NIILM University

Aspects of language

Subject: ASPECTS OF LANGUAGE **Credits: 4**

SYLLABUS

What is Language?
The Nature of Language, Looking at Data-1, Looking at Data-2, Language and Thought

History of English Language
An Introduction, Changes in Sounds and Spelling, Vocabulary, Changes in Grammar

English Phonetics and Phonology
The Speech Mechanism, The Description and Classification of Consonants and Vowels, Phonetic Transcription and Phonology, The Consonants of English, Word Accent, Stress and Rhythm in Connected Speech, Intonation

English Morphology
The Study of Words, Word Formation in English

English Syntax
Basic Notions of Syntactic Constituents and Phrase Structure, Types of Clauses and Sentences, Grammatical Functions, Cases and Thematic Roles, The Syntax of Inflectional Elements: Tense and Agreements, Pronouns, Reflexives and other Bound Elements, Syntax of Scope: Adverbs, Quantifiers and Negation

Language in Use
Introduction to Sociolinguistics, Speech Community and Multilingualism, Bilingualism, Language Standardization, Multilingual Use of Codes, Language Planning, Conversational Analysis, Learner Factors in Second Language Acquisition

The Spread of English
Variation and Varieties, Consolidation and Standardization of English, The Spread and Rise of English, Indian English

Stylistics
Language Variation: The Context of Situation, The Connection Between Linguistics, Literary Criticism and Stylistics, Style and Content, Analyzing Textsspeare and others

Suggested Readings:

1. Aspect of Language : Dr Jenkins

2. Aspect of Language : Alexander Drechsel

3. Non-Verbal and Social Aspects Of Language : Dan Kurland's

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CHAPTER 1

Language

Language is the human capacity for acquiring and using complex systems of communication, and a language is any specific example of such a system. The scientific study of language is called linguistics.

Estimates of the number of languages in the world vary between 6,000 and 7,000. However, any precise estimate depends on a partly arbitrary distinction between languages and dialects. Natural languages are spoken or signed, but any language can be encoded into secondary media using auditory, visual, or tactile stimuli, for example, in graphic writing, braille, or whistling. This is because human language is modality-independent. When used as a general concept, "language" may refer to the cognitive ability to learn and use systems of complex communication, or to describe the set of rules that makes up these systems, or the set of utterances that can be produced from those rules. All languages rely on the process of semiosis to relate signs with particular meanings. Oral and sign languages contain a phonological system that governs how symbols are used to form sequences known as words or morphemes, and a syntactic system that governs how words and morphemes are combined to form phrases and utterances.

Human language has the properties of productivity, recursivity, and displacement, and it relies entirely on social convention and learning. Its complex structure affords a much wider range of expressions than any known system of animal communication. Language is thought to have originated when early hominins started gradually changing their primate communication systems, acquiring the ability to form a theory of other minds and a shared intentionality. This development is sometimes thought to have coincided with an increase in brain volume, and many linguists see the structures of language as having evolved to serve specific communicative and social functions. Language is processed in many different locations in the human brain, but especially in Broca's and Wernicke's areas. Humans acquire language through social interaction in early childhood, and children generally speak fluently when they are approximately three years old. The use of language is deeply entrenched in human culture. Therefore, in addition to

its strictly communicative uses, language also has many social and cultural uses, such as signifying group identity, social stratification, as well as for social grooming and entertainment.

Languages evolve and diversify over time, and the history of their evolution can be reconstructed by comparing modern languages to determine which traits their ancestral languages must have had in order for the later stages to have occurred. A group of languages that descend from a common ancestor is known as a language family. The languages that are most spoken in the world today belong to the Indo-European family, which includes languages such as English, Spanish, Portuguese, Russian, and Hindi; the Sino-Tibetan family, which includes Mandarin Chinese, Cantonese, and many others; the Afro-Asiatic family, which includes Arabic, Amharic, Somali, and Hebrew; the Bantu languages, which include Swahili, Zulu, Shona, and hundreds of other languages spoken throughout Africa; and the Malayo-Polynesian languages, which include Indonesian, Malay, Tagalog, Malagasy, and hundreds of other languages spoken throughout the Pacific. The consensus is that between 50% and 90% of languages spoken at the beginning of the twenty-first century will probably have become extinct by the year 2100.

Definitions

Philosophy of language

The English word "language" derives ultimately from Indo-European "tongue, speech, language" through Latin lingua, "language; tongue", and Old French language. The word is sometimes used to refer to codes, ciphers, and other kinds of artificially constructed communication systems such as those used for computer programming. A language in this sense is a system of signs for encoding and decoding information. This article specifically concerns the properties of natural human language as it is studied in the discipline of linguistics.

As an object of linguistic study, "language" has two primary meanings: an abstract concept, and a specific linguistic system, e.g. "French". The Swiss linguist Ferdinand de Saussure, who defined the modern discipline of linguistics, first explicitly formulated the distinction using the French word langage for language as a concept, langue as a specific instance of a language system, and parole for the concrete usage of speech in a particular language.

When speaking of language as a general concept, definitions can be used which stress different aspects of the phenomenon.These definitions also entail different approaches and understandings of language, and they inform different and often incompatible schools of linguistic theory.

Mental faculty, organ or instinct

One definition sees language primarily as the mental faculty that allows humans to undertake linguistic behaviour: to learn languages and to produce and understand utterances. This definition stresses the universality of language to all humans and it emphasizes the biological basis for the human capacity for language as a unique development of the human brain. Proponents of the view that the drive to language acquisition is innate in humans often argue that this is supported by the fact that all cognitively normal children raised in an environment where language is accessible will acquire language without formal instruction. Languages may even spontaneously develop in environments where people live or grow up together without a common language, for example, creole languages and spontaneously developed sign languages such as Nicaraguan Sign Language. This view, which can be traced back to Kant and Descartes, often understands language to be largely innate, for example, in Chomsky's theory of Universal Grammar, or American philosopher Jerry Fodor's extreme innatist theory. These kinds of definitions are often applied by studies of language within a cognitive science framework and in neurolinguistics.

Formal Symbolic System

Another definition sees language as a formal system of signs governed by grammatical rules of combination to communicate meaning. This definition stresses that human languages can be described as closed structural systems consisting of rules that relate particular signs to particular meanings.This structuralist view of language was first introduced by Ferdinand de Saussure, and his structuralism remains foundational for most approaches to language today. Some proponents of this view of language have advocated a formal approach which studies language structure by identifying its basic elements and then by formulating a formal account of the rules according to which the elements combine in order to form words and sentences. The main proponent of such a theory is Noam Chomsky, the originator of the generative theory of grammar, who has defined language as a particular set of sentences that can be generated from a particular set of rules.

Chomsky considers these rules to be an innate feature of the human mind and to constitute the essence of what language is. Formal definitions of language are commonly used in formal logic, in formal theories of grammar, and in applied computational linguistics.

Tool For Communication

Yet another definition sees language as a system of communication that enables humans to cooperate. This definition stresses the social functions of language and the fact that humans use it to express themselves and to manipulate objects in their environment. Functional theories of grammar explain grammatical structures by their communicative functions, and understand the grammatical structures of language to be the result of an adaptive process by which grammar was "tailored" to serve the communicative needs of its users.

This view of language is associated with the study of language in pragmatic, cognitive, and interactive frameworks, as well as in sociolinguistics and linguistic anthropology. Functionalist theories tend to study grammar as dynamic phenomena, as structures that are always in the process of changing as they are employed by their speakers. This view places importance on the study of linguistic typology, or the classification of languages according to structural features, as it can be shown that processes of grammaticalization tend to follow trajectories that are partly dependent on typology. In the philosophy of language, these views are often associated with Wittgenstein's later works and with ordinary language philosophers such as Paul Grice, John Searle and J. L. Austin.

The Unique Status Of Human Language

Main articles: Animal language and Great ape language

Human language is unique in comparison to other forms of communication, such as those used by non-human animals. Communication systems used by other animals such as bees or non-human apes are closed systems that consist of a closed number of possible things that can be expressed. In contrast, human language is open-ended and productive, meaning that it allows humans to produce an infinite set of utterances from a finite set of elements and to create new words and sentences. This is possible because human language is based on a dual code, where a finite number of meaningless elements (e.g. sounds, letters or gestures) can be combined to form

units of meaning (words and sentences). Furthermore, the symbols and grammatical rules of any particular language are largely arbitrary, meaning that the system can only be acquired through social interaction. The known systems of communication used by animals, on the other hand, can only express a finite number of utterances that are mostly genetically transmitted. Several species of animals have proven able to acquire forms of communication through social learning, such as the Bonobo Kanzi, which learned to express itself using a set of symbolic lexigrams. Similarly, many species of birds and whales learn their songs by imitating other members of their species. However, while some animals may acquire large numbers of words and symbols, none have been able to learn as many different signs as is generally known by an average 4 year old human, nor have any acquired anything resembling the complex grammar of human language. Human languages also differ from animal communication systems in that they employ grammatical and semantic categories, such as noun and verb, present and past, to express exceedingly complex meanings. Human language is also unique in having the property of recursivity: the way in which, for example, a noun phrase is able to contain another noun phrase (as in "the chimpanzee]'s lips]") or a clause is able to contain a clause (as in "[I see [the dog is running]]"). Human language is also the only known natural communication system that is modality independent, meaning that it can be used not only for communication through one channel or medium, but through several — for example, spoken language uses the auditive modality, whereas sign languages and writing use the visual modality, and braille writing uses the tactile modality.

With regard to the meaning that it may convey and the cognitive operations that it builds on, human language is also unique in being able to refer to abstract concepts and to imagined or hypothetical events as well as events that took place in the past or may happen in the future. This ability to refer to events that are not at the same time or place as the speech event is called displacement, and while some animal communication systems can use displacement (such as the communication of bees that can communicate the location of sources of nectar that are out of sight), the degree to which it is used in human language is also considered unique.

CHAPTER 2

Origin

Main articles: Origin of language and Origin of speech

Theories about the origin of language differ in regards to their basic assumptions about what language is. Some theories are based on the idea that language is so complex that one cannot imagine it simply appearing from nothing in its final form, but that it must have evolved from earlier pre-linguistic systems among our pre-human ancestors. These theories can be called continuity-based theories. The opposite viewpoint is that language is such a unique human trait that it cannot be compared to anything found among non-humans and that it must therefore have appeared suddenly in the transition from pre-hominids to early man. These theories can be defined as discontinuity-based. Similarly, theories based on Chomsky's Generative view of language see language mostly as an innate faculty that is largely genetically encoded, whereas functionalist theories see it as a system that is largely cultural, learned through social interaction.

Currently, the only prominent proponent of a discontinuity-based theory of human language origins is linguist and philosopher Noam Chomsky. Chomsky proposes that "some random mutation took place, maybe after some strange cosmic ray shower, and it reorganized the brain, implanting a language organ in an otherwise primate brain." Though cautioning against taking this story too literally, Chomsky insists that "it may be closer to reality than many other fairy tales that are told about evolutionary processes, including language."

Continuity-based theories are currently held by a majority of scholars, but they vary in how they envision this development. Those who see language as being mostly innate, for example, psychologist Steven Pinker, hold the precedents to be animal cognition, whereas those who see language as a socially learned tool of communication, such as psychologist Michael Tomasello, see it as having developed from animal communication, either primate gestural or vocal communication to assist in cooperation. Other continuity-based models see language as having developed from music, a view already espoused by Rousseau, Herder, Humboldt, and Charles Darwin. A prominent proponent of this view today is archaeologist Steven Mithen. Stephen Anderson states that the age of spoken languages is estimated at 60,000 to 100,000 years and that:

Researchers on the evolutionary origin of language generally find it plausible to suggest that language was invented only once, and that all modern spoken languages are thus in some way related, even if that relation can no longer be recovered … because of limitations on the methods available for reconstruction.

Because the emergence of language is located in the early prehistory of man, the relevant developments have left no direct historical traces, and no comparable processes can be observed today. Theories that stress continuity often look at animals to see if, for example, primates display any traits that can be seen as analogous to what pre-human language must have been like. Alternatively, early human fossils can be inspected to look for traces of physical adaptation to language use or for traces of pre-linguistic forms of symbolic behaviour.

It is mostly undisputed that pre-human australopithecines did not have communication systems significantly different from those found in great apes in general, but scholarly opinions vary as to the developments since the appearance of the genus Homo some 2.5 million years ago. Some scholars assume the development of primitive language-like systems (proto-language) as early as Homo habilis (2.3 million years ago), while others place the development of primitive symbolic communication only with Homo erectus (1.8 million years ago) or Homo heidelbergensis (0.6 million years ago), and the development oflanguage proper with Anatomically Modern Homo sapiens with the Upper Paleolithic revolution less than 100,000 years ago

The study of language

The study of language, linguistics, has been developing into a science since the first grammatical descriptions of particular languages in India more than 2000 years ago. Today, linguistics is a science that concerns itself with all aspects of language, examining it from all of the theoretical viewpoints described above.

Subdisciplines

The academic study of language is conducted within many different disciplinary areas and from different theoretical angles, all of which inform modern approaches to linguistics. For example, descriptive linguistics examines the grammar of single languages, theoretical linguistics develops theories on how best to conceptualize and define the nature of language based on data from the

various extant human languages, sociolinguistics studies how languages are used for social purposes informing in turn the study of the social functions of language and grammatical description, neurolinguistics studies how language is processed in the human brain and allows the experimental testing of theories, computational linguistics builds on theoretical and descriptive linguistics to construct computational models of language often aimed at processing natural language or at testing linguistic hypotheses, and historical linguistics relies on grammatical and lexical descriptions of languages to trace their individual histories and reconstruct trees of language families by using the comparative method.

Early history

The formal study of language is often considered to have started in India with Pāṇini, the 5th century BC grammarian who formulated 3,959 rules of Sanskrit morphology. However, Sumerian scribes already studied the differences between Sumerian and Akkadian grammar around 1900 BC. Subsequent grammatical traditions developed in all of the ancient cultures that adopted writing.

In the 17th century AD, the French Port-Royal Grammarians developed the idea that the grammars of all languages were a reflection of the universal basics of thought, and therefore that grammar was universal. In the 18th century, the first use of the comparative method by British philologist and expert on ancient India William Jones sparked the rise of comparative linguistics.The scientific study of language was broadened from Indo-European to language in general by Wilhelm von Humboldt. Early in the 20th century, Ferdinand de Saussure introduced the idea of language as a static system of interconnected units, defined through the oppositions between them.

By introducing a distinction between diachronic and synchronic analyses of language, he laid the foundation of the modern discipline of linguistics. Saussure also introduced several basic dimensions of linguistic analysis that are still fundamental in many contemporary linguistic theories, such as the distinctions between syntagm and paradigm, and the Langue-parole distinction, distinguishing language as an abstract system (langue), from language as a concrete manifestation of this system (parole).

Contemporary Linguistics

In the 1960s, Noam Chomsky formulated the generative theory of language. According to this theory, the most basic form of language is a set of syntactic rules that is universal for all humans and which underlies the grammars of all human languages. This set of rules is called Universal Grammar; for Chomsky, describing it is the primary objective of the discipline of linguistics. Thus, he considered that the grammars of individual languages are only of importance to linguistics insofar as they allow us to deduce the universal underlying rules from which the observable linguistic variability is generated.

In opposition to the formal theories of the generative school, functional theories of language propose that since language is fundamentally a tool, its structures are best analyzed and understood by reference to their functions. Formal theories of grammar seek to define the different elements of language and describe the way they relate to each other as systems of formal rules or operations, while functional theories seek to define the functions performed by language and then relate them to the linguistic elements that carry them out. The framework of cognitive linguistics interprets language in terms of the concepts (which are sometimes universal, and sometimes specific to a particular language) which underlie its forms. Cognitive linguistics is primarily concerned with how the mind creates meaning through language.

Physiological and neural architecture of language and speech

Speaking is the default modality for language in all cultures. The production of spoken language depends on sophisticated capacities for controlling the lips, tongue and other components of the vocal apparatus, the ability to acoustically decode speech sounds, and the neurological apparatus required for acquiring and producing language.The study of the genetic bases for human language is still on a fairly basic level, and the only gene that has been positively implied in language production is FOXP2, which may cause a kind of congenital language disorder if affected by mutations.

The brain and language

Neurolinguistics

Language Areas of the brain. The Angular Gyrus is represented in orange, Supramarginal Gyrus is represented in yellow, Broca's area is represented in blue, Wernicke's area is represented in green, and the Primary Auditory Cortex is represented in pink.

The brain is the coordinating center of all linguistic activity; it controls both the production of linguistic cognition and of meaning and the mechanics of speech production. Nonetheless, our knowledge of the neurological bases for language is quite limited, though it has advanced considerably with the use of modern imaging techniques. The discipline of linguistics dedicated to studying the neurological aspects of language is called neurolinguistics.

