EL1101E Nature of Language

AY 25/26 Sem 2 — github/omgeta

1. Introduction

Linguistics is the descriptive scientific study of language as a system and as a social phenomenon. It studies:

i. How language is acquired
ii. How it is processed in the brain
iii. How it can be processed by computers
iv. How it changes over time
v. How it varies by situation
vi. How it functions in society

Big Questions:

i. Do all languages share an underlying structure?
ii. Is the way you think shaped by languages spoken?
iii. Is language learned and processed in the brain differently from other skills?

Qualtitative and Quantitive Research Methods:

i. Analytical Reasoning: observation of data and identification of patterns
ii. Brain Imaging
iii. Acoustic Analysis
iv. Statistical Analysis of Corpora
v. Ethnographic Fieldwork

Knowledge of Language:

i. Function: knowing how to communicate
ii. Form: knowing the words of that language and the rules for putting them together

Key Features of Language:

i. Arbitariness: of units to concepts
ii. Discreteness: discrete units with levels of structure
iii. Compositionality: of larger units by smaller units
iv. Productivity: using finite grammar to compose infinite number of utterances
v. Rule-governedness: set of conventional rules

2. Phonetics

Phonetics is the study of speech sounds. Areas:

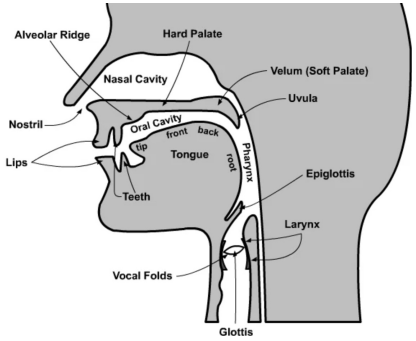
i. Articulatory: how speech sounds are produced
ii. Acoustic: acoustic properties of the speech signal
iii. Auditory: listeners' perception of speech sounds

Abstractions:

i. Speech Stream: speech as a continuous stream
ii. Speech Chain: production/perception is a chain
    - linguistic → physiological → acoustic → physiological → linguistic

Speech Production:

i. Voice is powered by air from the lungs
ii. Speech is the molding of air by the vocal tract as it travels to escape through our mouth and nose
iii. Voiced/Voiceless: vocal folds vibrate/ don't vibrate
iv. Nasal/Oral: velum lowered/ raised



Consonants: airflow via oral cavity is obstructed

i. Voicing (voiced vs. voiceless)
ii. Place of articulation (location of obstruction)
iii. Manner of articulation (cause of obstruction)

Vowels: airflow via oral cavity is unobstructed

i. Rounding: rounded vs. unrounded lips
ii. Height: tongue height (high, mid, low)
iii. Frontness: tongue position (front, central, back)
iv. Tenseness: effort (tense, lax)
v. Monophthongs vs. diphthongs (steady, transient)

Places of Articulation (English):

i. Bilabial: obstruction made with two lips
ii. Labiodental: lower lip against upper teeth
iii. Interdental: tongue between teeth
iv. Alveolar: tongue at/near alveolar ridge
v. Post-alveolar: tongue just behind alveolar ridge
vi. Palatal: tongue body against/near hard palate
vii. Velar: tongue body against/near velum
viii. Glottal: constriction at glottis

Manners of Articulation (English):

i. Stops: complete closure of oral cavity
    - Plosive: followed by release of closure
    - Nasal: airflow redirected through the nose
ii. Fricatives: partial constriction causing turbulence
iii. Affricates: stop + fricative as a single segment
iv. Approximants: narrowing but no turbulence
    - Liquid: relatively open constriction
    - Glide: very vowel-like

IPA (International Phonetic Alphabet):

i. Characters + diacritics representing speech sounds
ii. Consistent representation across all languages
iii. Narrow (specific) vs. broad (general) transcriptions

Lexical Stress:

i. Stress: emphasis placed on a specific linguistic unit
ii. Lexical Stress: emphasis placed on a specific syllable within a word
iii. Stressed syllables are higher, louder, and longer; unstressed vowels are likely to be reduced
iv. Primary stress: one syllable receives primary stress (optionally, mark with ['])
v. Secondary stress: longer words sometimes have secondary stress (optionally, mark with [,])

3. Phonology

Phonology is the study of the structures and patterns of speech sounds within languages.

