Collins & Quillian ’70 is an example of a semantic decision task.

Types of experimental tasks:

- **semantic decision** task: is a house a structure? (Meyer & Ellis ’70)
- **lexical decision** task: is ‘duck’ a word? (Meyer & Schvaneveldt ’71)
- **naming** task: what’s this called? (picture of an orange)

Collins & Quillian ’70 is an example of a semantic priming effect.

Types of priming effects:

- **semantic priming**: similar word facilitates (robin → bird)
- **form priming**: similar parts of word (‘pear’ → ‘chair’)
- **mediated priming**: lion → stripes (via tiger)
- **associative priming**: facil. by co-occurring concept (police → jail)

BTW: priming not symmetric (N. Korea → China, not reciprocal)
Rhodes & Donaldson ’08: is semantic priming just associative priming?

- stimuli: assoc+ sem+: ‘dog’, ‘cat’
  assoc+ sem-: ‘fountain’, ‘pen’
  assoc- sem+: ‘bread’, ‘cereal’
  assoc- sem-: ‘beard’, ‘tower’

- measure: ERP N400

- results: assoc+ (sem+/-) elicits N400, assoc- (sem+/-) doesn’t
Evidence against Lexical Structure

Smith, Shobin, Rips ’74: distance explanation has problems

- stimuli: ‘is a chicken a meteor?’
- measure: → ‘yes’/‘no’ accuracy, reaction time
- results: obviously false sentences rejected quickly

Not compatible with weighted network, since weight would be low

Implicates a feature-based model

- very similar features (close inheritance) → quick ‘yes’
- very dissimilar features (chicken & meteor) → quick ‘no’
- only some features match → slow

Also accommodates associative priming

Collins & Quillian ’95 say sem net can do this w. negative links