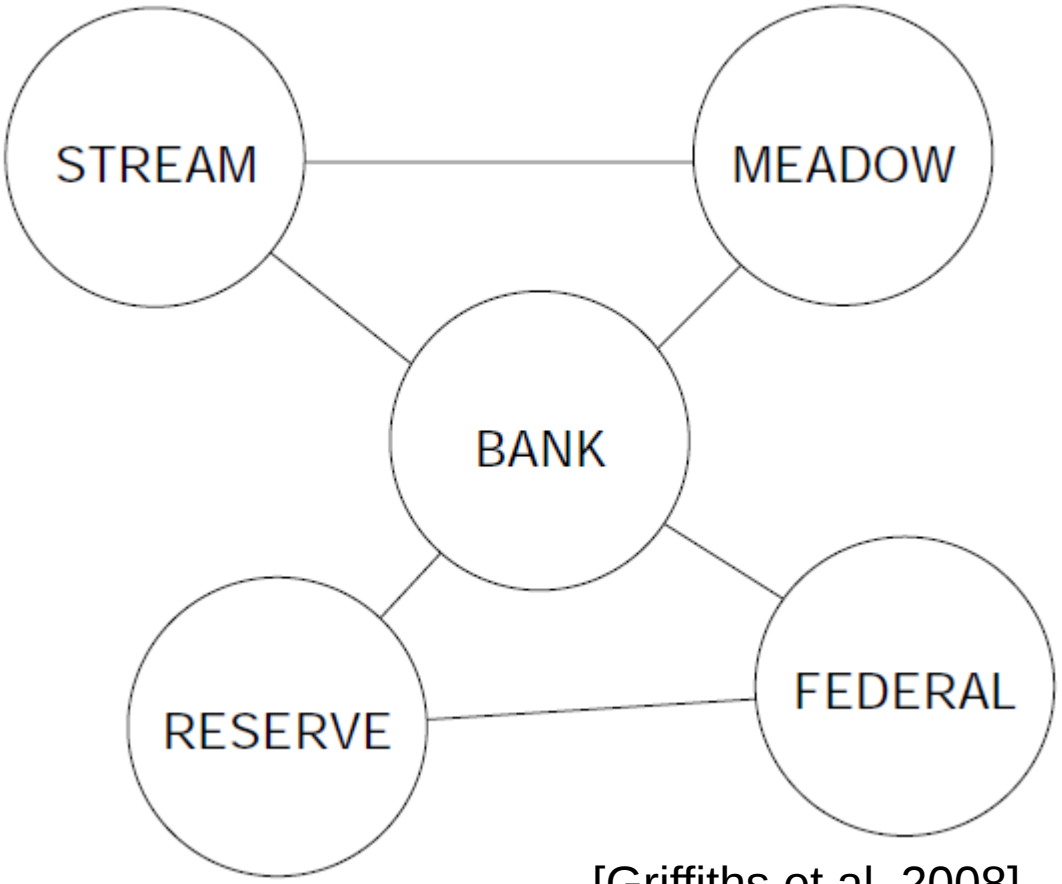
Computational Models of Mind

- Classical (symbolic, rule-based)
- Connectionist (perceptrons, neural networks)
- Bayesian (probabilistic with priors)

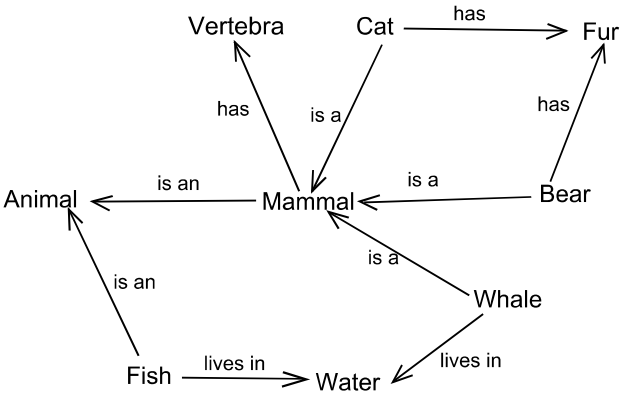
- Bridging approaches: Conceptual spaces, Word vectors

Large-scale structure of semantic memory

- Semantic networks



[Griffiths et al. 2008]