Representations:

i. Phone: basic unit of speech sound
ii. Phoneme: phonological units that contrast in a language, i.e. replacement forms different word (e.g. /t/)
iii. Allophone: possible phone realization of a phoneme (e.g. [t], [ɾ], [t^h], etc.)
iv. Language-specific: allophones vary
v. Phones can realise more than one phoneme

Phone Distributions:

i. Contrastive: two phones can occur in the same phonological environment ⇒ different phonemes
   - Minimal pairs: words differ by only one sound
ii. Complementary: two phones never occur in the same phonological environment ⇒ likely allophones
   - Must also be phonetically similar (share features)
iii. Free: two phones can occur in the same phonological environment as alternate pronunciation of same word ⇒ allophones

Phonological Rules describe when a phoneme is realised as a particular allophone:

i. Maximise Parsimony: simple, broad coverage
ii. Natural Classes: group of phones defined by phonological similarity (e.g. "voiced plosive")
iii. Format: $A \rightarrow B$ / [env. 1] _ [env. 2]
   - A realised as B when it occurs after env. 1 and before env. 2; else, realized by default as A
   - Features: used for natural classes
   - IPA: used for specific segments
iv. Environmental Symbols:
   - $: syllable boundary
   - #: word boundary
   - V, C: vowel, consonant
   - ∅: deletion

Common Phonological Patterns:

i. Assimilation: nearby sounds become more similar
ii. Dissimilation: nearby sounds become less similar
iii. Epenthesis: insert a phone
iv. Deletion: underlying phoneme is not realised on the surface phonetic level
v. Metathesis: switch sounds

Phonotactics describe constraints on where phones can appear in a language:

i. Language-specific: a sequence can use existing phonemes but still be ill-formed
ii. Syllables: primary prosodic unit
   - Prosody: rhythm, stress, intonation
   - Structure: Onset + Rime (Nucleus + Coda)
   - Must have a nucleus; onset and coda are optional
   - Dots in IPA indicate syllable boundaries
iii. Sonority Hierarchy:
   - Relative loudness of phones
   - vowels > approximants > nasals > fricatives > affricates > plosives
   - More sonorous phones tend to be closer to the syllable nucleus

Example Phonotactic constraints (English):

i. If the first consonant in a complex onset is not an /s/, the second must be a liquid or glide
   - OK: *trap, glum, break, please, cute, quake*; *stare, sphere, scare, spare*
   - Ill-formed: **ksare*, **tfare*
ii. If the second consonant in a complex coda is voiced, so is the first
   - OK: *bend, bent, best*
   - Ill-formed: **besd*

4. Morphology

Morphology is the study of words and their structure.

Morpheme is the smallest meaningful unit in a language:

i. Bound: cannot stand as an independent word
ii. Free: can stand on its own as a simple word

Affixes form most bound morphemes:

i. Occur more than once in the lexicon
ii. Have identifiable meaning/ grammatical function
iii. Be added to modify core meaning
iv. Types: prefix, suffix, infix, circumfix

Productive vs. Unproductive Affixes:

i. Productive: new words are commonly made using it
ii. Unproductive: falls out of use over time

Inflectional vs. Derivational Affixes:

i. Derivational: creates a new word with a different meaning (often different part of speech)
   - Class-changing (e.g. V→N; ADJ→ADV)
   - Class-maintaining (same class in → out)
ii. Inflectional: expresses grammatical information (e.g. tense, number); always class-maintaining
iii. Function over Form: identify morphemes by how they are used, not just by shape

Non-affix Bound Morphemes

i. Cranberry Morphemes: bound morphemes with no clear meaning (often due to language change/ borrowing; e.g. cran-, twi-)
ii. Bound Roots: roots that carry core meaning but cannot occur alone (common in some languages)

Grammaticalization:

i. Process where a free morpheme gradually serves a fixed grammatical function over time
ii. Involves phonological reduction + loss of syntactic freedom, sometimes into a bound morpheme (e.g. hope-full → hopeful, happy-like → happily)

Roots, Stems, Compounds:

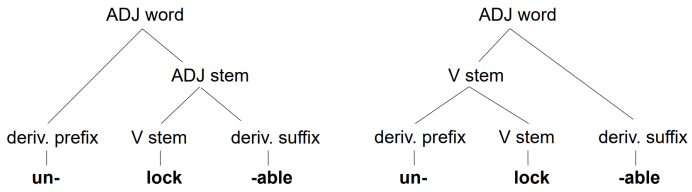
i. Root: primary indivisble morpheme
   - In English, almost always free morphemes
ii. Stem: unit that an affix attaches onto
   - Can be root alone, or root + affix(es)
iii. Compound Word: multiple stems combined
   - Orthography is irrelevant (e.g. hyphens)
iv. Stress test:
   - Compounds: stress first stem
   - Two-word sequences: stress both words

Word is the smallest meaningful unit that can occur alone:

i. Orthographic Word: "stuff between spaces" (useful, but not sufficient cross-linguistically)
ii. Word Boundary Criterion:
   - Orthography (e.g. spaces)
   - Phonology (stress patterns; word-internal rules)
   - Divisibility (can you insert more material?)
   - Pause (can speakers pause here?)