Early work in neurolinguistics involved the study of language in people with brain lesions, to see how lesions in specific areas affect language and speech. In this way, neuroscientists in the 19th century discovered that two areas in the brain are crucially implicated in language processing. The first area is Wernicke's area, which is located in the posterior section of the superior temporal gyrus in the dominant cerebral hemisphere. People with a lesion in this area of the brain develop receptive aphasia, a condition in which there is a major impairment of language comprehension, while speech retains a natural-sounding rhythm and a relatively normal sentence structure. The second area is Broca's area, located in the posterior inferior frontal gyrus of the dominant hemisphere. People with a lesion to this area develop expressive aphasia, meaning that they know what they want to say, they just cannot get it out. They are typically able to understand what is being said to them, but unable to speak fluently. Other symptoms that may be present in expressive aphasia include problems with fluency, articulation, word-finding, word repetition, and producing and comprehending complex grammatical sentences, both orally and in writing. Those with this aphasia also exhibit ungrammatical speech and show inability to use syntactic information to determine the meaning of sentences. Both expressive and receptive aphasia also affect the use of sign language, in analogous ways to how they affect speech, with expressive aphasia causing signers to sign slowly and with incorrect grammar, whereas a signer with receptive aphasia will sign fluently, but make little sense to others and have difficulties comprehending others' signs. This shows that the impairment is specific to the ability to use language, not to the physiology used for speech production.

With technological advances in the late 20th century, neurolinguists have also adopted non-invasive techniques such as functional magnetic resonance imaging (fMRI) and electrophysiology to study language processing in individuals without impairments.

Anatomy of speech

Speech production, Phonetics, and Articulatory phonetics

Spoken language relies on human physical ability to produce sound, which is a longitudinal wave propagated through the air at a frequency capable of vibrating the ear drum. This ability depends on the physiology of the human speech organs. These organs consist of the lungs, the voice box (larynx), and the upper vocal tract - the throat, the mouth, and the nose. By controlling the different parts of the speech apparatus, the airstream can be manipulated to produce different speech sounds.

The sound of speech can be analyzed into a combination of segmental and suprasegmental elements. The segmental elements are those that follow each other in sequences, which are usually represented by distinct letters in alphabetic scripts, such as the Roman script. In free flowing speech, there are no clear boundaries between one segment and the next, nor usually are there any audible pauses between words. Segments therefore are distinguished by their distinct sounds which are a result of their different articulations, and they can be either vowels or consonants. Suprasegmental phenomena encompass such elements as stress, phonation type, voice timbre, and prosody or intonation, all of which may have effects across multiple segments.

Consonants and vowel segments combine to form syllables, which in turn combine to form utterances; these can be distinguished phonetically as the space between two inhalations. Acoustically, these different segments are characterized by different formant structures, that are visible in a spectrogram of the recorded sound wave (See illustration of Spectrogram of the formant structures of three English vowels). Formants are the amplitude peaks in the frequency spectrum of a specific sound. Vowels are those sounds that have no audible friction caused by the narrowing or obstruction of some part of the upper vocal tract. They vary in quality according to the degree of lip aperture and the placement of the tongue within the oral cavity. Vowels are called close when the lips are relatively closed, as in the pronunciation of the vowel (English "ee"), or open when the lips are relatively open, as in the vowel (English "ah"). If the

tongue is located towards the back of the mouth, the quality changes, creating vowels such as (English "oo"). The quality also changes depending on whether the lips are rounded as opposed to unrounded, creating distinctions such as that between (unrounded front vowel such as English "ee") and (rounded front vowel such as German "ü").

Consonants are those sounds that have audible friction or closure at some point within the upper vocal tract. Consonant sounds vary by place of articulation, i.e. the place in the vocal tract where the airflow is obstructed, commonly at the lips, teeth, alveolar ridge, palate, velum, uvula, or glottis. Each place of articulation produces a different set of consonant sounds, which are further distinguished by manner of articulation, or the kind of friction, whether full closure, in which case the consonant is called occlusive or stop, or different degrees of aperture creating fricatives and approximants. Consonants can also be either voiced or unvoiced, depending on whether the vocal cords are set in vibration by airflow during the production of the sound. Voicing is what separates English in bus (unvoiced sibilant) from in buzz (voiced sibilant).

Some speech sounds, both vowels and consonants, involve release of air flow through the nasal cavity, and these are called nasals or nasalized sounds. Other sounds are defined by the way the tongue moves within the mouth: such as the l-sounds (called laterals, because the air flows along both sides of the tongue), and the r-sounds (called rhotics) that are characterized by how the tongue is positioned relative to the air stream.

By using these speech organs, humans can produce hundreds of distinct sounds: some appear very often in the world's languages, whereas others are much more common in certain language families, language areas, or even specific to a single language.

Structure

When described as a system of symbolic communication, language is traditionally seen as consisting of three parts: signs, meanings, and a code connecting signs with their meanings. The study of the process of semiosis, how signs and meanings are combined, used, and interpreted is called semiotics. Signs can be composed of sounds, gestures, letters, or symbols, depending on whether the language is spoken, signed, or written, and they can be combined into complex signs, such as words and phrases. When used in communication, a sign is encoded and transmitted by a sender through a channel to a receiver who decodes it.

Some of the properties that define human language as opposed to other communication systems are: the arbitrariness of the linguistic sign, meaning that there is no predictable connection between a linguistic sign and its meaning; the duality of the linguistic system, meaning that linguistic structures are built by combining elements into larger structures that can be seen as layered, e.g. how sounds build words and words build phrases; the discreteness of the elements of language, meaning that the elements out of which linguistic signs are constructed are discrete units, e.g. sounds and words, that can be distinguished from each other and rearranged in different patterns; and the productivity of the linguistic system, meaning that the finite number of linguistic elements can be combined into a theoretically infinite number of combinations.

The rules by which signs can be combined to form words and phrases are called syntax or grammar. The meaning that is connected to individual signs, morphemes, words, phrases, and texts is called semantics. The division of language into separate but connected systems of sign and meaning goes back to the first linguistic studies of de Saussure and is now used in almost all branches of linguistics

Semantics

Main articles: Semantics, Semiotics, and Meaning (linguistics)

Languages express meaning by relating a sign form to a meaning, or its content. Sign forms must be something that can be perceived, for example, in sounds, images, or gestures, and then related to a specific meaning by social convention. Because the basic relation of meaning for most linguistic signs is based on social convention, linguistic signs can be considered arbitrary, in the sense that the convention is established socially and historically, rather than by means of a natural relation between a specific sign form and its meaning.

Thus, languages must have a vocabulary of signs related to specific meaning. The English sign "dog" denotes, for example, a member of the species Canis familiaris. In a language, the array of arbitrary signs connected to specific meanings is called the lexicon, and a single sign connected to a meaning is called a lexeme. Not all meanings in a language are represented by single words. Often, semantic concepts are embedded in the morphology or syntax of the language in the form of grammatical categories.

All languages contain the semantic structure of predication: a structure that predicates a property, state, or action. Traditionally, semantics has been understood to be the study of how speakers and interpreters assign truth values to statements, so that meaning is understood to be the process by which a predicate can be said to be true or false about an entity, e.g. "[x [is y]]" or "[x [does y]]". Recently, this model of semantics has been complemented with more dynamic models of meaning that incorporate shared knowledge about the context in which a sign is interpreted into the production of meaning. Such models of meaning are explored in the field of pragmatics.

Sounds and symbols

Phonology and Writing

Depending on modality, language structure can be based on systems of sounds (speech), gestures (sign languages), or graphic or tactile symbols (writing). The ways in which languages use sounds or signs to construct meaning are studied in phonology. The study of how humans produce and perceive vocal sounds is called phonetics. In spoken language, meaning is produced when sounds become part of a system in which some sounds can contribute to expressing meaning and others do not. In any given language, only a limited number of the many distinct sounds that can be created by the human vocal apparatus contribute to constructing meaning.

Sounds as part of a linguistic system are called phonemes. Phonemes are abstract units of sound, defined as the smallest units in a language that can serve to distinguish between the meaning of a pair of minimally different words, a so-called minimal pair. In English, for example, the words /bat/ [bat] and /pat/ [p^{h}at] form a minimal pair, in which the distinction between /b/ and /p/ differentiates the two words, which have different meanings. However, each language contrasts sounds in different ways. For example, in a language that does not distinguish between voiced and unvoiced consonants, the sounds [p] and [b] would be considered a single phoneme, and consequently, the two pronunciations would have the same meaning. Similarly, the English language does not distinguish phonemically between aspirated and non-aspirated pronunciations of consonants, as many other languages do: the unaspirated /p/ in /spin/ [spin] and the aspirated /p/ in /pin/ [p^{h}in] are considered to be merely different ways of pronouncing the same phoneme (such variants of a single phoneme are called allophones), whereas in Mandarin Chinese, the

same difference in pronunciation distinguishes between the words [pʰá] "crouch" and [pá] "eight" (the accent above the á means that the vowel is pronounced with a high tone).

All spoken languages have phonemes of at least two different categories, vowels and consonants, that can be combined to form syllables. As well as segments such as consonants and vowels, some languages also use sound in other ways to convey meaning. Many languages, for example, use stress, pitch, duration, and tone to distinguish meaning. Because these phenomena operate outside of the level of single segments, they are called suprasegmental. Some languages have only a few phonemes, for example, Rotokas and Pirahã language with 11 and 10 phonemes respectively, whereas languages like Taa may have as many as 141 phonemes. In sign languages, the equivalent to phonemes (formerly called cheremes) are defined by the basic elements of gestures, such as hand shape, orientation, location, and motion, which correspond to manners of articulation in spoken language.

Writing systems represent language using visual symbols, which may or may not correspond to the sounds of spoken language. The Latin alphabet (and those on which it is based or that have been derived from it) was originally based on the representation of single sounds, so that words were constructed from letters that generally denote a single consonant or vowel in the structure of the word. In syllabic scripts, such as the Inuktitut syllabary, each sign represents a whole syllable. In logographic scripts, each sign represents an entire word, and will generally bear no relation to the sound of that word in spoken language.

Because all languages have a very large number of words, no purely logographic scripts are known to exist. Written language represents the way spoken sounds and words follow one after another by arranging symbols according to a pattern that follows a certain direction. The direction used in a writing system is entirely arbitrary and established by convention. Some writing systems use the horizontal axis (left to right as the Latin script or right to left as the Arabic script), while others such as traditional Chinese writing use the vertical dimension (from top to bottom). A few writing systems use opposite directions for alternating lines, and others, such as the ancient Maya script, can be written in either direction and rely on graphic cues to show the reader the direction of reading.

In order to represent the sounds of the world's languages in writing, linguists have developed the International Phonetic Alphabet, designed to represent all of the discrete sounds that are known to contribute to meaning in human languages.

CHAPTER 3

Grammar

Grammar is the study of how meaningful elements called morphemes within a language can be combined into utterances. Morphemes can either be free or bound. If they are free to be moved around within an utterance, they are usually called words, and if they are bound to other words or morphemes, they are called affixes. The way in which meaningful elements can be combined within a language is governed by rules. The rules for the internal structure of words are called morphology. The rules of the internal structure of phrases and sentences are called syntax.

Grammatical Categories

Grammar can be described as a system of categories and a set of rules that determine how categories combine to form different aspects of meaning. Languages differ widely in whether they are encoded through the use of categories or lexical units. However, several categories are so common as to be nearly universal. Such universal categories include the encoding of the grammatical relations of participants and predicates by grammatically distinguishing between their relations to a predicate, the encoding of temporal and spatial relations on predicates, and a system of grammatical person governing reference to and distinction between speakers and addressees and those about whom they are speaking.

Word Classes

Languages organize their parts of speech into classes according to their functions and positions relative to other parts. All languages, for instance, make a basic distinction between a group of words that prototypically denotes things and concepts and a group of words that prototypically denotes actions and events. The first group, which includes English words such as "dog" and "song", are usually called nouns. The second, which includes "run" and "sing", are called verbs. Another common category is the adjective: words that describe properties or qualities of nouns, such as "red" or "big". Word classes can be "open" if new words can continuously be added to the class, or relatively "closed" if there is a fixed number of words in a class. In English, the class of pronouns is closed, whereas the class of adjectives is open, since infinite numbers of adjectives can be constructed from verbs (e.g. "saddened") or nouns (e.g. with the -like suffix

"noun-like"). In other languages such as Korean, the situation is the opposite, and new pronouns can be constructed, whereas the number of adjectives is fixed.

The word classes also carry out differing functions in grammar. Prototypically, verbs are used to construct predicates, while nouns are used as arguments of predicates. In a sentence such as "Sally runs", the predicate is "runs", because it is the word that predicates a specific state about its argument "Sally". Some verbs such as "curse" can take two arguments, e.g. "Sally cursed John.". A predicate that can only take a single argument is called intransitive, while a predicate that can take two arguments is called transitive.

Many other word classes exist in different languages, such as conjunctions that serve to join two sentences, articles that introduce a noun, interjections such as "agh!" or "wow!", or ideophones that mimic the sound of some event. Some languages have positionals that describe the spatial position of an event or entity. Many languages have classifiers that identify countable nouns as belonging to a particular type or having a particular shape. For instance, in Japanese, the general noun classifier for humans is nin (人), and it is used for counting humans, whatever they are called:

san-nin no gakusei (三人の学生) lit. "3 human-classifier of student" — three students

For trees, it would be:

san-bon no ki (三本の木) lit. "3 classifier-for-long-objects of tree" — three trees

Morphology

In linguistics, the study of the internal structure of complex words and the processes by which words are formed is called morphology. In most languages, it is possible to construct complex words that are built of several morphemes. For instance, the English word "unexpected" can be analyzed as being composed of the three morphemes "un-", "expect" and "-ed".

Morphemes can be classified according to whether they are independent morphemes, so-called roots, or whether they can only co-occur attached to other morphemes. These bound morphemes or affixes can be classified according to their position in relation to the root: prefixes precede the root, suffixes follow the root, and infixes are inserted in the middle of a root. Affixes serve to

modify or elaborate the meaning of the root. Some languages change the meaning of words by changing the phonological structure of a word, for example, the English word "run", which in the past tense is "ran". This process is called ablaut. Furthermore, morphology distinguishes between the process of inflection, which modifies or elaborates on a word, and the process of derivation, which creates a new word from an existing one. In English, the verb "sing" has the inflectional forms "singing" and "sung", which are both verbs, and the derivational form "singer", which is a noun derived from the verb with the agentive suffix "-er".

Languages differ widely in how much they rely on morphological processes of word formation. In some languages, for example, Chinese, there are no morphological processes, and all grammatical information is encoded syntactically by forming strings of single words. This type of morpho-syntax is often called isolating, or analytic, because there is almost a full correspondence between a single word and a single aspect of meaning. Most languages have words consisting of several morphemes, but they vary in the degree to which morphemes are discrete units. In many languages, notably in most Indo-European languages, single morphemes may have several distinct meanings that cannot be analyzed into smaller segments. For example, in Latin, the word bonus, or "good", consists of the root bon-, meaning "good", and the suffix -us, which indicates masculine gender, singular number, and nominative case. These languages are called fusional languages, because several meanings may be fused into a single morpheme. The opposite type of fusional languages are agglutinative languages, which construct words by stringing morphemes together in chains, but with each morpheme as a discrete semantic unit. An example of such a language is Turkish, where for example, the word evlerinizden, or "from your houses", consists of the morphemes, ev-ler-iniz-den with the meanings house-plural-your-from. The languages that rely on morphology to the greatest extent are traditionally called polysynthetic languages. They may express the equivalent of an entire English sentence in a single word. For example, in Persian the single word nafahmidamesh means I didn't understand it consisting of morphemes na-fahm-id-am-esh with the meanings, "negation.understand.past.I.it". As another example with more complexity, in the Yupik word tuntussuqatarniksaitengqiggtuq, which means "He had not yet said again that he was going to hunt reindeer", the word consists of the morphemes tuntu-ssur-qatar-ni-ksaite-ngqiggte-uq with the meanings, "reindeer-hunt-future-say-negation-again-third.person.singular.indicative", and except for the morpheme tuntu ("reindeer") none of the other morphemes can appear in isolation.

Many languages use morphology to cross-reference words within a sentence. This is sometimes called agreement. For example, in many Indo-European languages, adjectives must cross-reference the noun they modify in terms of number, case, and gender, so that the Latin adjective bonus, or "good", is inflected to agree with a noun that is masculine gender, singular number, and nominative case. In many polysynthetic languages, verbs cross-reference their subjects and objects. In these types of languages, a single verb may include information that would require an entire sentence in English. For example, in the Basque phrase ikusi nauzu, or "you saw me", the past tense auxiliary verb n-au-zu (similar to English "do") agrees with both the subject (you) expressed by the n- prefix, and with the object (me) expressed by the -zu suffix. The sentence could be directly transliterated as "see you-did-me

Syntax

In addition to word classes, a sentence can be analyzed in terms of grammatical functions: "The cat" is the subject of the phrase, "on the mat" is a locative phrase, and "sat" is the core of the predicate.