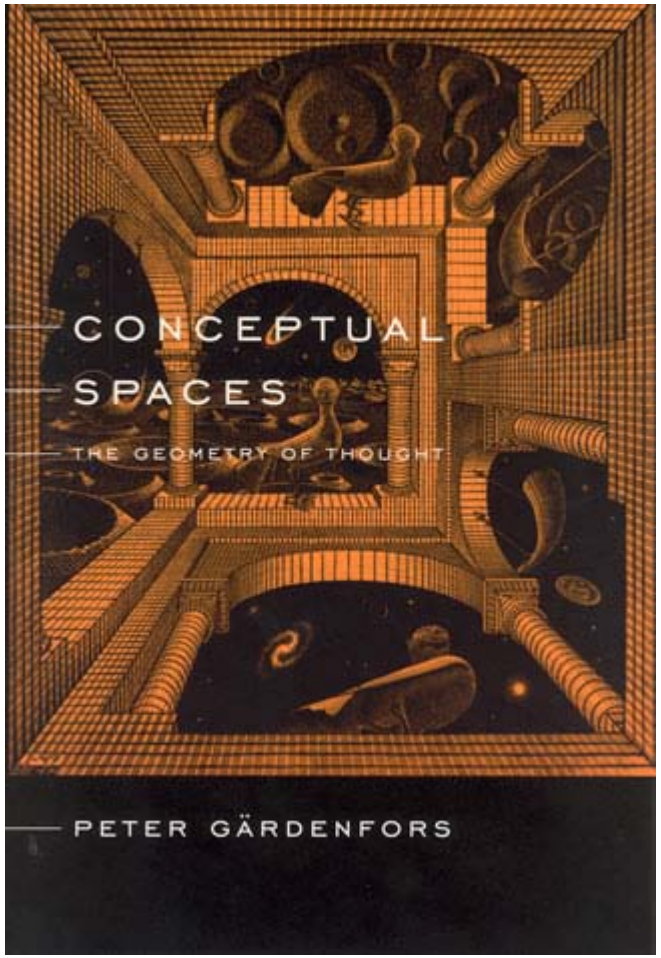


[Wikipedia]