Word Structure:

i. Affixes have constraints on what classes they attach to and what they create
ii. Multiple affixation can force an order of formation (intermediate forms must be well-formed)
iii. Word structure is hierarchical:
   - Binary-branching
   - Each node has a label
   - Each stage must be a well-formed word
iv. Ambiguity arises if more than one tree is possible



5. Word Classes

Word Classes categorise words based on grammatical behaviour, not just meaning:

i. Noun (incl. pronoun): entities
ii. Verb: actions
iii. Adjective: descriptors for nouns
iv. Adverb: descriptors for verbs
v. Preposition: indicate time/place/direction/manner
vi. Determiner: specify nouns
vii. Conjunction: link words/phrases/clauses
viii. Auxiliary Verb: helping verbs

Content vs. Function Words:

i. Content Words:
   - Incl. nouns, verbs, adjectives, adverbs
   - Open-class: can easily add new words
   - Contentful: easily defined meaning
ii. Function Words:
   - Incl. determiners, pronouns, conjunctions, prepositions, auxilaries
   - Closed-class: lexicon relatively stable
   - Serve grammatical functions, relationships between content words

Word Formation:

i. Affixation
ii. Compounding
iii. Conversion: change word class with no new morphemes added
iv. Backformation: from reanalysis of structure
v. Clipping: cutting off part of a word
vi. Blending: combining clippings into a blend
vii. Acronym: initials pronounced as a word
viii. Initialism: pronounced as letters

6. Syntax

Syntax is the study of rules underlying sentence structure.

i. Grammaticality does not depend on acceptability/meaningfulness of the sentence
ii. Approaches:
   - Top-down: how can we parse a sentence?
   - Bottom-up: what rules determine how words fit?

Constituents are chunks that operate as a single unit:

i. Types: words, phrases, sentences
ii. Constituency Tests:
   - Topicalization: move a chunk to the front
     * *In linguistics, Kunmei tutors us.*
   - Clefts: *It is X that Y*
     * *It is in linguistics that Kunmei tutors us.*
   - Pseudoclefts: *X is what Y*
     * *Tutors us in linguistics is what Kunmei does.*
   - Substitution: replace chunk with a pronoun / known constituent (e.g. *it*, *do so*)
     * *Yunbo tutors us in linguistics and Kunmei does, too.*
   - Deletion: if the chunk can be removed
     * *Kunmei tutors us.*
   – Not 100% reliable, but passing > 1 test is strong evidence for constituency

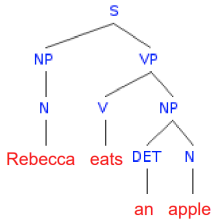
Phrase is an intermediate between words and sentences:

i. Head: determines the phrase's syntactic class:
   - Noun Phrase (NP)
   - Verb Phrase (VP)
   - Prepositional Phrase (PP)
ii. Head Test: "A Y is a type of X"
   - "The yellow box" is a type of "box"
   - "ate an apple" is a type of eating
   - "in the little box" is a type of in-position

Phrase Structure:

i. Rules indicate what types of constituents can make up different classes of phrases. In English:
   - NP → (Det) (Adj)* N (PP)
   - PP → P NP
   - VP → V (NP) (NP) (PP)
   - S → NP VP (Complete Sentence)

ii. Syntax Trees: represent hierarchical structure
   - A string is a constituent ⇔ there is a node that exclusively dominates that sequence



Sentence Constituents:

i. Subject (NP)

ii. Predicate (VP)
   - Main: verbs differ in how many and what types of arguments they take
     * Intransitive: subject only (no object)
     * Transitive: subject + object
     * Ditransitive: subject + two objects
   - Auxiliary: modify the grammatical function and meaning of the main verb
   - Argument: necessary for predicates' meaning
   - Adjunct: optional; adds information about how something occurred

Recursion:

i. Nesting: rules can generate infinitely long sentences

ii. Coordination: link constituents of the same syntactic class as sisters

iii. Subordination: add a subordinate constituent as the daughter of another constituent

Syntactic Ambiguity arises from multiple possible syntactic structures:

i. Example: *She saw the man with the telescope*
   - [VP saw [NP the man] [PP with the telescope]] - used a telescope to see the man
   - [VP saw [NP the man [PP with the telescope]]] - saw a man carrying a telescope

ii. Garden-path Sentence: difficult to parse initially due to ambiguity
   - *The horse raced past the barn fell.*

iii. Demonstrates parsing strategies and how syntax interacts with processing.