Another way in which languages convey meaning is through the order of words within a sentence. The grammatical rules for how to produce new sentences from words that are already known is called syntax. The syntactical rules of a language determine why a sentence in English such as "I love you" is meaningful, but "*love you I" is not. Syntactical rules determine how word order and sentence structure is constrained, and how those constraints contribute to meaning. For example, in English, the two sentences "the slaves were cursing the master" and "the master was cursing the slaves" mean different things, because the role of the grammatical subject is encoded by the noun being in front of the verb, and the role of object is encoded by the noun appearing after the verb. Conversely, in Latin, both Dominus servos vituperabat and Servos vituperabat dominus mean "the master was reprimanding the slaves", because servos, or "slaves", is in the accusative case, showing that they are the grammatical object of the sentence, and dominus, or "master", is in the nominative case, showing that he is the subject. Latin uses morphology to express the distinction between subject and object, whereas English uses word order. Another example of how syntactic rules contribute to meaning is the rule of inverse word order in questions, which exists in many languages. This rule explains why when in English, the phrase "John is talking to Lucy" is turned into a question, it becomes "Who is John talking to?",

and not "John is talking to who?". The latter example may be used as a way of placing special emphasis on "who", thereby slightly altering the meaning of the question. Syntax also includes the rules for how complex sentences are structured by grouping words together in units, called phrases, that can occupy different places in a larger syntactic structure. Sentences can be described as consisting of phrases connected in a tree structure, connecting the phrases to each other at different levels. To the right is a graphic representation of the syntactic analysis of the English sentence "the cat sat on the mat". The sentence is analyzed as being constituted by a noun phrase, a verb, and a prepositional phrase; the prepositional phrase is further divided into a preposition and a noun phrase, and the noun phrases consist of an article and a noun. The reason sentences can be seen as being composed of phrases is because each phrase would be moved around as a single element if syntactic operations were carried out. For example, "the cat" is one phrase, and "on the mat" is another, because they would be treated as single units if a decision was made to emphasize the location by moving forward the prepositional phrase: "[And] on the mat, the cat sat". There are many different formalist and functionalist frameworks that propose theories for describing syntactic structures, based on different assumptions about what language is and how it should be described. Each of them would analyze a sentence such as this in a different manner.

Typology And Universals

Languages can be classified in relation to their grammatical types. Languages that belong to different families nonetheless often have features in common, and these shared features tend to correlate. For example, languages can be classified on the basis of their basic word order, the relative order of the verb, and its constituents in a normal indicative sentence. In English, the basic order is SVO: "The snake(S) bit(V) the man(O)", whereas for example, the corresponding sentence in the Australian language Gamilaraay would be (Snake Man Bit), SOV. Word order type is relevant as a typological parameter, because basic word order type corresponds with other syntactic parameters, such as the relative order of nouns and adjectives, or of the use of prepositions or postpositions. Such correlations are called implicational universals. For example, most (but not all) languages that are of the SOV type have postpositions rather than prepositions, and have adjectives before nouns. Through the study of various types of word order, it has been discovered that not all languages group the relations between actors and actions into Subject,

Object and Verb, as English does. This type is called the nominative-accusative type. Some languages called ergative, Gamilaraay among them, distinguish between Agents and Patients. In English transitive clauses, both the subject of intransitive sentences ("I run") and transitive sentences ("I love you") are treated in the same way, shown here by the nominative pronoun I. In ergative languages, the single participant in an intransitive sentence, such as "I run", is treated the same as the patient in a transitive sentence, giving the equivalent of "me run" and "you love me". Only in transitive sentences would the equivalent of the pronoun "I" be used. In this way the semantic roles can map onto the grammatical relations in different ways, grouping an intransitive subject either with Agents (accusative type) or Patients (ergative type) or even making each of the three roles differently, which is called the tripartite type. The shared features of languages which belong to the same typological class type may have arisen completely independently. Their co-occurrence might be due to the universal laws governing the structure of natural languages, "language universals", or they might be the result of languages evolving convergent solutions to the recurring communicative problems that humans use language to solve.

Social Contexts of Use and Transmission

While humans have the ability to learn any language, they only do so if they grow up in an environment in which language exists and is used by others. Language is therefore dependent on communities of speakers in which children learn language from their elders and peers and themselves transmit language to their own children. Languages are used by those who speak them to communicate and to solve a plethora of social tasks. Many aspects of language use can be seen to be adapted specifically to these purposes. Due to the way in which language is transmitted between generations and within communities, language perpetually changes, diversifying into new languages or converging due to language contact. The process is similar to the process of evolution, where the process of descent with modification leads to the formation of a phylogenetic tree.

However, languages differ from a biological organisms in that they readily incorporate elements from other languages through the process of diffusion, as speakers of different languages come into contact. Humans also frequently speak more than one language, acquiring their first language or languages as children, or learning new languages as they grow up. Because of the

increased language contact in the globalizing world, many small languages are becoming endangered as their speakers shift to other languages that afford the possibility to participate in larger and more influential speech communities

CHAPTER 4

Usage And Meaning

The semantic study of meaning assumes that meaning is located in a relation between signs and meanings that are firmly established through social convention. However, semantics does not study the way in which social conventions are made and affect language. Rather, when studying the way in which words and signs are used, it is often the case that words have different meanings, depending on the social context of use. An important example of this is the process called deixis, which describes the way in which certain words refer to entities through their relation between a specific point in time and space when the word is uttered. Such words are, for example, the word, "I" (which designates the person speaking), "now" (which designates the moment of speaking), and "here" (which designates the time of speaking). Signs also change their meanings over time, as the conventions governing their usage gradually change. The study of how the meaning of linguistic expressions changes depending on context is called pragmatics. Deixis is an important part of the way that we use language to point out entities in the world. Pragmatics is concerned with the ways in which language use is patterned and how these patterns contribute to meaning. For example, in all languages, linguistic expressions can be used not just to transmit information, but to perform actions. Certain actions are made only through language, but nonetheless have tangible effects, e.g. the act of "naming", which creates a new name for some entity, or the act of "pronouncing someone man and wife", which creates a social contract of marriage. These types of acts are called speech acts, although they can of course also be carried out through writing or hand signing.

The form of linguistic expression often does not correspond to the meaning that it actually has in a social context. For example, if at a dinner table a person asks, "Can you reach the salt?", that is, in fact, not a question about the length of the arms of the one being addressed, but a request to

pass the salt across the table. This meaning is implied by the context in which it is spoken; these kinds of effects of meaning are called conversational implicatures. These social rules for which ways of using language are considered appropriate in certain situations and how utterances are to be understood in relation to their context vary between communities, and learning them is a large part of acquiring communicative competence in a language.

Language Acquisition

All normal children acquire language if they are exposed to it in their first years of life, even in cultures where adults rarely address infants and toddlers directly.

All healthy, normally-developing human beings learn to use language. Children acquire the language or languages used around them: whichever languages they receive sufficient exposure to during childhood. The development is essentially the same for children acquiring sign or oral languages. This learning process is referred to as first-language acquisition, since unlike many other kinds of learning, it requires no direct teaching or specialized study. In The Descent of Man, naturalist Charles Darwin called this process "an instinctive tendency to acquire an art"..

First language acquisition proceeds in a fairly regular sequence, though there is a wide degree of variation in the timing of particular stages among normally-developing infants. From birth, newborns respond more readily to human speech than to other sounds. Around one month of age, babies appear to be able to distinguish between different speech sounds. Around six months of age, a child will begin babbling, producing the speech sounds or handshapes of the languages used around them. Words appear around the age of 12 to 18 months; the average vocabulary of an eighteen-month old child is around 50 words. A child's first utterances are holophrases (literally "whole-sentences"), utterances that use just one word to communicate some idea. Several months after a child begins producing words, she or he will produce two-word utterances, and within a few more months will begin to produce telegraphic speech, or short sentences that are less grammatically complex than adult speech, but that do show regular syntactic structure. From roughly the age of three to five years, a child's ability to speak or sign is refined to the point that it resembles adult language.

Acquisition of second and additional languages can come at any age, through exposure in daily life or courses. Children learning a second language are more likely to achieve native-like

fluency than adults, but in general, it is very rare for someone speaking a second language to pass completely for a native speaker. An important difference between first language acquisition and additional language acquisition is that the process of additional language acquisition is influenced by languages that the learner already knows.

Language And Culture

Languages, understood as the particular set of speech norms of a particular community, are also a part of the larger culture of the community that speaks them. Languages do not differ only in pronunciation, vocabulary, or grammar, but also through having different "cultures of speaking". Humans use language as a way of signalling identity with one cultural group and difference from others. Even among speakers of one language, several different ways of using the language exist, and each is used to signal affiliation with particular subgroups within a larger culture. Linguists and anthropologists, particularly sociolinguists, ethnolinguists, and linguistic anthropologists have specialized in studying how ways of speaking vary between speech communities.

Linguists use the term "varieties" to refer to the different ways of speaking a language. This term includes geographically or socioculturally defined dialects as well as the jargons or styles of subcultures. Linguistic anthropologists and sociologists of language define communicative style as the ways that language is used and understood within a particular culture.

Because norms for language use are shared by members of a specific group, communicative style also becomes a way of displaying and constructing group identity. Linguistic differences may become salient markers of divisions between social groups, for example, speaking a language with a particular accent may imply membership of an ethnic minority or social class, one's area of origin, or status as a second language speaker. These kinds of differences are not part of the linguistic system, but are an important part of how language users use language as a social tool for constructing groups.

However, many languages also have grammatical conventions that signal the social position of the speaker in relation to others through the use of registers that are related to social hierarchies or divisions. In many languages, there are stylistic or even grammatical differences between the ways men and women speak, between age groups, or between social classes, just as some languages employ different words depending on who is listening. For example, in the Australian

language Dyirbal, a married man must use a special set of words to refer to everyday items when speaking in the presence of his mother-in-law. Some cultures, for example, have elaborate systems of "social deixis", or systems of signalling social distance through linguistic means. In English, social deixis is shown mostly through distinguishing between addressing some people by first name and others by surname, and also in titles such as "Mrs.", "boy", "Doctor", or "Your Honor", but in other languages, such systems may be highly complex and codified in the entire grammar and vocabulary of the language. For instance, in several languages of east Asia, such as Thai, Burmese, and Javanese, different words are used according to whether a speaker is addressing someone of higher or lower rank than oneself in a ranking system with animals and children ranking the lowest and gods and members of royalty as the highest.

Writing, Literacy And Technology

An inscription of Swampy Cree using Canadian Aboriginal syllabics, an abugida developed by Christian missionaries for Indigenous Canadian languages

Throughout history a number of different ways of representing language in graphic media have been invented. These are called writing systems.

The use of writing has made language even more useful to humans. It makes it possible to store large amounts of information outside of the human body and retrieve it again, and it allows communication across distances that would otherwise be impossible. Many languages conventionally employ different genres, styles, and register in written and spoken language, and in some communities, writing traditionally takes place in an entirely different language than the one spoken. There is some evidence that the use of writing also has effects on the cognitive development of humans, perhaps because acquiring literacy generally requires explicit and formal education.

The invention of the first writing systems is roughly contemporary with the beginning of the Bronze Age in the late Neolithic period of the late 4th millennium BC. The Sumerian archaic cuneiform script and the Egyptian hieroglyphs are generally considered to be the earliest writing systems, both emerging out of their ancestral proto-literate symbol systems from 3400–3200 BC with the earliest coherent texts from about 2600 BC. It is generally agreed that Sumerian writing was an independent invention; however, it is debated whether Egyptian writing was developed

completely independently of Sumerian, or was a case of cultural diffusion. A similar debate exists for the Chinese script, which developed around 1200 BC. The pre-Columbian Mesoamerican writing systems (including among others Olmec and Maya scripts) are generally believed to have had independent origins.

Language Change

The first page of the Beowulf poem written in Old English in the early medieval period (800 - 1100 AD). Although old English language is the direct ancestor of modern English language, change has rendered it unintelligible to contemporary English speakers.

All languages change as speakers adopt or invent new ways of speaking and pass them on to other members of their speech community. Language change happens at all levels from the phonological level to the levels of vocabulary, morphology, syntax, and discourse. Even though language change is often initially evaluated negatively by speakers of the language who often consider changes to be "decay" or a sign of slipping norms of language usage, it is natural and inevitable.

Changes may affect specific sounds or the entire phonological system. Sound change can consist of the replacement of one speech sound or phonetic feature by another, the complete loss of the affected sound, or even the introduction of a new sound in a place where there previously was none. Sound changes can be conditioned in which case a sound is changed only if it occurs in the vicinity of certain other sounds. Sound change is usually assumed to be regular, which means that it is expected to apply mechanically whenever its structural conditions are met, irrespective of any non-phonological factors. On the other hand, sound changes can sometimes be sporadic, affecting only one particular word or a few words, without any seeming regularity. Sometimes a simple change triggers a chain shift in which the entire phonological system is affected. This happened in the Germanic languages when the sound change known as Grimm's law affected all the stop consonants in the system. The original consonant *b^h became /b/ in the Germanic languages, the previous *b in turn became /p/, and the previous *p became /f/. The same process applied to all stop consonants and explains why Italic languages such as Latin have p in words like pater and pisces, whereas Germanic languages, like English, have father and fish.

Another example is the Great Vowel Shift in English, which is the reason that the spelling of English vowels do not correspond well to their current pronunciation. This is because the vowel shift brought the already established orthography out of synchronization with pronunciation. Another source of sound change is the erosion of words as pronunciation gradually becomes increasingly indistinct and shortens words, leaving out syllables or sounds. This kind of change caused Latin mea domina to eventually become the French madame and American English ma'am.

Change also happens in the grammar of languages as discourse patterns such as idioms or particular constructions become grammaticalized. This frequently happens when words or morphemes erode and the grammatical system is unconsciously rearranged to compensate for the lost element. For example, in some varieties of Caribbean Spanish the final /s/ has eroded away. Since Standard Spanish uses final /s/ in the morpheme marking the second person subject "you" in verbs, the Caribbean varieties now have to express the second person using the pronoun tú. This means that the sentence "what's your name" is ¿como te llamas?

'komo te 'jamas] in Standard Spanish, but ['komo 'tu te 'jama] in Caribbean Spanish. The simple sound change has affected both morphology and syntax.[102] Another common cause of grammatical change is the gradual petrification of idioms into new grammatical forms, for example, the way the English "going to" construction lost its aspect of movement and in some varieties of English has almost become a full fledged future tense (e.g. I'm gonna).

Language change may be motivated by "language internal" factors, such as changes in pronunciation motivated by certain sounds being difficult to distinguish aurally or to produce, or because of certain patterns of change that cause certain rare types of constructions to drift towards more common types. Other causes of language change are social, such as when certain pronunciations become emblematic of membership in certain groups, such as social classes, or with ideologies, and therefore are adopted by those who wish to identify with those groups or ideas. In this way, issues of identity and politics can have profound effects on language structure.

Language Contact

One important source of language change is contact between different languages and resulting diffusion of linguistic traits between languages. Language contact occurs when speakers of two

or more languages or varieties interact on a regular basis. Multilingualism is likely to have been the norm throughout human history, and today, most people in the world are multilingual. Before the rise of the concept of the ethno-national state, monolingualism was characteristic mainly of populations inhabiting small islands. But with the ideology that made one people, one state, and one language the most desirable political arrangement, monolingualism started to spread throughout the world. Nonetheless, there are only 250 countries in the world corresponding to some 6000 languages, which means that most countries are multilingual and most languages therefore exist in close contact with other languages.

When speakers of different languages interact closely, it is typical for their languages to influence each other. Through sustained language contact over long periods, linguistic traits diffuse between languages, and languages belonging to different families may converge to become more similar. In areas where many languages are in close contact, this may lead to the formation of language areas in which unrelated languages share a number of linguistic features. A number of such language areas have been documented, among them, the Balkan language area, the Mesoamerican language area, and the Ethiopian language area. Also, larger areas such as South Asia, Europe, and Southeast Asia have sometimes been considered language areas, because of widespread diffusion of specific areal features.

Language contact may also lead to a variety of other linguistic phenomena, including language convergence, borrowing, and relexification (replacement of much of the native vocabulary with that of another language). In situations of extreme and sustained language contact, it may lead to the formation of new mixed languages that cannot be considered to belong to a single language family. One type of mixed language called pidgins occurs when adult speakers of two different languages interact on a regular basis, but in a situation where neither group learns to learn to speak the language of the other group fluently. In such a case, they will often construct a communication form that has traits of both languages, but which has a simplified grammatical and phonological structure. The language comes to contain mostly the grammatical and phonological categories that exist in both languages. Pidgin languages are defined by not having any native speakers, but only being spoken by people who have another language as their first language. But if a Pidgin language becomes the main language of a speech community, then eventually children will grow up learning the pidgin as their first language. As the generation of

child learners grow up, the pidgin will often be seen to change its structure and acquire a greater degree of complexity. This type of language is generally called a creole language. An example of such mixed languages is Tok Pisin, the official language of Papua New-Guinea, which originally arose as a Pidgin based on English and Austronesian languages; others are Kreyòl ayisyen, the French based creole language spoken in Haiti, and Michif, a mixed language of Canada, based on the Native American language Cree and French.