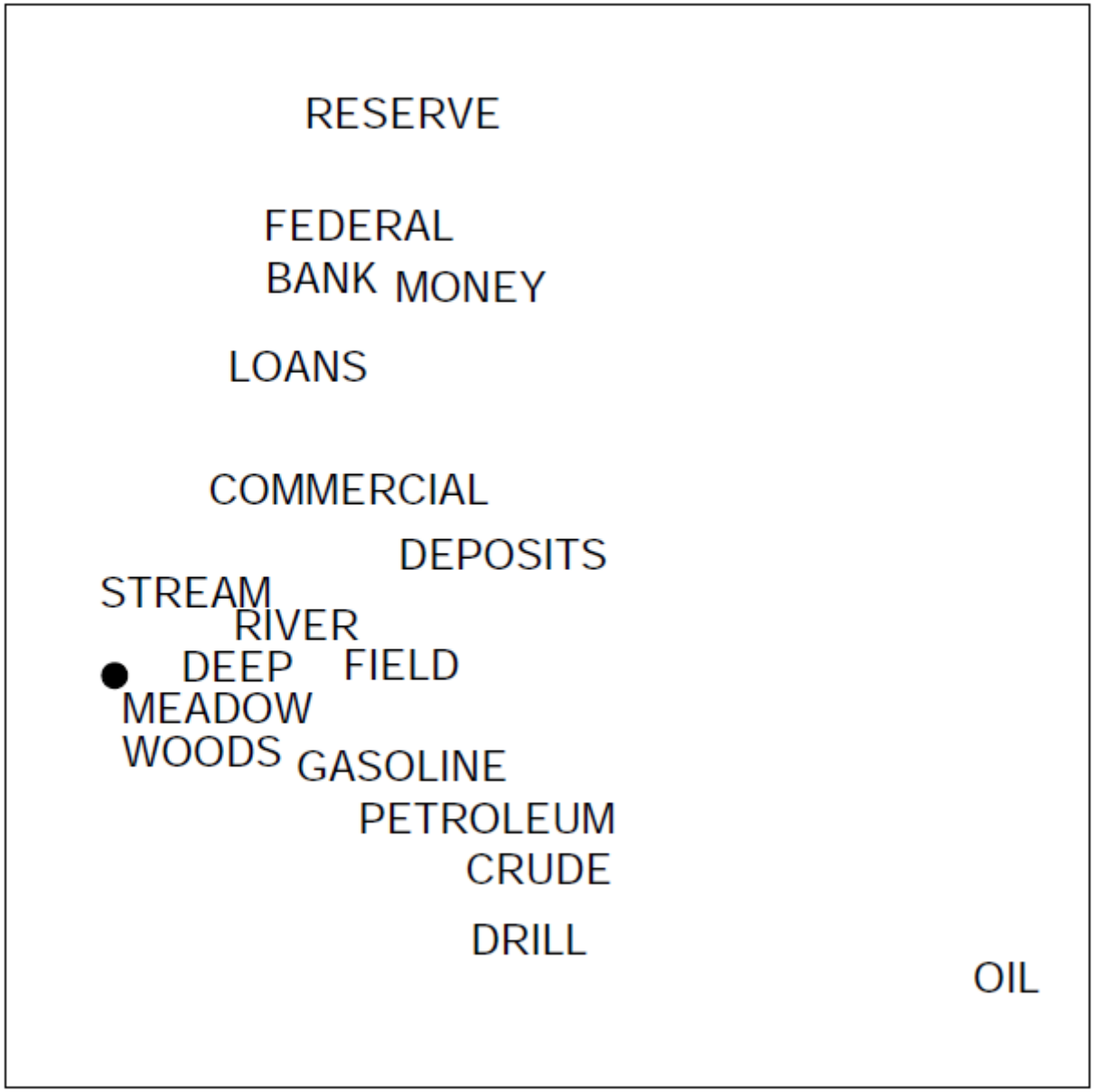
WordNet

Large-scale structure of semantic memory

- Semantic spaces



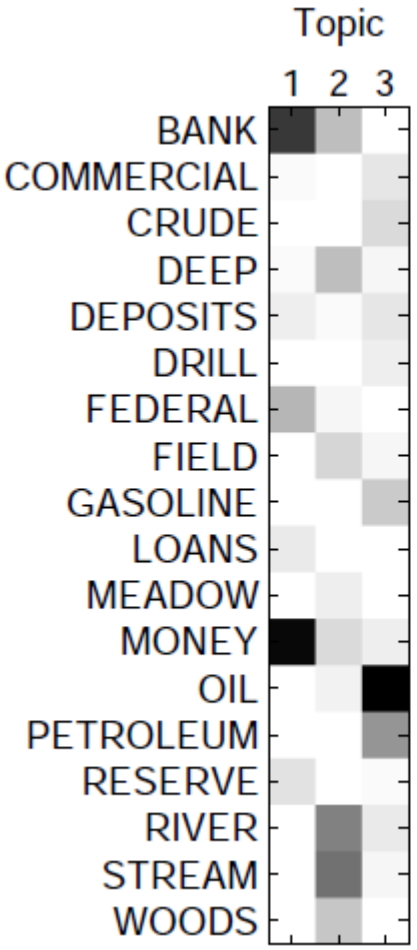
[MIT Press]



[Griffiths et al. 2008]

Large-scale structure of semantic memory

- Probabilistic topic models



MONEY	STREAM	OIL
BANK	RIVER	PETROLEUM
FEDERAL	BANK	GASOLINE
RESERVE	DEEP	CRUDE
LOANS	WOODS	COMMERCIAL
DEPOSITS	FIELD	DEPOSITS
COMMERCIAL	MONEY	RIVER
DEEP	MEADOW	DRILL
MEADOW	OIL	MONEY
OIL	FEDERAL	DEEP
RIVER	DEPOSITS	FIELD
CRUDE	LOANS	STREAM
DRILL	COMMERCIAL	RESERVE
FIELD	CRUDE	BANK
GASOLINE	DRILL	LOANS
PETROLEUM	GASOLINE	FEDERAL
STREAM	PETROLEUM	MEADOW
WOODS	RESERVE	WOODS

[Griffiths et al. 2008]

Large-scale structure of semantic memory

- Probabilistic topic models
  - Provide a way to deal with polysemy and homonymy

PRINTING	**PLAY**	TEAM	JUDGE	HYPOTHESIS	STUDY	**CLASS**	ENGINE
PAPER	PLAYS	GAME	TRIAL	EXPERIMENT	**TEST**	MARX	FUEL
PRINT	STAGE	BASKETBALL	**COURT**	SCIENTIFIC	STUDYING	ECONOMIC	ENGINES
PRINTED	AUDIENCE	PLAYERS	CASE	OBSERVATIONS	HOMEWORK	CAPITALISM	STEAM
TYPE	THEATER	PLAYER	JURY	SCIENTISTS	NEED	CAPITALIST	GASOLINE
PROCESS	ACTORS	**PLAY**	ACCUSED	EXPERIMENTS	**CLASS**	SOCIALIST	AIR
INK	DRAMA	PLAYING	GUILTY	SCIENTIST	MATH	SOCIETY	**POWER**
PRESS	SHAKESPEARE	SOCCER	DEFENDANT	EXPERIMENTAL	TRY	SYSTEM	COMBUSTION
IMAGE	ACTOR	PLAYED	JUSTICE	**TEST**	TEACHER	**POWER**	DIESEL
PRINTER	THEATRE	BALL	**EVIDENCE**	METHOD	WRITE	RULING	EXHAUST
PRINTS	PLAYWRIGHT	TEAMS	WITNESSES	HYPOTHESES	PLAN	SOCIALISM	MIXTURE
PRINTERS	PERFORMANCE	BASKET	CRIME	TESTED	ARITHMETIC	HISTORY	GASES
COPY	DRAMATIC	FOOTBALL	LAWYER	**EVIDENCE**	ASSIGNMENT	POLITICAL	CARBURETOR
COPIES	COSTUMES	SCORE	WITNESS	BASED	PLACE	SOCIAL	GAS
FORM	COMEDY	**COURT**	ATTORNEY	OBSERVATION	STUDIED	STRUGGLE	COMPRESSION
OFFSET	TRAGEDY	GAMES	HEARING	SCIENCE	CAREFULLY	REVOLUTION	JET
GRAPHIC	**CHARACTERS**	TRY	INNOCENT	FACTS	DECIDE	WORKING	BURNING
SURFACE	SCENES	COACH	DEFENSE	DATA	IMPORTANT	PRODUCTION	AUTOMOBILE
PRODUCED	OPERA	GYM	CHARGE	RESULTS	NOTEBOOK	CLASSES	STROKE
CHARACTERS	PERFORMED	SHOT	CRIMINAL	EXPLANATION	REVIEW	BOURGEOIS	INTERNAL

[Griffiths et al. 2008]

[Griffiths et al. 2008]

Learning probabilistic topic models