Word Order:

i. Basic Syntactic Roles: subject, verb, object.

ii. Word Order Typology:
   - SVO: English, Chinese, Malay, French
   - SOV: Japanese, Tamil, Korean
   - VSO: Tagalog, Irish Gaelic, Arabic
   - VOS/OVS rare: Malagasy

iii. Generalisation: subjects tend to precede objects

Morphology-Syntax Tradeoff:

i. Inflectional Morphology: changes on a word mark grammatical information (case, number, agreement)

ii. Analytic Languages: minimal inflectional morphology, stricter word order
   - English: *Rebecca gave Melody a dog* ≠ *Melody gave Rebecca a dog*
   - Roles are largely signalled by position (subject/object/indirect object)

iii. Synthetic Languages: rich inflectional morphology, freer word order
   - Latin: dominus (nominative), domine (vocative) Troia est in Asia = Troia in Asia est

iv. Generalisation: languages converge to balance overall grammatical complexity

7. Semantics

Semantics is the study of meaning in language.

i. Referent Approach: meaning is tied to the referent
   - Referent: the object/entity a word refers to; can be constant or variable
   – Frege's Puzzle: same referent can lead to different truth in different belief contexts
     - Solution: Sense: way term refers to referent

ii. Non-referring Expressions: meaningful with sense
   - Truth-value gap: neither true nor false (no referent to evaluate against)

Word Meaning Relationships:

i. Similar Form, Different Meanings:
   - Homophone: same pronunciation, diff. spelling
   - Homograph: same spelling, diff. pronunciation
   - Homonym: same spelling and pronunciation
   - Polyseme: same word used in diff. related sense

ii. Hyponomy: if $A \subseteq B$
   - A is a hyponym of B
   - B is a hypernym of A

iii. Similarity/Opposition:
   - Synonyms: words with the same/similar meaning
   - Antonyms: words with opposite meaning
     * Gradable: ends of a continuous scale
     * Complementary: no middle ground (can be used gradably metaphorically)
     * Relational: opposite roles in a relationship ("if there is an X, there must be a Y")

Semantic Shift/Drift is the change of meaning in words over time. Patterns:

i. Narrowing: meaning becomes more specific (e.g. *girl*: child of either sex → female child)
ii. Broadening: meaning becomes more general (incl. genericization; e.g. *Kleenex, Hoover, Google*)
iii. Upgrading: meaning becomes more positive (e.g. *nice*: stupid → kind or pleasant)
iv. Downgrading: meaning becomes more negative (e.g. many terms for *women*: *wench, tart, bitch*)

Sentence Meaning Relationships:

i. Entailment: if A is true, B must be true
   - *Taylor bought a poodle* ⇒ *Taylor bought a dog*
ii. Contradiction: if A is true, B must be false
   - *Taylor bought a dog* ⇒⇐ *Taylor didn't buy a dog*
iii. Paraphrase: A and B entail each other
   - *He killed it* ⇔ *It was killed by him*
iv. Presupposition: If A presupposes B, then both A and *not* A still assume B (background assumption that survives negation)
   - *Lee is (not) the current Prime Minister of Singapore* ⇒ *Singapore has a Prime Minister*
   - Presupposition Triggers:
     * Factive Verbs: *I (didn't) realize she was sick*
     * Clefts: *It (wasn't) my phone that exploded*
     * Temporal Clauses: *She (didn't) call me before she went to dinner*
     * Change of State: *It (hasn't) stopped raining*

8. Pragmatics

Pragmatics is the study of meaning in context.