Languages And Dialects

There is no clear distinction between a language and a dialect, notwithstanding a famous aphorism attributed to linguist Max Weinreich that "a language is a dialect with an army and navy".For example, national boundaries frequently override linguistic difference in determining whether two linguistic varieties are languages or dialects. Cantonese and Mandarin are, for example, often classified as "dialects" of Chinese, even though they are more different from each other than Swedish is from Norwegian. Before the Yugoslav civil war, Serbo-Croatian was considered a single language with two dialects, but now Croatian and Serbian are considered different languages and employ different writing systems. In other words, the distinction may hinge on political considerations as much as on cultural differences, distinctive writing systems, or degree of mutual intelligibility.

The world's languages can be grouped into language families consisting of languages that can be shown to have common ancestry. Linguists currently recognize many hundreds of language families, although some of them can possibly be grouped into larger units as more evidence becomes available and in-depth studies are carried out. At present, there are also dozens of language isolates: languages that cannot be shown to be related to any other languages in the world. Among them is Basque, spoken in Europe, Zuni of New Mexico, P'urhépecha of Mexico, Ainu of Japan, Burushaski of Pakistan, and many others.

The language family of the world that has the most speakers is the Indo-European languages, spoken by 46% of the world's population. This family includes major world languages like English, Spanish, Russian, and Hindustani (Hindi/Urdu). The Indo-European family achieved prevalence first during the Eurasian Migration Period (c. 400–800 AD), and subsequently through the European colonial expansion, which brought the Indo-European languages to a

politically and often numerically dominant position in the Americas and much of Africa. The Sino-Tibetan languages are spoken by 21% of the world's population and include many of the languages of East Asia, including Mandarin Chinese, Cantonese, and hundreds of smaller languages.

Africa is home to a large number of language families, the largest of which is the Niger-Congo language family, which includes such languages as Swahili, Shona, and Yoruba. Speakers of the Niger-Congo languages account for 6.4% of the world's population. A similar number of people speak the Afroasiatic languages, which include the populous Semitic languages such as Arabic, Hebrew language, and the languages of the Sahara region, such as the Berber languages and Hausa.

The Austronesian languages are spoken by 5.9% of the world's population and stretch from Madagascar to maritime Southeast Asia all the way to Oceania. It includes such languages as Malagasy, Māori, Samoan, and many of the indigenous languages of Indonesia and Taiwan. The Austronesian languages are considered to have originated in Taiwan around 3000 BC and spread through the Oceanic region through island-hopping, based on an advanced nautical technology. Other populous language families are the Dravidian languages of South Asia (among them Tamil and Telugu), the Turkic languages of Central Asia (such as Turkish), the Austroasiatic (among them Khmer), and Tai–Kadai languages of Southeast Asia (including Thai).

The areas of the world in which there is the greatest linguistic diversity, such as the Americas, Papua New Guinea, West Africa, and South-Asia, contain hundreds of small language families. These areas together account for the majority of the world's languages, though not the majority of speakers. In the Americas, some of the largest language families include the Quechumaran, Arawak, and Tupi-Guarani families of South America, the Uto-Aztecan, Oto-Manguean, and Mayan of Mesoamerica, and the Na-Dene and Algonquian language families of North America. In Australia, most indigenous languages belong to the Pama-Nyungan family, whereas Papua-New Guinea is home to a large number of small families and isolates, as well as a number of Austronesian languages.

CHAPTER 5

PHILOSOPHY OF LANGUAGE.

Philosophy of language is concerned with four central problems: the nature of meaning, language use, language cognition, and the relationship between language and reality. For continental philosophers, however, the philosophy of language tends to be dealt with, not as a separate topic, but as a part of logic (see the section "Language and continental philosophy" below).

First and foremost, philosophers of language prioritize their inquiry on the nature of meaning. They seek to explain what it means to "mean" something. Topics in that vein include the nature of synonymy, the origins of meaning itself, and how any meaning can ever really be known. Another project under this heading of special interest to analytic philosophers of language is the investigation into the manner in which sentences are composed into a meaningful whole out of the meaning of its parts.

Secondly, they seek to better understand what speakers and listeners do with language in communication, and how it is used socially. Specific interests may include the topics of language learning, language creation, and speech acts.

Thirdly, they would like to know how language relates to the minds of both the speaker and the interpreter. Of specific interest is the grounds for successful translation of words into other words.

Finally, philosophers of language investigate how language and meaning relate to truth and the world. They tend to be less concerned with which sentences are actually true, and more with what kinds of meanings can be true or false. A truth-oriented philosopher of language might wonder whether or not a meaningless sentence can be true or false, or whether or not sentences can express propositions about things that do not exist, rather than the way sentences are used.

Many aspects of the problem of the composition of sentences are addressed in the field of linguistics of syntax. Philosophical semantics tends to focus on the principle of compositionality to explain the relationship between meaningful parts and whole sentences. The principle of compositionality asserts that a sentence can be understood on the basis of the meaning of the parts of the sentence (i.e., words, morphemes) along with an understanding of its structure (i.e., syntax, logic).

It is possible to use the concept of functions to describe more than just how lexical meanings work: they can also be used to describe the meaning of a sentence. Take, for a moment, the sentence "The horse is red". We may consider "the horse" to be the product of a propositional function. A propositional function is an operation of language that takes an entity (in this case, the horse) as an input and outputs a semantic fact (i.e., the proposition that is represented by "The horse is red"). In other words, a propositional function is like an algorithm. The meaning of "red" in this case is whatever takes the entity "the horse" and turns it into the statement, "The horse is red."

Linguists have developed at least two general methods of understanding the relationship between the parts of a linguistic string and how it is put together: syntactic and semantic trees. Syntactic trees draw upon the words of a sentence with the grammar of the sentence in mind. Semantic trees, on the other hand, focus upon the role of the meaning of the words and how those meanings combine to provide insight onto the genesis of semantic facts.

Nature of Meaning

Generally speaking, there have been at least seven distinctive explanations of what a linguistic "meaning" is. Each has been associated with its own body of literature.

1. Idea theories of meaning, most commonly associated with the British empiricist tradition of Locke, Berkeley and Hume, claim that meanings are purely mental contents provoked by signs. Although this view of meaning has been beset by a number of problems from the beginning (see the main article for details), interest in it has been renewed by some contemporary theorists under the guise of semantic internalism.

2. Truth-conditional theories hold meaning to be the conditions under which an expression may be true or false. This tradition goes back at least to Frege and is associated with a rich body of modern work, spearheaded by philosophers like Alfred Tarski and Donald Davidson.

3. Theories of language use, for example theories by the later Wittgenstein, helped inaugurate the idea of "meaning as use", and a communitarian view of language. Wittgenstein was interested in the way in which the communities use language, and how

far it can be taken. It is also associated with P. F. Strawson, John Searle, Robert Brandom, and others.

4. Constructivist theories of language are connected to the revolutionary idea claiming that speech is not only passively describing a given reality, but it can change the (social) reality it is describing through speech acts, which for linguistics was as revolutionary a discovery as for physics was the discovery that measurement itself can change the measured reality itself. Speech act theory was developed by J. L. Austin, although other previous thinkers have had similar ideas.

5. Reference theories of meaning, also known collectively as semantic externalism, view meaning to be equivalent to those things in the world that are actually connected to signs. There are two broad subspecies of externalism: social and environmental. The first is most closely associated with Tyler Burge and the second with Hilary Putnam, Saul Kripke and others.Verificationist theories of meaning are generally associated with the early 20th century movement of logical positivism. The traditional formulation of such a theory is that the meaning of a sentence is its method of verification or falsification. In this form, the thesis was abandoned after the acceptance by most philosophers of the Duhem–Quine thesis of confirmation holism after the publication of Quine's Two Dogmas of Empiricism. However, Michael Dummett has advocated a modified form of verificationism since the 1970s. In this version, the comprehension (and hence meaning) of a sentence consists in the hearer's ability to recognize the demonstration (mathematical, empirical or other) of the truth of the sentence.

6. A pragmatist theory of meaning is any theory in which the meaning (or understanding) of a sentence is determined by the consequences of its application. Dummett attributes such a theory of meaning to Charles Sanders Peirce and other early 20th century American pragmatists.

REFERENCES

Investigations into how language interacts with the world are called theories of reference. Gottlob Frege was an advocate of a mediated reference theory. Frege divided the semantic content of every expression, including sentences, into two components: sense and meaning. The

sense of a sentence is the thought that it expresses. Such a thought is abstract, universal and objective. The sense of any sub-sentential expression consists in its contribution to the thought that its embedding sentence expresses. Senses determine reference and are also the modes of presentation of the objects to which expressions refer. Referents are the objects in the world that words pick out. The senses of sentences are thoughts, while their referents are truth values (true or false). The referents of sentences embedded in propositional attitude ascriptions and other opaque contexts are their usual senses.

Bertrand Russell, in his later writings and for reasons related to his theory of acquaintance in epistemology, held that the only directly referential expressions are, what he called, "logically proper names". Logically proper names are such terms as I, now, here and other indexicals. He viewed proper names of the sort described above as "abbreviated definite descriptions". Hence Barack H. Obama may be an abbreviation for "the current President of the United States and husband of Michelle Obama". Definite descriptions are denoting phrases (see On Denoting) which are analyzed by Russell into existentially quantified logical constructions. Such phrases denote in the sense that there is an object that satisfies the description. However, such objects are not to be considered meaningful on their own, but have meaning only in the proposition expressed by the sentences of which they are a part. Hence, they are not directly referential in the same way as logically proper names, for Russell.

On Frege's account, any referring expression has a sense as well as a referent. Such a "mediated reference" view has certain theoretical advantages over Mill's view. For example, co-referential names, such as Samuel Clemens and Mark Twain, cause problems for a directly referential view because it is possible for someone to hear "Mark Twain is Samuel Clemens" and be surprised – thus, their cognitive content seems different.

Despite the differences between the views of Frege and Russell, they are generally lumped together as descriptivists about proper names. Such descriptivism was criticized in Saul Kripke's Naming and Necessity.

Kripke put forth what has come to be known as "the modal argument" (or "argument from rigidity"). Consider the name Aristotle and the descriptions "the greatest student of Plato", "the founder of logic" and "the teacher of Alexander". Aristotle obviously satisfies all of the

descriptions (and many of the others we commonly associate with him), but it is not necessarily true that if Aristotle existed then Aristotle was any one, or all, of these descriptions. Aristotle may well have existed without doing any single one of the things for which he is known to posterity. He may have existed and not have become known to posterity at all or he may have died in infancy. Suppose that Aristotle is associated by Mary with the description "the last great philosopher of antiquity" and (the actual) Aristotle died in infancy. Then Mary's description would seem to refer to Plato. But this is deeply counterintuitive. Hence, names are rigid designators, according to Kripke. That is, they refer to the same individual in every possible world in which that individual exists. In the same work, Kripke articulated several other arguments against "Frege-Russell" descriptivism..

Language And Thought

An important problem which touches both philosophy of language and philosophy of mind is to what extent language influences thought and vice-versa. There have been a number of different perspectives on this issue, each offering a number of insights and suggestions.

Linguists Sapir and Whorf suggested that language limited the extent to which members of a "linguistic community" can think about certain subjects (a hypothesis paralleled in George Orwell's novel Nineteen Eighty-Four). In other words, language was analytically prior to thought. Philosopher Michael Dummett is also a proponent of the "language-first" viewpoint.

The stark opposite to the Sapir–Whorf position is the notion that thought (or, more broadly, mental content) has priority over language. The "knowledge-first" position can be found, for instance, in the work of Paul Grice. Further, this view is closely associated with Jerry Fodor and his language of thought hypothesis. According to his argument, spoken and written language derive their intentionality and meaning from an internal language encoded in the mind. The main argument in favor of such a view is that the structure of thoughts and the structure of language seem to share a compositional, systematic character. Another argument is that it is difficult to explain how signs and symbols on paper can represent anything meaningful unless some sort of meaning is infused into them by the contents of the mind. One of the main arguments against is that such levels of language can lead to an infinite regress. In any case, many philosophers of

mind and language, such as Ruth Millikan, Fred Dretske and Fodor, have recently turned their attention to explaining the meanings of mental contents and states directly.

Another tradition of philosophers has attempted to show that language and thought are coextensive – that there is no way of explaining one without the other. Donald Davidson, in his essay "Thought and Talk", argued that the notion of belief could only arise as a product of public linguistic interaction. Daniel Dennett holds a similar interpretationist view of propositional attitudes. To an extent, the theoretical underpinnings to cognitive semantics (including the notion of semantic framing) suggest the influence of language upon thought. However, the same tradition views meaning and grammar as a function of conceptualization, making it difficult to assess in any straightfoward way.

Some thinkers, like the ancient sophist Gorgias, have questioned whether or not language was capable of capturing thought at all.

"...speech can never exactly represent perciptibles, since it is different from them, and perceptibles are apprehended each by the one kind of organ, speech by another. Hence, since the objects of sight cannot be presented to any other organ but sight, and the different sense-organs cannot give their information to one another, similarly speech cannot give any information about perceptibles. Therefore, if anything exists and is comprehended, it is incommunicable. "

There are studies that prove that languages shape how people understand causality. Some of them were performed by Lera Boroditsky. For example, English speakers tend to say things like "John broke the vase" even for accidents. However, Spanish or Japanese speakers would be more likely to say "the vase broke itself." In studies conducted by Caitlin Fausey at Stanford University speakers of English, Spanish and Japanese watched videos of two people popping balloons, breaking eggs and spilling drinks either intentionally or accidentally. Later everyone was asked whether they could remember who did what. Spanish and Japanese speakers did not remember the agents of accidental events as well as did English speakers. In another study, English speakers watched the video of Janet Jackson's infamous "wardrobe malfunction", accompanied by one of two written reports. The reports were identical except in the last sentence where one used the agentive phrase "ripped the costume" while the other said "the costume ripped." The people who read "ripped the costume" blamed Justin Timberlake more.

Russian speakers, who make an extra distinction between light and dark blue in their language, are better able to visually discriminate shades of blue. The Piraha, a tribe in Brazil, whose language has only terms like few and many instead of numerals, are not able to keep track of exact quantities.

In one study German and Spanish speakers were asked to describe objects having opposite gender assignment in those two languages. The descriptions they gave differed in a way predicted by grammatical gender. For example, when asked to describe a "key" — a word that is masculine in German and feminine in Spanish — the German speakers were more likely to use words like "hard," "heavy," "jagged," "metal," "serrated," and "useful," whereas Spanish speakers were more likely to say "golden," "intricate," "little," "lovely," "shiny," and "tiny." To describe a "bridge," which is feminine in German and masculine in Spanish, the German speakers said "beautiful," "elegant," "fragile," "peaceful," "pretty," and "slender," and the Spanish speakers said "big," "dangerous," "long," "strong," "sturdy," and "towering." This was the case even though all testing was done in English, a language without grammatical gender.

In a series of studies conducted by Gary Lupyan, people were asked to look at a series of images of imaginary aliens. Whether each alien was friendly or hostile was determined by certain subtle features but participants were not told what these were. They had to guess whether each alien was friendly or hostile, and after each response they were told if they were correct or not, helping them learn the subtle cues that distinguished friend from foe. A quarter of the participants were told in advance that the friendly aliens were called "leebish" and the hostile ones "grecious", while another quarter were told the opposite. For the rest, the aliens remained nameless. It was found that participants who were given names for the aliens learned to categorize the aliens far more quickly, reaching 80 per cent accuracy in less than half the time taken by those not told the names. By the end of the test, those told the names could correctly categorize 88 per cent of aliens, compared to just 80 per cent for the rest. It was concluded that naming objects helps us categorize and memorize them.

In another series of experiments a group of people was asked to view furniture from an IKEA catalog. Half the time they were asked to label the object - whether it was a chair or lamp, for example - while the rest of the time they had to say whether or not they liked it. It was found that when asked to label items, people were later less likely to recall the specific details of products,

such as whether a chair had arms or not. It was concluded that labeling objects helps our minds build a prototype of the typical object in the group at the expense of individual features.

CHAPTER 6

Mind and language

Innateness and learning

Some of the major issues at the intersection of philosophy of language and philosophy of mind are also dealt with in modern psycholinguistics. Some important questions are How much of language is innate? Is language acquisition a special faculty in the mind? What is the connection between thought and language?

There are three general perspectives on the issue of language learning. The first is the behaviorist perspective, which dictates that not only is the solid bulk of language learned, but it is learned via conditioning. The second is the hypothesis testing perspective, which understands the child's learning of syntactic rules and meanings to involve the postulation and testing of hypotheses, through the use of the general faculty of intelligence. The final candidate for explanation is the innatist perspective, which states that at least some of the syntactic settings are innate and hardwired, based on certain modules of the mind.

There are varying notions of the structure of the brain when it comes to language. Connectionist models emphasize the idea that a person's lexicon and their thoughts operate in a kind of distributed, associative network. Nativist models assert that there are specialized devices in the brain that are dedicated to language acquisition. Computation models emphasize the notion of a representational language of thought and the logic-like, computational processing that the mind performs over them. Emergentist models focus on the notion that natural faculties are a complex system that emerge from simpler biological parts. Reductionist models attempt to explain higher-level mental processes in terms of the basic low-level neurophysiological activity of the brain

Social Interaction and Language

A common claim is that language is governed by social conventions. Questions inevitably arise on surrounding topics. One question is, "What exactly is a convention, and how do we study it?", and second, "To what extent do conventions even matter in the study of language?" David Kellogg Lewis proposed a worthy reply to the first question by expounding the view that a convention is a rationally self-perpetuating regularity in behavior. However, this view seems to compete to some extent with the Gricean view of speaker's meaning, requiring either one (or both) to be weakened if both are to be taken as true. Some have questioned whether or not conventions are relevant to the study of meaning at all. Noam Chomsky proposed that the study of language could be done in terms of the I-Language, or internal language of persons. If this is so, then it undermines the pursuit of explanations in terms of conventions, and relegates such explanations to the domain of "meta-semantics". Metasemantics is a term used by philosopher of language Robert Stainton to describe all those fields that attempt to explain how semantic facts arise. One fruitful source of research involves investigation into the social conditions that give rise to, or are associated with, meanings and languages. Etymology (the study of the origins of words) and stylistics (philosophical argumentation over what makes "good grammar", relative to a particular language) are two other examples of fields that are taken to be meta-semantic.

Not surprisingly, many separate (but related) fields have investigated the topic of linguistic convention within their own research paradigms. The presumptions that prop up each theoretical view are of interest to the philosopher of language. For instance, one of the major fields of sociology, symbolic interactionism, is based on the insight that human social organization is based almost entirely on the use of meanings.In consequence, any explanation of a social structure (like an institution) would need to account for the shared meanings which create and sustain the structure.

Rhetoric is the study of the particular words that people use to achieve the proper emotional and rational effect in the listener, be it to persuade, provoke, endear, or teach. Some relevant applications of the field include the examination of propaganda and didacticism, the examination of the purposes of swearing and pejoratives (especially how it influences the behavior of others, and defines relationships), or the effects of gendered language. It can also be used to study linguistic transparency (or speaking in an accessible manner), as well as performative utterances and the various tasks that language can perform (called "speech acts"). It also has applications to

the study and interpretation of law, and helps give insight to the logical concept of the domain of discourse.

Literary theory is a discipline that some literary theorists claim overlaps with the philosophy of language. It emphasizes the methods that readers and critics use in understanding a text. This field, an outgrowth of the study of how to properly interpret messages, is unsurprisingly closely tied to the ancient discipline of hermeneutics.

Natural Language

This article is about natural language in neuropsychology and linguistics. For natural language in computer systems, see Natural language processing.

In the philosophy of language, a natural language (or ordinary language) is any language which arises in an unpremeditated fashion as the result of the innate facility for language possessed by the human intellect. A natural language is typically used for communication, and may be spoken, signed, or written. Natural language is distinguished from constructed languages and formal languages such as computer-programming languages or the "languages" used in the study of formal logic, especially mathematical logic.

Defining Natural Language

Though the exact definition varies between scholars, natural language can broadly be defined in contrast on the one hand to artificial or constructed languages, such as computer programming languages like Python and international auxiliary languages like Esperanto, and on the other hand to other communication systems in nature, such as the waggle dance of bees. Although there are a variety of natural languages, any cognitively normal human infant is able to learn any natural language. By comparing the different natural languages, scholars hope to learn something about the nature of human intelligence and the innate biases and constraints that shape natural language, which are sometimes called universal grammar.

The term "natural language" refers only a language that has developed naturally, and hence to actual speech, rather than prescribed speech. Hence, unstandardized speech (such as African

American Vernacular English) is natural, whereas standardized speech such as Standard American English, which is in part prescribed, is somewhat artificial.

Native Language Learning

The learning of one's own native language, typically that of one's parents, normally occurs spontaneously in early human childhood and is biologically, socially and ecologically driven. A crucial role of this process is the ability of humans from an early age to engage in speech repetition and so quickly acquire a spoken vocabulary from the pronunciation of words spoken around them. This together with other aspects of speech involves the neural activity of parts of the human brain such as the Wernicke's and Broca's areas. There are approximately 7,000 current human languages, and many, if not most seem to share certain properties, leading to the hypothesis of Universal Grammar, as argued by the generative grammar studies of Noam Chomsky and his followers. Recently, it has been demonstrated that a dedicated network in the human brain (crucially involving Broca's area, a portion of the left inferior frontal gyrus), is selectively activated by complex verbal structures (but not simple ones) of those languages that meet the Universal Grammar requirements.

While it is clear that there are innate mechanisms that enable the learning of language and define the range of languages that can be learned, it is not clear that these mechanisms in anyway resemble a human language or universal grammar. The study of language acquisition is the domain of psycholinguistics and Chomsky always declined to engage in questions of how his putative language organ, the Language Acquisition Device or Universal Grammar, might have evolved. During a period (the 1970s and 80s) when nativist Transformational Generative Grammar was becoming dominant in Linguistics, and called "Standard Theory", linguists who questioned these tenets were disenfranchised and Cognitive Linguistics and Computational Psycholinguistics were born and the more general term Emergentism developed for the anti-nativist view that language is emergent from more fundamental cognitive processes that are not specifically linguistic in nature.

Origins of Natural Language

There is disagreement among anthropologists on when language was first used by humans (or their ancestors). Estimates range from about two million (2,000,000) years ago, during the time of Homo habilis, to as recently as forty thousand (40,000) years ago, during the time of Cro-Magnon man. However recent evidence suggests modern human language was invented or evolved in Africa prior to the dispersal of humans from Africa around 50,000 years ago. Since all people including the most isolated indigenous groups such as the Andamanese or the Tasmanian aboriginals possess language, then it was presumedly present in the ancestral populations in Africa before the human population split into various groups to inhabit the rest of the world.

Controlled Languages

Controlled natural languages are subsets of natural languages whose grammars and dictionaries have been restricted in order to reduce or eliminate both ambiguity and complexity (for instance, by cutting down on rarely used superlative or adverbial forms or irregular verbs). The purpose behind the development and implementation of a controlled natural language typically is to aid non-native speakers of a natural language in understanding it, or to ease computer processing of a natural language. An example of a widely used controlled natural language is Simplified English, which was originally developed for aerospace industry maintenance manuals.

Constructed Languages And International Auxiliary Languages

Constructed international auxiliary languages such as Esperanto and Interlingua (even those that have native speakers) are not generally considered natural languages. The problem is that other languages have been used to communicate and evolve in a natural way, while Esperanto was selectively designed by L.L. Zamenhof from natural languages, not grown from the natural fluctuations in vocabulary and syntax. Some natural languages have become naturally "standardized" by children's natural tendency to correct for illogical grammar structures in their parents' language, which can be seen in the development of pidgin languages into creole languages (as explained by Steven Pinker in The Language Instinct), but this is not the case in many languages, including constructed languages such as Esperanto, where strict rules are in place as an attempt to consciously remove such irregularities. The possible exception to this are true native speakers of such languages. More substantive basis for this designation is that the vocabulary, grammar, and orthography of Interlingua are natural; they have been standardized

and presented by a linguistic research body, but they predated it and are not themselves considered a product of human invention. Most experts, however, consider Interlingua to be naturalistic rather than natural. Latino Sine Flexione, a second naturalistic auxiliary language, is also naturalistic in content but is no longer widely spoken.

MODALITIES

Natural language manifests itself in modalities other than speech.

Sign languages

A sign language is a language which conveys meaning through visual rather than acoustic patterns—simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to express a speaker's thoughts. Sign languages are natural languages which have developed in Deaf communities, which can include interpreters and friends and families of deaf people as well as people who are deaf or hard of hearing themselves.

In contrast, a manually coded language (or signed oral language) is a constructed sign system combining elements of a sign language and an oral language. For example, Signed Exact English (SEE) did not develop naturally in any population, but was "created by a committee of individuals".

Written languages

Main article: Written language

In a sense, written language should be distinguished from natural language. Until recently in the developed world, it was common for many people to be fluent in spoken and yet remain illiterate; this is still the case in poor countries today. Furthermore, natural language acquisition during childhood is largely spontaneous, while literacy must usually be intentionally acquired.

CHAPTER 7

Programming Language

A programming language is an artificial language designed to communicate instructions to a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine and/or to express algorithms.

The earliest programming languages preceded the invention of the computer, and were used to direct the behavior of machines such as Jacquard looms and player pianos.Thousands of different programming languages have been created, mainly in the computer field, and still many are being created every year. Many programming languages require computation to be specified in an imperative form (i.e., as a sequence of operations to perform), while other languages utilize other forms of program specification such as the declarative form (i.e., the desired result is specified, not how to achieve it).

The description of a programming language is usually split into the two components of syntax (form) and semantics (meaning).Some languages are defined by a specification document (for example, the C programming language is specified by an ISO Standard), while other languages (such as Perl) have a

A programming language is a notation for writing programs, which are specifications of a computation or algorithm. Some, but not all, authors restrict the term "programming language" to those languages that can express all possible algorithms.Traits often considered important for what constitutes a programming language include:

- Function and target: A computer programming language is a language used to write computer programs, which involve a computer performing some kind of computation or algorithm and possibly control external devices such as printers, disk drives, robots, and so on. For example PostScript programs are frequently created by another program to control a computer printer or display. More generally, a programming language may describe computation on some, possibly abstract, machine. It is generally accepted that a complete specification for a programming language includes a description, possibly idealized, of a machine or processor for that language.

- In most practical contexts, a programming language involves a computer; consequently, programming languages are usually defined and studied this way. Programming languages differ

from natural languages in that natural languages are only used for interaction between people, while programming languages also allow humans to communicate instructions to machines.

- Abstractions: Programming languages usually contain abstractions for defining and manipulating data structures or controlling the flow of execution. The practical necessity that a programming language support adequate abstractions is expressed by the abstraction principle;this principle is sometimes formulated as recommendation to the programmer to make proper use of such abstractions.

- Expressive power: The theory of computation classifies languages by the computations they are capable of expressing. All Turing complete languages can implement the same set of algorithms. ANSI/ISO SQL-92 and Charity are examples of languages that are not Turing complete, yet often called programming languages.

Refinement

The period from the 1960s to the late 1970s brought the development of the major language paradigms now in use, though many aspects were refinements of ideas in the very first Third-generation programming languages:

- APL introduced array programming and influenced functional programming.

- PL/I, originally called NPL, was designed in the early 1960s to incorporate the best ideas from FORTRAN and COBOL with block structures taken from ALGOL.

- In the 1960s, Simula was the first language designed to support object-oriented programming; in the mid-1970s, Smalltalk followed with the first "purely" object-oriented language.

- C was developed between 1969 and 1973 as a system programming language, and remains popular.

- Prolog, designed in 1972, was the first logic programming language.

- In 1978, ML built a polymorphic type system on top of Lisp, pioneering statically typed functional programming languages.

Each of these languages spawned an entire family of descendants, and most modern languages count at least one of them in their ancestry.

The 1960s and 1970s also saw considerable debate over the merits of structured programming, and whether programming languages should be designed to support it. Edsger Dijkstra, in a famous 1968 letter published in the Communications of the ACM, argued that GOTO statements should be eliminated from all "higher level" programming languages.

The 1960s and 1970s also saw expansion of techniques that reduced the footprint of a program as well as improved productivity of the programmer and user. The card deck for an early 4GL was a lot smaller for the same functionality expressed in a 3GL deck.

Consolidation and growth

A selection of textbooks that teach programming, in languages both popular and obscure. These are only a few of the thousands of programming languages and dialects that have been designed in history.

The 1980s were years of relative consolidation. C++ combined object-oriented and systems programming. The United States government standardized Ada, a systems programming language derived from Pascal and intended for use by defense contractors. In Japan and elsewhere, vast sums were spent investigating so-called "fifth generation" languages that incorporated logic programming constructs. The functional languages community moved to standardize ML and Lisp. Rather than inventing new paradigms, all of these movements elaborated upon the ideas invented in the previous decade.

One important trend in language design for programming large-scale systems during the 1980s was an increased focus on the use of modules, or large-scale organizational units of code. Modula-2, Ada, and ML all developed notable module systems in the 1980s, although other languages, such as PL/I, already had extensive support for modular programming. Module systems were often wedded to generic programming constructs.

The rapid growth of the Internet in the mid-1990s created opportunities for new languages. Perl, originally a Unix scripting tool first released in 1987, became common in dynamic websites. Java came to be used for server-side programming, and bytecode virtual machines became popular again in commercial settings with their promise of "Write once, run anywhere" (UCSD Pascal had been popular for a time in the early 1980s). These developments were not fundamentally novel, rather they were refinements to existing languages and paradigms, and largely based on the C family of programming languages.

Programming language evolution continues, in both industry and research. Current directions include security and reliability verification, new kinds of modularity (mixins, delegates, aspects), and database integration such as Microsoft's LINQ.

The 4GLs are examples of languages which are domain-specific, such as SQL, which manipulates and returns sets of data rather than the scalar values which are canonical to most programming languages. Perl, for example, with its 'here document' can hold multiple 4GL programs, as well as multiple JavaScript programs, in part of its own perl code and use variable interpolation in the 'here document' to support multi-language programming.

ELEMENTS

All programming languages have some primitive building blocks for the description of data and the processes or transformations applied to them (like the addition of two numbers or the selection of an item from a collection). These primitives are defined by syntactic and semantic rules which describe their structure and meaning respectively.

SYNTAX

Syntax highlighting is often used to aid programmers in recognizing elements of source code. The language above is Python.

A programming language's surface form is known as its syntax. Most programming languages are purely textual; they use sequences of text including words, numbers, and punctuation, much like written natural languages. On the other hand, there are some programming languages which are more graphical in nature, using visual relationships between symbols to specify a program.

The syntax of a language describes the possible combinations of symbols that form a syntactically correct program. The meaning given to a combination of symbols is handled by semantics (either formal or hard-coded in a reference implementation). Since most languages are textual, this article discusses textual syntax.

Programming language syntax is usually defined using a combination of regular expressions (for lexical structure) and Backus–Naur Form (for grammatical structure). Below is a simple grammar, based on Lisp:

expression ::= atom | list

atom ::= number | symbol

number ::= [+-]?['0'-'9']+

symbol ::= ['A'-'Z''a'-'z'].*

list ::= '(' expression* ')'

This grammar specifies the following:

- an expression is either an atom or a list;
- an atom is either a number or a symbol;
- a number is an unbroken sequence of one or more decimal digits, optionally preceded by a plus or minus sign;
- a symbol is a letter followed by zero or more of any characters (excluding whitespace); and
- a list is a matched pair of parentheses, with zero or more expressions inside it.

  The following are examples of well-formed token sequences in this grammar: 12345, () and (a b c232 (1)).

Not all syntactically correct programs are semantically correct. Many syntactically correct programs are nonetheless ill-formed, per the language's rules; and may (depending on the

language specification and the soundness of the implementation) result in an error on translation or execution. In some cases, such programs may exhibit undefined behavior. Even when a program is well-defined within a language, it may still have a meaning that is not intended by the person who wrote it.

Using natural language as an example, it may not be possible to assign a meaning to a grammatically correct sentence or the sentence may be false:

- "Colorless green ideas sleep furiously." is grammatically well-formed but has no generally accepted meaning.
- "John is a married bachelor." is grammatically well-formed but expresses a meaning that cannot be true.

The following C language fragment is syntactically correct, but performs operations that are not semantically defined (the operation *p >> 4 has no meaning for a value having a complex type and p->im is not defined because the value of p is the null pointer):

```
complex *p = NULL;

complex abs_p = sqrt(*p >> 4 + p->im);
```

If the type declaration on the first line were omitted, the program would trigger an error on compilation, as the variable "p" would not be defined. But the program would still be syntactically correct, since type declarations provide only semantic information.

The grammar needed to specify a programming language can be classified by its position in the Chomsky hierarchy. The syntax of most programming languages can be specified using a Type-2 grammar, i.e., they are context-free grammars.Some languages, including Perl and Lisp, contain constructs that allow execution during the parsing phase. Languages that have constructs that allow the programmer to alter the behavior of the parser make syntax analysis an undecidable problem, and generally blur the distinction between parsing and execution. In contrast to Lisp's macro system and Perl's BEGIN blocks, which may contain general computations, C macros are merely string replacements, and do not require code execution.

SEMANTICS

The term Semantics refers to the meaning of languages, as opposed to their form (syntax).

Static semantics

The static semantics defines restrictions on the structure of valid texts that are hard or impossible to express in standard syntactic formalisms. For compiled languages, static semantics essentially include those semantic rules that can be checked at compile time. Examples include checking that every identifier is declared before it is used (in languages that require such declarations) or that the labels on the arms of a case statement are distinct.Many important restrictions of this type, like checking that identifiers are used in the appropriate context (e.g. not adding an integer to a function name), or that subroutine calls have the appropriate number and type of arguments, can be enforced by defining them as rules in a logic called a type system. Other forms of static analyses like data flow analysis may also be part of static semantics. Newer programming languages like Java and C# have definite assignment analysis, a form of data flow analysis, as part of their static semantics.