Speech Acts:

i. Utterances convey meaning and make listeners do specific things
   - Not all utterances have truth values
   - Saying something is doing something
   - Different words can achieve the same outcome
   - Utterances can be the same but with different intent or effect depending on context
ii. Components:
   - Locution: utterance
   - Illocution: intention
   - Perlocution: effect
iii. Performatives: not true/false; change social reality under particular (felicity) conditions
   - *I now pronounce you man and wife.*
   - "Hereby" test: *I hereby apologize* vs. **I hereby bought a phone*
iv. Searle's Speech Act Classification:
   - Representative: express beliefs (true/false)
   - Directive: get the addressee to do something (incl. questions as a subtype)
   - Commissive: commit speaker to future action
   - Expressive: express emotional state
   - Declaration: bring about a state of affairs

Conversational Implicature:

i. Cooperative Principle: safe assumption that interlocutors contribute appropriately to the accepted purpose/direction of the exchange
ii. Gricean Maxims:
   - Quality: be truthful
   - Quantity: be as informative as required
   - Relation: be relevant
   - Manner: be clear and orderly
iii. Flouting Maxims:
   - Generates implications via cooperative principle
     * Context-dependent
     * Cancellable
   - Quantity (under-informative):
     * A: *Did you contact the prof and the tutor?* B: *I contacted the tutor.*
     * Implicature: B did not contact the prof
   - Quality (sarcasm):
     * A: *Do I look okay in this dress?* B: *No, it's so hideous.*
     * Implicature: B thinks A knows perfectly she looks great (B's true views are obvious to A)
   - Relation (surface irrelevance):
     * A: *Can we meet up on Friday?* B: *My sister wants me to go shopping with her.*
     * Implicature: B can't meet up on Friday
   - Manner (obscuring / lack of clarity):
     * Journalist: *...what have you got wrong, so that you get it right next time?* Boris: *I think, Laura, when you look back...*
     * Implicature: the speaker does not wish to cooperate with the narrative implied
iv. Tests:
   - "and not" test: implicatures are cancellable
     * A: *My sister has been to Taiwan, and I have too.*
   - "but" test: can make the implicature explicit
     * *My sister has been to Taiwan, but I haven't.*

Politeness Theory:

i. Politeness: interacting harmoniously; avoiding conflict/offense (culture- and context-dependent)
ii. Politeness Strategies:
    - Positive Politeness: show friendliness/closeness
    - Negative Politeness: avoid offense with deference
iii. Face Wants:
    - Positive Face: want to be liked/approved of
    - Negative Face: want freedom of action; freedom from imposition
iv. Face-Threatening Acts (FTAs)
    - Threaten addressee: criticism (positive face), orders (negative face)
    - Threaten speaker: apologizing (positive face), thanking (negative face)
v. Mitigating FTAs (examples):
    - No mitigation: *You've got dirt on your nose.*
    - Positive politeness: *This is really interesting, but I have to get going.*
    - Negative politeness: *I'm so sorry to interrupt, but I have to get going.*
    - Off-record hint: *Wow, look at the time.*
vi. Strategy Choice Factors:
    - Social distance
    - Power difference
    - Cost of imposition

9. Sociolinguistics

Sociolinguistics is the study of how language functions in society.

Variation in Language:

i. Accent: difference in pronunciation
ii. Dialect: difference in pronunciation-related features, lexicon and grammatical structure
iii. Mutual Intelligibility:
    - Not straightforward: can be asymmetric; shaped by experience and attitudes
    - Sociopolitical factors often determine whether varieties are treated as "languages" vs. "dialects"
    - "A language is a dialect with an army and navy."
iv. Sociolinguistic Knowledge: native speakers know how to use language appropriately in different situations
v. Language Use Factors:
    - Linguistic: feature environment
    - Social: difference in speakers
    - Stylistic: choice across situations

Non-standard Language:

i. Language Attitudes:
    - Status: standard speakers rated "intelligent/wealthy/educated"
    - Solidarity: non-standard speakers rated "friendly/trustworthy/kind"
ii. Regional features can index local identity and become commodified
iii. Standard varieties are not inherently better:
    - Misconception: non-standard language is "random/illogical/simplified"
    - All varieties are equally rule-governed, expressive
    - Complexity is not owned by the standard
    - Stigma is social: prestige tracks the social status of the people who use a variant

Identity and Style:

i. Co-constitutive: language reflects identity *and* language helps construct identity
ii. Speaker-focused approach: speakers actively construct styles using linguistic + other resources
iii. Personae: recognizable community identities with conventional attributes
    - Ex. SG: Ah Beng, Taxi Uncle, XMM, Auntie
iv. Indexing and style-building:
    - Features become linked with social meanings; a single feature can index many meanings
    - People mix-and-match features to create new styles

Language Change:

i. Diachronic Linguistics: language change across time
ii. Synchronic Linguistics: language at a time-slice
iii. Languages change incrementally; studied via:
    - Real-time: compare data across time periods
    - Apparent-time: compare age groups at one time

Language Contact:

i. Borrowing: lexical/structural influence
ii. Code-switching: structured alternation in discourse
iii. Contact Languages:
    - Pidgin: reduced system for communication between groups without shared language; no native speakers
    - Creole: stable language that develops from a pidgin and becomes a native language

Language and Justice:

i. Linguistics can be applied to injustice (e.g. forensic linguistics; discrimination; institutional bias)
ii. Accent-based discrimination: differential treatment by accent (e.g. housing enquiries)
iii. Language and police bias: body-cam analysis used to study differences in officer speech

10. Psycholinguistics

Psycholinguistics is the study of the psychology of language.