DYNAMIC SEMANTICS

Main article: Semantics of programming languages

Once data has been specified, the machine must be instructed to perform operations on the data. For example, the semantics may define the strategy by which expressions are evaluated to values, or the manner in which control structures conditionally execute statements. The dynamic semantics (also known as execution semantics) of a language defines how and when the various constructs of a language should produce a program behavior. There are many ways of defining execution semantics. Natural language is often used to specify the execution semantics of languages commonly used in practice. A significant amount of academic research went into formal semantics of programming languages, which allow execution semantics to be specified in a formal manner. Results from this field of research have seen limited application to programming language design and implementation outside academia.

CHAPTER 8

PHONOLOGY

Phonology is a branch of linguistics concerned with the systematic organization of sounds in languages. It has traditionally focused largely on study of the systems of phonemes in particular languages (and is therefore also called phonemics, or phonematics), but it may also cover any linguistic analysis either at a level beneath the word (including syllable, onset and rhyme, articulatory gestures, articulatory features, mora, etc.) or at all levels of language where sound is considered to be structured for conveying linguistic meaning. Phonology also includes the study of equivalent organizational systems in sign languages.

The word phonology (as in the phonology of English) can also refer to the phonological system (sound system) of a given language. This is one of the fundamental systems which a language is considered to comprise, like its syntax and its vocabulary.

Phonology is often distinguished from phonetics. While phonetics concerns the physical production, acoustic transmission and perception of the sounds of speech, phonology describes the way sounds function within a given language or across languages to encode meaning. For many linguists, phonetics belongs to descriptive linguistics, and phonology to theoretical linguistics, although establishing the phonological system of a language is necessarily an application of theoretical principles to analysis of phonetic evidence. Note that this distinction was not always made, particularly before the development of the modern concept of phoneme in the mid 20th century. Some subfields of modern phonology have a crossover with phonetics in descriptive disciplines such as psycholinguistics and speech perception, resulting in specific areas like articulatory phonology or laboratory phonology.

DERIVATION AND DEFINITIONS

The word phonology comes from Greek φωνή, phōnḗ, "voice, sound," and the suffix -logy (which is from Greek λόγος, lógos, "word, speech, subject of discussion"). Definitions of the term vary. Nikolai Trubetzkoy in Grundzüge der Phonologie (1939) defines phonology as "the study of sound pertaining to the system of language," as opposed to phonetics, which is "the study of sound pertaining to the act of speech." (the distinction between language and speech being basically Saussure's distinction between langue and parole) More recently, Lass (1998) writes that phonology refers broadly to the subdiscipline of linguistics concerned with the sounds of language, while in more narrow terms, "phonology proper is concerned with the function, behavior and organization of sounds as linguistic items." According to Clark et al. (2007) it means the systematic use of sound to encode meaning in any spoken human language, or the field of linguistics studying this use.

Development of Phonology

The history of phonology may be traced back to the Ashtadhyayi, the Sanskrit grammar composed by Pāṇini in the 4th century BC. In particular the Shiva Sutras, an auxiliary text to the Ashtadhyayi, introduces what can be considered a list of the phonemes of the Sanskrit language, with a notational system for them that is used throughout the main text, which deals with matters of morphology, syntax and semantics.

The Polish scholar Jan Baudouin de Courtenay (together with his former student Mikołaj Kruszewski) introduced the concept of the phoneme in 1876, and his work, though often unacknowledged, is considered to be the starting point of modern phonology. He also worked on the theory of phonetic alternations (what is now called allophony and morphophonology), and had a significant influence on the work of Ferdinand de Saussure.

An influential school of phonology in the interwar period was the Prague school. One of its leading members was Prince Nikolai Trubetzkoy, whose Grundzüge der Phonologie (Principles of Phonology), published posthumously in 1939, is among the most important works in the field from this period. Directly influenced by Baudouin de Courtenay, Trubetzkoy is considered the founder of morphophonology, although this concept had also been recognized by de Courtenay.

Trubetzkoy also developed the concept of the archiphoneme. Another important figure in the Prague school was Roman Jakobson, who was one of the most prominent linguists of the 20th century.

In 1968 Noam Chomsky and Morris Halle published The Sound Pattern of English (SPE), the basis for generative phonology. In this view, phonological representations are sequences of segments made up of distinctive features. These features were an expansion of earlier work by Roman Jakobson, Gunnar Fant, and Morris Halle. The features describe aspects of articulation and perception, are from a universally fixed set, and have the binary values + or −. There are at least two levels of representation: underlying representation and surface phonetic representation. Ordered phonological rules govern how underlying representation is transformed into the actual pronunciation (the so-called surface form). An important consequence of the influence SPE had on phonological theory was the downplaying of the syllable and the emphasis on segments. Furthermore, the generativists folded morphophonology into phonology, which both solved and created problems.

Natural phonology was a theory based on the publications of its proponent David Stampe in 1969 and (more explicitly) in 1979. In this view, phonology is based on a set of universal phonological processes which interact with one another; which ones are active and which are suppressed are language-specific. Rather than acting on segments, phonological processes act on distinctive features within prosodic groups. Prosodic groups can be as small as a part of a syllable or as large as an entire utterance. Phonological processes are unordered with respect to each other and apply simultaneously (though the output of one process may be the input to another). The second-most prominent natural phonologist is Stampe's wife, Patricia Donegan; there are many Natural Phonologists in Europe, though also a few others in the U.S., such as Geoffrey Nathan. The principles of natural phonology were extended to morphology by Wolfgang U. Dressler, who founded natural morphology.

In 1976 John Goldsmith introduced autosegmental phonology. Phonological phenomena are no longer seen as operating on one linear sequence of segments, called phonemes or feature combinations, but rather as involving some parallel sequences of features which reside on multiple tiers. Autosegmental phonology later evolved into feature geometry, which became the

standard theory of representation for the theories of the organization of phonology as different as lexical phonology and optimality theory.

Government phonology, which originated in the early 1980s as an attempt to unify theoretical notions of syntactic and phonological structures, is based on the notion that all languages necessarily follow a small set of principles and vary according to their selection of certain binary parameters. That is, all languages' phonological structures are essentially the same, but there is restricted variation that accounts for differences in surface realizations. Principles are held to be inviolable, though parameters may sometimes come into conflict. Prominent figures include Jonathan Kaye, Jean Lowenstamm, Jean-Roger Vergnaud, Monik Charette, John Harris, and many others.

In a course at the LSA summer institute in 1991, Alan Prince and Paul Smolensky developed optimality theory—an overall architecture for phonology according to which languages choose a pronunciation of a word that best satisfies a list of constraints which is ordered by importance: a lower-ranked constraint can be violated when the violation is necessary in order to obey a higher-ranked constraint. The approach was soon extended to morphology by John McCarthy and Alan Prince, and has become a dominant trend in phonology. Though this usually goes unacknowledged, optimality theory was strongly influenced by natural phonology; both view phonology in terms of constraints on speakers and their production, though these constraints are formalized in very different ways The appeal to phonetic grounding of constraints in various approaches has been criticized by proponents of 'substance-free phonology', especially Mark Hale and Charles Reiss. Broadly speaking, government phonology (or its descendant, strict-CV phonology) has a greater following in the United Kingdom, whereas optimality theory is predominant in North America

Analysis of Phonemes

An important part of traditional, pre-generative, schools of phonology is studying which sounds can be grouped into distinctive units within a language; these units are known as phonemes. For example, in English, the "p" sound in pot is aspirated (pronounced [p^h]), while that in spot is not aspirated (pronounced). However, English speakers intuitively treat both sounds as variations (allophones) of the same phonological category, that is, of the phoneme /p/. (Traditionally, it

would be argued that if an aspirated [p^h] were interchanged with the unaspirated [p] in spot, native speakers of English would still hear the same words; that is, the two sounds are perceived as "the same" /p/.) In some other languages, however, these two sounds are perceived as different, and they are consequently assigned to different phonemes in those languages. For example, in Thai, Hindi, and Quechua, there are minimal pairs of words for which aspiration is the only contrasting feature (two words with different meanings that are identical except that one has an aspirated sound where the other has an unaspirated one).

The vowels of modern (Standard) Arabic and (Israeli) Hebrew from the phonemic point of view. Note the intersection of the two circles—the distinction between short a, i and u is made by both speakers, but Arabic lacks the mid articulation of short vowels, while Hebrew lacks the distinction of vowel length.

The vowels of modern (Standard) Arabic and (Israeli) Hebrew from the phonetic point of view. Note that the two circles are totally separate—none of the vowel-sounds made by speakers of one language is made by speakers of the other.

Part of the phonological study of a language therefore involves looking at data (phonetic transcriptions of the speech of native speakers) and trying to deduce what the underlying phonemes are and what the sound inventory of the language is. The presence or absence of minimal pairs, as mentioned above, is a frequently used criterion for deciding whether two sounds should be assigned to the same phoneme. However other considerations often need to be taken into account as well.

The particular sounds which are phonemic in a language can change over time. At one time, and were allophones in English, but these later changed into separate phonemes. This is one of the main factors of historical change of languages as described in historical linguistics.

The findings and insights of speech perception and articulation research complicates the traditional and somewhat intuitive idea of interchangeable allophones being perceived as the same phoneme. First, interchanged allophones of the same phoneme can result in unrecognizable words. Second, actual speech, even at a word level, is highly co-articulated, so it is problematic to expect to be able to splice words into simple segments without affecting speech perception.

Different linguists therefore take different approaches to the problem of assigning sounds to phonemes. For example, they differ in the extent to which they require allophones to be phonetically similar. There are also differing ideas as to whether this grouping of sounds is purely a tool for linguistic analysis, or reflects an actual process in the way the human brain processes a language.

Since the early 1960s, theoretical linguists have moved away from the traditional concept of a phoneme, preferring to consider basic units at a more abstract level, as a component of morphemes; these units can be called morphophonemes, and analysis using this approach is called morphophonology.

Other topics in phonology

In addition to the minimal units that can serve the purpose of differentiating meaning (the phonemes), phonology studies how sounds alternate, i.e. replace one another in different forms of the same morpheme (allomorphs), as well as, for example, syllable structure, stress, feature geometry, accent, and intonation.

Phonology also includes topics such as phonotactics (the phonological constraints on what sounds can appear in what positions in a given language) and phonological alternation (how the pronunciation of a sound changes through the application of phonological rules, sometimes in a given order which can be feeding or bleeding, as well as prosody, the study of suprasegmentals and topics such as stress and intonation.

The principles of phonological analysis can be applied independently of modality because they are designed to serve as general analytical tools, not language-specific ones. The same principles have been applied to the analysis of sign languages (see Phonemes in sign languages), even though the sub-lexical units are not instantiated as speech sounds.

CHAPTER 9

PRAGMATICS

Pragmatics is a subfield of linguistics and semiotics which studies the ways in which context contributes to meaning. Pragmatics encompasses speech act theory, conversational implicature, talk in interaction and other approaches to language behavior in philosophy, sociology, linguistics and anthropology.Unlike semantics, which examines meaning that is conventional or "coded" in a given language, pragmatics studies how the transmission of meaning depends not only on structural and linguistic knowledge (e.g., grammar, lexicon, etc.) of the speaker and listener, but also on the context of the utterance, any pre-existing knowledge about those involved, the inferred intent of the speaker, and other factors. In this respect, pragmatics explains how language users are able to overcome apparent ambiguity, since meaning relies on the manner, place, time etc. of an utterance.

The ability to understand another speaker's intended meaning is called pragmatic competence.

AMBIGUITY

The sentence "You have a green light" is ambiguous. Without knowing the context, the identity of the speaker, and his or her intent, it is difficult to infer the meaning with confidence. For example:

- It could mean that you have green ambient lighting.
- It could mean that you have a green light while driving your car.
- It could mean that you can go ahead with the project.
- It could mean that your body has a green glow.
- It could mean that you possess a light bulb that is tinted green.

Similarly, the sentence "Sherlock saw the man with binoculars" could mean that Sherlock observed the man by using binoculars, or it could mean that Sherlock observed a man who was holding binoculars (syntactic ambiguity). The meaning of the sentence depends on an

understanding of the context and the speaker's intent. As defined in linguistics, a sentence is an abstract entity — a string of words divorced from non-linguistic context — as opposed to an utterance, which is a concrete example of a speech act in a specific context. The closer conscious subjects stick to common words, idioms, phrasings, and topics, the more easily others can surmise their meaning; the further they stray from common expressions and topics, the wider the variations in interpretations. This suggests that sentences do not have meaning intrinsically; there is not a meaning associated with a sentence or word, they can only symbolically represent an idea. The cat sat on the mat is a sentence in English; if you say to your sister on Tuesday afternoon, "The cat sat on the mat," this is an example of an utterance. Thus, there is no such thing as a sentence, term, expression or word symbolically representing a single true meaning; it is underspecified (which cat sat on which mat?) and potentially ambiguous. The meaning of an utterance, on the other hand, is inferred based on linguistic knowledge and knowledge of the non-linguistic context of the utterance (which may or may not be sufficient to resolve ambiguity). In mathematics with Berry's paradox there arose a systematic ambiguity with the word "definable". The ambiguity with words shows that the descriptive power of any human language is limited.

Etymology

The word pragmatics derives via Latin pragmaticus from the Greek πραγματικός (pragmatikos), meaning amongst others "fit for action", which comes from πρᾶγμα (pragma), "deed, act",and that from πράσσω (prassō), "to pass over, to practise, to achieve".

Origins

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Pragmatics was a reaction to structuralist linguistics as outlined by Ferdinand de Saussure. In many cases, it expanded upon his idea that language has an analyzable structure, composed of parts that can be defined in relation to others. Pragmatics first engaged only in synchronic study, as opposed to examining the historical development of language. However, it rejected the notion that all meaning comes from signs existing purely in the abstract space of langue. Meanwhile, historical pragmatics has also come into being.

Areas of interest

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- The study of the speaker's meaning, not focusing on the phonetic or grammatical form of an utterance, but instead on what the speaker's intentions and beliefs are.
- The study of the meaning in context, and the influence that a given context can have on the message. It requires knowledge of the speaker's identities, and the place and time of the utterance.
- Metapragmatics means to understand the context in which the speech event took place. Without the context, pure referential meanings elide the complexities of the any speech utterance.
- The study of implicatures, i.e. the things that are communicated even though they are not explicitly expressed.
- The study of relative distance, both social and physical, between speakers in order to understand what determines the choice of what is said and what is not said.
- The study of what is not meant, as opposed to the intended meaning, i.e. that which is unsaid and unintended, or unintentional.
- Information Structure, the study of how utterances are marked in order to efficiently manage the common ground of referred entities between speaker and hearer
- Formal Pragmatics, the study of those aspects of meaning and use, for which context of use is an important factor, by using the methods and goals of formal semantics.

Referential uses of language

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When we speak of the referential uses of language we are talking about how we use signs to refer to certain items. Below is an explanation of, first, what a sign is, second, how meanings are accomplished through its usage.

A sign is the link or relationship between a signified and the signifier as defined by Saussure and Huguenin. The signified is some entity or concept in the world. The signifier represents the signified. An example would be:

Signified: the concept cat

Signifier: the word "cat"

The relationship between the two gives the sign meaning. This relationship can be further explained by considering what we mean by "meaning." In pragmatics, there are two different types of meaning to consider: semantico-referential meaning and indexical meaning. Semantico-referential meaning refers to the aspect of meaning, which describes events in the world that are independent of the circumstance they are uttered in. An example would be propositions such as:

"Santa Claus eats cookies."

In this case, the proposition is describing that Santa Claus eats cookies. The meaning of this proposition does not rely on whether or not Santa Claus is eating cookies at the time of its utterance. Santa Claus could be eating cookies at any time and the meaning of the proposition would remain the same. The meaning is simply describing something that is the case in the world. In contrast, the proposition, "Santa Claus is eating a cookie right now," describes events that are happening at the time the proposition is uttered.

Semantico-referential meaning is also present in meta-semantical statements such as:

Tiger: carnivorous, a mammal

If someone were to say that a tiger is an carnivorous animal in one context and a mammal in another, the definition of tiger would still be the same. The meaning of the sign tiger is describing some animal in the world, which does not change in either circumstance.

Indexical meaning, on the other hand, is dependent on the context of the utterance and has rules of use. By rules of use, it is meant that indexicals can tell you when they are used, but not what they actually mean.

Example: "I"

Whom "I" refers to depends on the context and the person uttering it.

As mentioned, these meanings are brought about through the relationship between the signified and the signifier. One way to define the relationship is by placing signs in two categories: referential indexical signs, also called "shifters," and pure indexical signs.

Referential indexical signs are signs where the meaning shifts depending on the context hence the nickname "shifters." 'I' would be considered a referential indexical sign. The referential aspect of its meaning would be '1st person singular' while the indexical aspect would be the person who is speaking (refer above for definitions of semantico-referential and indexical meaning). Another example would be:

1. Icon: the signified resembles the signifier (signified: a dog's barking noise, signifier: bow - wow)
2. Index: the signified and signifier are linked by proximity or the signifier has meaning only because it is pointing to the signified
3. Symbol: the signified and signifier are arbitrarily linked (signified: a cat, signifier: the word cat)

These relationships allow us to use signs to convey what we want to say. If two people were in a room and one of them wanted to refer to a characteristic of a chair in the room he would say "this chair has four legs" instead of "a chair has four legs." The former relies on context (indexical and referential meaning) by referring to a chair specifically in the room at that moment while the latter is independent of the context (semantico-referential meaning), meaning the concept chair.

Non-referential uses of language

Silverstein's "pure" indexes

Michael Silverstein has argued that "nonreferential" or "pure" indices do not contribute to an utterance's referential meaning but instead "signal some particular value of one or more contextual variables."

Although nonreferential indexes are devoid of semantico-referential meaning, they do encode "pragmatic" meaning.

The sorts of contexts that such indexes can mark are varied. Examples include:

- Sex indexes are affixes or inflections that index the sex of the speaker, e.g. the verb forms of female Koasati speakers take the suffix "-s".
- Deference indexes are words that signal social differences (usually related to status or age) between the speaker and the addressee. The most common example of a deference index is the V form in a language with a T-V distinction, the widespread phenomenon in which there are multiple second-person pronouns that correspond to the addressee's relative status or familiarity to the speaker. Honorifics are another common form of deference index and demonstrate the speaker's respect or esteem for the addressee via special forms of address and/or self-humbling first-person pronouns.
- An Affinal taboo index is an example of avoidance speech that produces and reinforces sociological distance, as seen in the Aboriginal Dyirbal language of Australia. In this language and some others, there is a social taboo against the use of the everyday lexicon in the presence of certain relatives (mother-in-law, child-in-law, paternal aunt's child, and maternal uncle's child). If any of those relatives are present, a Dyirbal speaker has to switch to a completely separate lexicon reserved for that purpose.

In all of these cases, the semantico-referential meaning of the utterances is unchanged from that of the other possible (but often impermissible) forms, but the pragmatic meaning is vastly different.

The performative

Main articles: Performative utterance and Speech act theory

J.L. Austin introduced the concept of the performative, contrasted in his writing with "constative" (i.e. descriptive) utterances. According to Austin's original formulation, a performative is a type of utterance characterized by two distinctive features:

- It is not truth-evaluable (i.e. it is neither true nor false)
- Its uttering performs an action rather than simply describing one

However, a performative utterance must also conform to a set of felicity conditions.

Examples:

- "I hereby pronounce you man and wife."
- "I accept your apology."
- "This meeting is now adjourned."

CHAPTER 10

Semantics

Semantics (from Ancient Greek: σημαντικός sēmantikós; important) is the study of meaning. It focuses on the relation between signifiers, like words, phrases, signs, and symbols, and what they stand for, their denotation.

Linguistic semantics is the study of meaning that is used for understanding human expression through language. Other forms of semantics include the semantics of programming languages, formal logics, and semiotics.

The word semantics itself denotes a range of ideas - from the popular to the highly technical. It is often used in ordinary language for denoting a problem of understanding that comes down to word selection or connotation. This problem of understanding has been the subject of many

formal enquiries, over a long period of time, most notably in the field of formal semantics. In linguistics, it is the study of interpretation of signs or symbols used in agents or communities within particular circumstances and contexts. Within this view, sounds, facial expressions, body language, and proxemics have semantic (meaningful) content, and each comprises several branches of study. In written language, things like paragraph structure and punctuation bear semantic content; other forms of language bear other semantic content.

The formal study of semantics intersects with many other fields of inquiry, including lexicology, syntax, pragmatics, etymology and others, although semantics is a well-defined field in its own right, often with synthetic properties. In philosophy of language, semantics and reference are closely connected. Further related fields include philology, communication, and semiotics. The formal study of semantics is therefore complex.

Semantics contrasts with syntax, the study of the combinatorics of units of a language (without reference to their meaning), and pragmatics, the study of the relationships between the symbols of a language, their meaning, and the users of the language.

In international scientific vocabulary semantics is also called semasiology.

Linguistics

In linguistics, semantics is the subfield that is devoted to the study of meaning, as inherent at the levels of words, phrases, sentences, and larger units of discourse (termed texts). The basic area of study is the meaning of signs, and the study of relations between different linguistic units and compounds: homonymy, synonymy, antonymy, hypernymy, hyponymy, meronymy, metonymy, holonymy, paronyms. A key concern is how meaning attaches to larger chunks of text, possibly as a result of the composition from smaller units of meaning. Traditionally, semantics has included the study of sense and denotative reference, truth conditions, argument structure, thematic roles, discourse analysis, and the linkage of all of these to syntax.

Montague grammar

In the late 1960s, Richard Montague proposed a system for defining semantic entries in the lexicon in terms of the lambda calculus. In these terms, the syntactic parse of the sentence John

ate every bagel would consist of a subject (John) and a predicate (ate every bagel); Montague demonstrated that the meaning of the sentence altogether could be decomposed into the meanings of its parts and in relatively few rules of combination. The logical predicate thus obtained would be elaborated further, e.g. using truth theory models, which ultimately relate meanings to a set of Tarskiian universals, which may lie outside the logic. The notion of such meaning atoms or primitives is basic to the language of thought hypothesis from the 1970s.

Despite its elegance, Montague grammar was limited by the context-dependent variability in word sense, and led to several attempts at incorporating context, such as:

- Situation semantics (1980s): truth-values are incomplete, they get assigned based on context
- Generative lexicon (1990s): categories (types) are incomplete, and get assigned based on context

In Chomskyan linguistics there was no mechanism for the learning of semantic relations, and the nativist view considered all semantic notions as inborn. Thus, even novel concepts were proposed to have been dormant in some sense. This view was also thought unable to address many issues such as metaphor or associative meanings, and semantic change, where meanings within a linguistic community change over time, and qualia or subjective experience. Another issue not addressed by the nativist model was how perceptual cues are combined in thought, e.g. in mental rotation.

This view of semantics, as an innate finite meaning inherent in a lexical unit that can be composed to generate meanings for larger chunks of discourse, is now being fiercely debated in the emerging domain of cognitive linguistics and also in the non-Fodorian camp in philosophy of language.The challenge is motivated by:

- factors internal to language, such as the problem of resolving indexical or anaphora (e.g. this x, him, last week). In these situations context serves as the input, but the interpreted utterance also modifies the context, so it is also the output. Thus, the interpretation is necessarily dynamic and the meaning of sentences is viewed as context change potentials instead of propositions.

- factors external to language, i.e. language is not a set of labels stuck on things, but "a toolbox, the importance of whose elements lie in the way they function rather than their attachments to things." This view reflects the position of the later Wittgenstein and his famous game example, and is related to the positions of Quine, Davidson, and others.

A concrete example of the latter phenomenon is semantic underspecification – meanings are not complete without some elements of context. To take an example of one word, red, its meaning in a phrase such as red book is similar to many other usages, and can be viewed as compositional. However, the colours implied in phrases such as red wine (very dark), and red hair (coppery), or red soil, or red skin are very different. Indeed, these colours by themselves would not be called red by native speakers. These instances are contrastive, so red wine is so called only in comparison with the other kind of wine (which also is not white for the same reasons). This view goes back to de Saussure:

Each of a set of synonyms like redouter ('to dread'), craindre ('to fear'), avoir peur ('to be afraid') has its particular value only because they stand in contrast with one another. No word has a value that can be identified independently of what else is in its vicinity.

and may go back to earlier Indian views on language, especially the Nyaya view of words as indicators and not carriers of meaning.

An attempt to defend a system based on propositional meaning for semantic underspecification can be found in the generative lexicon model of James Pustejovsky, who extends contextual operations (based on type shifting) into the lexicon. Thus meanings are generated "on the fly" (as you go), based on finite context.

Prototype theory

Another set of concepts related to fuzziness in semantics is based on prototypes. The work of Eleanor Rosch in the 1970s led to a view that natural categories are not characterizable in terms of necessary and sufficient conditions, but are graded (fuzzy at their boundaries) and inconsistent as to the status of their constituent members. One may compare it with Jung's archetype, though the concept of archetype sticks to static concept. Some post-structuralists are against the fixed or

static meaning of the words. Derrida, following Nietzsche, talked about slippages in fixed meanings.

Systems of categories are not objectively out there in the world but are rooted in people's experience. These categories evolve as learned concepts of the world – meaning is not an objective truth, but a subjective construct, learned from experience, and language arises out of the "grounding of our conceptual systems in shared embodiment and bodily experience". A corollary of this is that the conceptual categories (i.e. the lexicon) will not be identical for different cultures, or indeed, for every individual in the same culture. This leads to another debate (see the Sapir–Whorf hypothesis or Eskimo words for snow).

Theories in semantics

Model theoretic semantics

Main article: formal semantics (linguistics)

Originates from Montague's work (see above). A highly formalized theory of natural language semantics in which expressions are assigned denotations (meanings) such as individuals, truth values, or functions from one of these to another. The truth of a sentence, and more interestingly, its logical relation to other sentences, is then evaluated relative to a model.

Formal (or truth-conditional) semantics

Main article: truth-conditional semantics

Pioneered by the philosopher Donald Davidson, another formalized theory, which aims to associate each natural language sentence with a meta-language description of the conditions under which it is true, for example: `Snow is white' is true if and only if snow is white. The challenge is to arrive at the truth conditions for any sentences from fixed meanings assigned to the individual words and fixed rules for how to combine them. In practice, truth-conditional semantics is similar to model-theoretic semantics; conceptually, however, they differ in that truth-conditional semantics seeks to connect language with statements about the real world (in the form of meta-language statements), rather than with abstract models.

Lexical and conceptual semantics

Main article: conceptual semantics

This theory is an effort to explain properties of argument structure. The assumption behind this theory is that syntactic properties of phrases reflect the meanings of the words that head them. With this theory, linguists can better deal with the fact that subtle differences in word meaning correlate with other differences in the syntactic structure that the word appears in. The way this is gone about is by looking at the internal structure of words. These small parts that make up the internal structure of words are termed semantic primitives.

Lexical semantics

Main article: lexical semantics

A linguistic theory that investigates word meaning. This theory understands that the meaning of a word is fully reflected by its context. Here, the meaning of a word is constituted by its contextual relations. Therefore, a distinction between degrees of participation as well as modes of participation are made. In order to accomplish this distinction any part of a sentence that bears a meaning and combines with the meanings of other constituents is labeled as a semantic constituent. Semantic constituents that cannot be broken down into more elementary constituents are labeled minimal semantic constituents.

Computational semantics

Main article: computational semantics

Computational semantics is focused on the processing of linguistic meaning. In order to do this concrete algorithms and architectures are described. Within this framework the algorithms and architectures are also analyzed in terms of decidability, time/space complexity, data structures they require and communication protocols.

Computer science

In computer science, the term semantics refers to the meaning of languages, as opposed to their form (syntax). According to Euzenat, semantics "provides the rules for interpreting the syntax

which do not provide the meaning directly but constrains the possible interpretations of what is declared." In other words, semantics is about interpretation of an expression. Additionally, the term is applied to certain types of data structures specifically designed and used for representing information content.

Programming languages

The semantics of programming languages and other languages is an important issue and area of study in computer science. Like the syntax of a language, its semantics can be defined exactly.

For instance, the following statements use different syntaxes, but cause the same instructions to be executed:

Statement	Programming languages
x += y	C, C++, C#, Java, Perl, Python, Ruby, PHP, etc.
x := x + y	ALGOL, BCPL, Simula, ALGOL 68, SETL, Pascal, Smalltalk, Modula-2, Ada, Standard ML, OCaml, Eiffel, Object Pascal (Delphi), Oberon, Dylan, VHDL, etc.
ADD x, y	Assembly languages: Intel 8086
LET X = X + Y	BASIC: early
x = x + y	BASIC: most dialects; Fortran, MATLAB, Lua
Set x = x + y	Caché ObjectScript
ADD Y TO X.	ABAP
ADD Y TO X GIVING X	COBOL
set /a x=x+y	Batch
(incf x y)	Common Lisp
/x y x add def	PostScript

Generally these operations would all perform an arithmetical addition of 'y' to 'x' and store the result in a variable called 'x'.

Various ways have been developed to describe the semantics of programming languages formally, building on mathematical logic: Operational semantics: The meaning of a construct is specified by the computation it induces when it is executed on a machine. In particular, it is of interest how the effect of a computation is produced.

- Denotational semantics: Meanings are modelled by mathematical objects that represent the effect of executing the constructs. Thus only the effect is of interest, not how it is obtained.
- Axiomatic semantics: Specific properties of the effect of executing the constructs are expressed as assertions. Thus there may be aspects of the executions that are ignored.

Semantic models

Terms such as semantic network and semantic data model are used to describe particular types of data models characterized by the use of directed graphs in which the vertices denote concepts or entities in the world, and the arcs denote relationships between them.

The Semantic Web refers to the extension of the World Wide Web via embedding added semantic metadata, using semantic data modelling techniques such as Resource Description Framework (RDF) and Web Ontology Language (OWL).

Psychology

In psychology, semantic memory is memory for meaning – in other words, the aspect of memory that preserves only the gist, the general significance, of remembered experience – while episodic memory is memory for the ephemeral details – the individual features, or the unique particulars of experience. Word meaning is measured by the company they keep, i.e. the relationships among words themselves in a semantic network. The memories may be transferred intergenerationally or isolated in one generation due to a cultural disruption. Different generations may have different experiences at similar points in their own time-lines. This may then create a vertically heterogeneous semantic net for certain words in an otherwise homogeneous culture. In a network created by people analyzing their understanding of the word (such as Wordnet) the links and decomposition structures of the network are few in number and kind, and include part of, kind of, and similar links. In automated ontologies the links are computed vectors without explicit meaning. Various automated technologies are being developed to compute the meaning of words: latent semantic indexing and support vector machines as well as natural language processing, neural networks and predicate calculus

techniques.

Ideasthesia is a psychological phenomenon in which activation of concepts evokes sensory experiences. For example, in synestheisa, activation of a concept of a letter (e.g., that of the letter A) evokes sensory-like experiences (e.g., of red color). In everyday experiences, our conceptual understanding of a situation may affect the way we experience the situation

CHAPTER 11

Grammar

In linguistics, grammar is the set of structural rules governing the composition of clauses, phrases, and words in any given natural language. The term refers also to the study of such rules, and this field includes morphology, syntax, and phonology, often complemented by phonetics, semantics, and pragmatics.

Use of the term

The term grammar is often used by non-linguists with a very broad meaning. As Jeremy Butterfield puts it, "Grammar is often a generic way of referring to any aspect of English that people object to." However, linguists use it in a much more specific sense. Speakers of a language have in their heads a set of rules for using that language. This is a grammar, and the vast majority of the information in it is acquired—at least in the case of one's native language—not by conscious study or instruction, but by observing other speakers; much of this work is done during infancy. Learning a language later in life usually involves a greater degree of explicit instruction.

The term "grammar" can also be used to describe the rules that govern the linguistic behaviour of a group of speakers. The term "English grammar", therefore, may have several meanings. It may refer to the whole of English grammar—that is, to the grammars of all the speakers of the language—in which case, the term encompasses a great deal of variation. Alternatively, it may refer only to what is common to the grammars of all, or of the vast majority of English speakers

(such as subject–verb–object word order in simple declarative sentences). Or it may refer to the rules of a particular, relatively well-defined variety of English (such as Standard English).

"An English grammar" is a specific description, study or analysis of such rules. A reference book describing the grammar of a language is called a "reference grammar" or simply "a grammar." A fully explicit grammar that exhaustively describes the grammatical constructions of a language is called a descriptive grammar.

Development of grammars

Grammars evolve through usage and also due to separations of the human population. With the advent of written representations, formal rules about language usage tend to appear also. Formal grammars are codifications of usage that are developed by repeated documentation over time, and by observation as well. As the rules become established and developed, the prescriptive concept of grammatical correctness can arise. This often creates a discrepancy between contemporary usage and that which has been accepted, over time, as being correct. Linguists tend to view prescriptive grammars as having little justification beyond their authors' aesthetic tastes, although style guides may give useful advice about standard language employment, based on descriptions of usage in contemporary writings of the same language. Linguistic prescriptions also form part of the explanation for variation in speech, particularly variation in the speech of an individual speaker (an explanation, for example, for why some people say "I didn't do nothing", some say "I didn't do anything", and some say one or the other depending on social context).

The formal study of grammar is an important part of education for children from a young age through advanced learning, though the rules taught in schools are not a "grammar" in the sense most linguists use the term, particularly as they are often prescriptive rather than descriptive.