Language Acquisition:

i. Studying child language is hard ⇒ specialized methods (e.g. head-turn preference)

ii. Early perception:
- Newborns: familiar with rhythms/sounds of caregiver language(s) (womb exposure)
- Perceptual narrowing: perception becomes specialized to native phonology
  - 6 mo: can hear non-native contrasts (e.g. /r/ vs. /l/ for Japanese)
  - 12 mo: reduced sensitivity to non-contrastive differences

iii. Milestones (typical):
- 6 mo: babbling; responds to name
- 12 mo: one-word/holophrastic; understands simple instructions
- 18–24 mo: rapid vocab growth; two-word combinations
- 3–5 yrs: multiword sentences; large receptive/expressive vocab; all vowels + most consonants
- 12 yrs: receptive ∼20k–50k

iv. Learning problems/strategies:
- Mapping problem: many words/day; few directly taught
- Whole object assumption ("gavagai")
- Comprehension > production: *fis* phenomenon

Acquisition Evidence:

i. Error patterns:
- Overregularization: irregulars → rule over-application (go → *goed*; mouse → *mouses*)
- Suggests active rule-building (Go + *-ed* = *goed*)

ii. Universal Grammar + poverty of the stimulus:
- Claim: input lacks enough evidence
- Example:
  - *Anyone who is interested can see me later.*
  - *Can anyone who is interested see me later?*
  - **Is anyone who interested can see me later?*

iii. A critical period?
- Idea: sensitive window (duck imprinting)
- Evidence: age-of-arrival vs. grammar performance (e.g. Johnson & Newport 1989)
- Critics: gradual decline; children still take years; adults have less time

Language in the Brain:

i. Methods:
- Atypical/impaired brains (e.g. stroke)
- Typical brains (direct imaging, e.g. fMRI)
- Indirect evidence from cognition (e.g. speech errors: *"Three cheers for our queer old dean!"*)

ii. Localization (left hemisphere):
- Broca's area: important for speech production
- Broca's aphasia: comprehension relatively intact; difficulty producing speech/syntax
- Wernicke's area: associated with comprehension
- Wernicke's aphasia: fluent syntax but often nonsensical; frequent word substitutions

iii. Beyond Broca/Wernicke:
- Language mostly left-lateralized, but right hemisphere crucial for some tasks (e.g. intonation/emotion)
- Reading Chinese characters involves both hemispheres more than alphabetic reading
- Many additional areas contribute (e.g. switching between languages)

Language Production and Processing:

i. Automatic processing can interfere with responses:
- Stroop effect: word meaning interferes with naming ink color

ii. Multimodal integration:
- McGurk effect: audio [ba] + visual [ga] ⇒ many hear [da]

iii. Modeling Production with connectionist networks
- Nodes + spreading activation
- Most activated node is selected as output
- Ex.: semantic features of *cat* → lexical CAT (vs. DOG) → phonological /k/ /a/ /t/

Language and Thought:

i. Competing views:
- Linguistic determinism (strong Sapir-Whorf): can only conceive what language can describe
- Linguistic relativism (weak Sapir-Whorf): some cognition is influenced by language
- Linguistic universalism: thinking is not affected by language differences (universal metalanguage)

ii. Thinking for speaking: speakers attend to distinctions their language requires
- Color terms:
  - Japanese: one term can cover "blue"/"green"
  - Russian: green vs. light blue vs. dark blue

iii. Metaphorical Mappings:
- Space → time mappings vary; influence cognition
- Horizontal Metaphors (English/Chinese): *looking back/behind* vs. *looking forward/ahead*
- Vertical Metaphors (Chinese): (up month = last month), (down month = next month)
- Boroditsky (2001): English faster after horizontal tasks; Chinese faster after horizontal *or* vertical tasks
- Trainability: English speakers trained with "Monday is above Tuesday" shift toward the Mandarin-like pattern