Constructed languages (also called planned languages or conlangs) are more common in the modern day. Many have been designed to aid human communication (for example, naturalistic Interlingua, schematic Esperanto, and the highly logic-compatible artificial language Lojban). Each of these languages has its own grammar.

Syntax refers to linguistic structure above the word level (e.g. how sentences are formed)—though without taking into account intonation, which is the domain of phonology. Morphology,

by contrast, refers to structure at and below the word level (e.g. how compound words are formed), but above the level of individual sounds, which, like intonation, are in the domain of phonology. No clear line can be drawn, however, between syntax and morphology. Analytic languages use syntax to convey information that is encoded via inflection in synthetic languages. In other words, word order is not significant and morphology is highly significant in a purely synthetic language, whereas morphology is not significant and syntax is highly significant in an analytic language. Chinese and Afrikaans, for example, are highly analytic, and meaning is therefore very context-dependent. (Both do have some inflections, and have had more in the past; thus, they are becoming even less synthetic and more "purely" analytic over time.) Latin, which is highly synthetic, uses affixes and inflections to convey the same information that Chinese does with syntax. Because Latin words are quite (though not completely) self-contained, an intelligible Latin sentence can be made from elements that are placed in a largely arbitrary order. Latin has a complex affixation and simple syntax, while Chinese has the opposite.

Grammar frameworks

Various "grammar frameworks" have been developed in theoretical linguistics since the mid-20th century, in particular under the influence of the idea of a "universal grammar" in the United States. Of these, the main divisions are:

- Transformational grammar (TG)
- Systemic functional grammar (SFG)
- Principles and Parameters Theory (P&P)
- Lexical-functional Grammar (LFG)
- Generalized Phrase Structure Grammar (GPSG)
- Head-Driven Phrase Structure Grammar (HPSG)
- Dependency grammars (DG)
- Role and reference grammar (RRG)

Education

Further information: Orthography

Prescriptive grammar is taught in primary school (elementary school). The term "grammar school" historically refers to a school teaching Latin grammar to future Roman citizens, orators, and, later, Catholic priests. In its earliest form, "grammar school" referred to a school that taught students to read, scan, interpret, and declaim Greek and Latin poets (including Homer, Virgil, Euripides, Ennius, and others). These should not be confused with the related, albeit distinct, modern British grammar schools.

A standard language is a particular dialect of a language that is promoted above other dialects in writing, education, and broadly speaking in the public sphere; it contrasts with vernacular dialects, which may be the objects of study in descriptive grammar but which are rarely taught prescriptively. The standardized "first language" taught in primary education may be subject to political controversy, because it establishes a standard defining nationality or ethnicity.

Recently, efforts have begun to update grammar instruction in primary and secondary education. The primary focus has been to prevent the use of outdated prescriptive rules in favor of more accurate descriptive ones and to change perceptions about relative "correctness" of standard forms in comparison to non standard dialects.

The pre-eminence of Parisian French has reigned largely unchallenged throughout the history of modern French literature. Standard Italian is not based on the speech of the capital, Rome, but on the speech of Florence because of the influence Florentines had on early Italian literature. Similarly, standard Spanish is not based on the speech of Madrid, but on the one of educated speakers from more northerly areas like Castile and León. In Argentina and Uruguay the Spanish standard is based on the local dialects of Buenos Aires and Montevideo (Rioplatense Spanish). Portuguese has for now two official written standards, respectively Brazilian Portuguese and European Portuguese, but in a short term it will have a unified orthography.

The Serbian language is divided in a similar way; Serbia and the Republika Srpska use their own separate standards. The existence of a third standard is a matter of controversy, some consider Montenegrin as a separate language, and some think it's merely another variety of Serbian.

Norwegian has two standards, Bokmål and Nynorsk, the choice between which is subject to controversy: Each Norwegian municipality can declare one of the two its official language, or it can remain "language neutral". Nynorsk is endorsed by a minority of 27 percent of the municipalities. The main language used in primary schools normally follows the official language of its municipality, and is decided by referendum within the local school district. Standard German emerged from the standardized chancellery use of High German in the 16th and 17th centuries. Until about 1800, it was almost entirely a written language, but now it is so widely spoken that most of the former German dialects are nearly extinct.

Standard Chinese has official status as the standard spoken form of the Chinese language in the People's Republic of China (PRC), the Republic of China (ROC) and the Republic of Singapore. Pronunciation of Standard Chinese is based on the Beijing dialect of Mandarin Chinese, while grammar and syntax are based on modern vernacular written Chinese. Modern Standard Arabic is directly based on Classical Arabic, the language of the Qur'an. The Hindustani language has two standards, Hindi and Urdu.

In the United States, the Society for the Promotion of Good Grammar designated March 4 as National Grammar Day in 2008

Syntax

In linguistics, syntax (from Ancient Greek σύνταξις "arrangement" from σύν syn, "together", and τάξις táxis, "an ordering") is "the study of the principles and processes by which sentences are constructed in particular languages".

In addition to referring to the overarching discipline, the term syntax is also used to refer directly to the rules and principles that govern the sentence structure of any individual language, for example in "the syntax of Modern Irish." Modern research in syntax attempts to describe languages in terms of such rules. Many professionals in this discipline attempt to find general rules that apply to all natural languages.

The term syntax is also used to refer to the rules governing the behavior of mathematical systems, such as formal languages used in logic (see logical syntax).

Early history

Works on grammar were written long before modern syntax came about; the Aṣṭādhyāyī of Pāṇini (c. 4th century BC) is often cited as an example of a premodern work that approaches the sophistication of a modern syntactic theory. In the West, the school of thought that came to be known as "traditional grammar" began with the work of Dionysius Thrax.

For centuries, work in syntax was dominated by a framework known as grammaire générale, first expounded in 1660 by Antoine Arnauld in a book of the same title. This system took as its basic premise the assumption that language is a direct reflection of thought processes and therefore there is a single, most natural way to express a thought. (That natural way, coincidentally, was exactly the way it was expressed in French.)

However, in the 19th century, with the development of historical-comparative linguistics, linguists began to realize the sheer diversity of human language and to question fundamental assumptions about the relationship between language and logic. It became apparent that there was no such thing as the most natural way to express a thought, and therefore logic could no longer be relied upon as a basis for studying the structure of language.

The Port-Royal grammar modeled the study of syntax upon that of logic (indeed, large parts of the Port-Royal Logic were copied or adapted from the Grammaire générale). Syntactic categories were identified with logical ones, and all sentences were analyzed in terms of "Subject – Copula – Predicate". Initially, this view was adopted even by the early comparative linguists such as Franz Bopp.

The central role of syntax within theoretical linguistics became clear only in the 20th century, which could reasonably be called the "century of syntactic theory" as far as linguistics is concerned. For a detailed and critical survey of the history of syntax in the last two centuries, see the monumental work by Giorgio Graffi (2001).

Modern theories

There are a number of theoretical approaches to the discipline of syntax. One school of thought, founded in the works of Derek Bickerton, sees syntax as a branch of biology, since it conceives of syntax as the study of linguistic knowledge as embodied in the human mind. Other linguists (e.g. Gerald Gazdar) take a more Platonistic view, since they regard syntax to be the study of an abstract formal system. Yet others (e.g. Joseph Greenberg) consider grammar a taxonomical device to reach broad generalizations across languages.

Generative grammar

The hypothesis of generative grammar is that language is a structure of the human mind. The goal of generative grammar is to make a complete model of this inner language (known as i-language). This model could be used to describe all human language and to predict the grammaticality of any given utterance (that is, to predict whether the utterance would sound correct to native speakers of the language). This approach to language was pioneered by Noam Chomsky. Most generative theories (although not all of them) assume that syntax is based upon the constituent structure of sentences. Generative grammars are among the theories that focus primarily on the form of a sentence, rather than its communicative function.

Other theories that find their origin in the generative paradigm are:

- Generative semantics (now largely out of date)
- Relational grammar (RG) (now largely out of date)
- Arc pair grammar
- Generalized phrase structure grammar (GPSG; now largely out of date)
- Head-driven phrase structure grammar (HPSG)
- Lexical functional grammar (LFG)
- Nanosyntax

Categorial grammar

Main article: Categorial grammar

Categorial grammar is an approach that attributes the syntactic structure not to rules of grammar, but to the properties of the syntactic categories themselves. For example, rather than asserting that sentences are constructed by a rule that combines a noun phrase (NP) and a verb phrase (VP) (e.g. the phrase structure rule S → NP VP), in categorial grammar, such principles are embedded in the category of the head word itself. So the syntactic category for an intransitive verb is a complex formula representing the fact that the verb acts as a function word requiring an NP as an input and produces a sentence level structure as an output. This complex category is notated as (NP\S) instead of V. NP\S is read as "a category that searches to the left (indicated by \) for a NP (the element on the left) and outputs a sentence (the element on the right)". The category of transitive verb is defined as an element that requires two NPs (its subject and its direct object) to form a sentence. This is notated as (NP/(NP\S)) which means "a category that searches to the right (indicated by /) for an NP (the object), and generates a function (equivalent to the VP) which is (NP\S), which in turn represents a function that searches to the left for an NP and produces a sentence).

Tree-adjoining grammar is a categorial grammar that adds in partial tree structures to the categories.

Dependency grammar

Dependency grammar is an approach to sentence structure where syntactic units are arranged according to the dependency relation, as opposed to the constituency relation of phrase structure grammars. Dependencies are directed links between words. The (finite) verb is seen as the root of all clause structure and all the other words in the clause are either directly or indirectly dependent on this root. Some prominent dependency-based theories of syntax:

- Algebraic syntax
- Word grammar

- Operator grammar
- Meaning–text theory
- Functional generative description

Lucien Tesnière (1893–1954) is widely seen as the father of modern dependency-based theories of syntax and grammar. He argued vehemently against the binary division of the clause into subject and predicate that is associated with the grammars of his day (S → NP VP) and which remains at the core of all phrase structure grammars, and in the place of this division, he positioned the verb as the root of all clause structure.

Stochastic/probabilistic grammars/network theories

Theoretical approaches to syntax that are based upon probability theory are known as stochastic grammars. One common implementation of such an approach makes use of a neural network or connectionism. Some theories based within this approach are:

- Optimality theory
- Stochastic context-free grammar

Functionalist grammars

Functionalist theories, although focused upon form, are driven by explanation based upon the function of a sentence (i.e. its communicative function). Some typical functionalist theories include:

CHAPTER 12

Sign language

A sign language (also signed language or simply signing) is a language which uses manual communication and body language to convey meaning, as opposed to acoustically conveyed sound patterns. This can involve simultaneously combining hand shapes, orientation and

movement of the hands, arms or body, and facial expressions to fluidly express a speaker's thoughts. They share many similarities with spoken languages (sometimes called "oral languages", which depend primarily on sound), which is why linguists consider both to be natural languages, but there are also some significant differences between signed and spoken languages.

Wherever communities of deaf people exist, sign languages develop. Signing is also done by persons who can hear, but cannot physically speak. While they utilize space for grammar in a way that spoken languages do not, sign languages exhibit the same linguistic properties and use the same language faculty as do spoken languages. Hundreds of sign languages are in use around the world and are at the cores of local deaf cultures. Some sign languages have obtained some form of legal recognition, while others have no status at all.

A common misconception is that all sign languages are the same worldwide or that sign language is international. Aside from the pidgin International Sign, each country generally has its own, native sign language, and some have more than one, though sign languages may share similarities to each other, whether in the same country or another one. No one knows how many sign languages there are; the 2013 edition of Ethnologue lists 137.

Relationships with spoken languages

Sign language relief sculpture on a stone wall: "Life is beautiful, be happy and love each other", by Czech sculptor Zuzana Čížková on Holečkova Street in Prague-Smíchov, by a school for the deaf.

A common misconception is that sign languages are somehow dependent on spoken languages, that is, that they are spoken language spelled out in gesture, or that they were invented by hearing people. Hearing teachers in deaf schools, such as Thomas Hopkins Gallaudet, are often incorrectly referred to as “inventors” of sign language.

Although not part of sign languages, elements from the Manual alphabets (fingerspelling) may be used in signed communication, mostly for proper names and concepts for which no sign is available at that moment. Elements from the manual alphabet can sometimes be a source of new

signs (e.g. initialized signs, in which the shape of the hand represents the first letter of the word for the sign).

On the whole, sign languages are independent of spoken languages and follow their own paths of development. For example, British Sign Language and American Sign Language (ASL) are quite different and mutually unintelligible, even though the hearing people of Britain and America share the same spoken language. The grammars of sign languages do not usually resemble that of spoken languages used in the same geographical area; in fact, in terms of syntax, ASL shares more with spoken Japanese than it does with English.

Similarly, countries which use a single spoken language throughout may have two or more sign languages; whereas an area that contains more than one spoken language might use only one sign language. Africa South , which has 11 official spoken languages and a similar number of other widely used spoken languages, is a good example of this. It has only one sign language with two variants due to its history of having two major educational institutions for the deaf which have served different geographic areas of the country.

Spatial grammar and simultaneity

Sign languages exploit the unique features of the visual medium (sight), but may also exploit tactile features (tactile sign languages). Spoken language is by and large linear; only one sound can be made or received at a time. Sign language, on the other hand, is visual and, hence, can use simultaneous expression, although this is limited articulatorily and linguistically. Visual perception allows processing of simultaneous information.

One way in which many sign languages take advantage of the spatial nature of the language is through the use of classifiers. Classifiers allow a signer to spatially show a referent's type, size, shape, movement, or extent.

The large focus on the possibility of simultaneity in sign languages in contrast to spoken languages is sometimes exaggerated, though. The use of two manual articulators is subject to motor constraints, resulting in a large extent of symmetry or signing with one articulator only.

Non-manual signs

Sign languages convey much of their prosody through non-manual signs. Postures or movements of the body, head, eyebrows, eyes, cheeks, and mouth are used in various combinations to show several categories of information, including lexical distinction, grammatical structure, adjectival or adverbial content, and discourse functions.

In ASL (American Sign Language), some signs have required facial components that distinguish them from other signs. An example of this sort of lexical distinction is the sign translated 'not yet', which requires that the tongue touch the lower lip and that the head rotate from side to side, in addition to the manual part of the sign. Without these features it would be interpreted as 'late'.

Grammatical structure that is shown through non-manual signs includes questions, negation, relative clauses,boundaries between sentences, and the argument structure of some verbs.ASL and BSL use similar non-manual marking for yes/no questions, for example. They are shown through raised eyebrows and a forward head tilt.

Some adjectival and adverbial information is conveyed through non-manual signs, but what these signs are varies from language to language. For instance, in ASL a slightly open mouth with the tongue relaxed and visible in the corner of the mouth means 'carelessly,' but a similar sign in BSL means 'boring' or 'unpleasant.'

Discourse functions such as turn taking are largely regulated through head movement and eye gaze. Since the addressee in a signed conversation must be watching the signer, a signer can avoid letting the other person have a turn by not looking at them, or can indicate that the other person may have a turn by making eye contact.

Classification

Sign language families

Although sign languages have emerged naturally in deaf communities alongside or among spoken languages, they are unrelated to spoken languages and have different grammatical structures at their core.

Sign languages may be classified by how they arise.

Home sign is not a full language, but closer to a pidgin. Home sign is amorphous and generally idiosyncratic to a particular family, where a deaf child does not have contact with other deaf children and is not educated in sign. Such systems are not generally passed on from one generation to the next. Where they are passed on, creolization would be expected to occur, resulting in a full language.

A village sign language is a local indigenous language that typically arises over several generations in a relatively insular community with a high incidence of deafness, and is used both by the deaf and by a significant portion of the hearing community, who have deaf family and friends.The most famous of these is probably Martha's Vineyard Sign Language of the US, but there are also numerous village languages scattered throughout Africa, Asia, and America.

Deaf-community sign languages, on the other hand, arise where deaf people come together to form their own communities. These include school sign, such as Nicaraguan Sign Language, which develop in the student bodies of deaf schools which do not use sign as a language of instruction, as well as community languages such as Bamako Sign Language, which arise where generally uneducated deaf people congregate in urban centers for employment. At first, Deaf-community sign languages are not generally known by the hearing population, in many cases not even by close family members. However, they may grow, in some cases becoming a language of instruction and receiving official recognition, as in the case of ASL.

Both contrast with speech-taboo languages such as the various Aboriginal Australian sign languages, which are developed by the hearing community and only used secondarily by the deaf. It is doubtful whether any of these are languages in their own right, rather than manual codes of spoken languages. Hearing people may also develop sign to communicate with speakers of other languages, as in Plains Indian Sign Language; this was a contact signing system or pidgin that was evidently not used by deaf people in the Plains nations, who used home sign.

Language contact and creolization is common in the development of sign languages, making clear family classifications difficult – it is often unclear whether lexical similarity is due to borrowing or a common parent language, or whether there was one or several parent languages, such as several village languages merging into a Deaf-community language. Contact occurs between sign languages, between sign and spoken languages (contact sign, a kind of pidgin), and

between sign languages and gestural systems used by the broader community. One author has speculated that Adamorobe Sign Language, a village sign language of Ghana, may be related to the "gestural trade jargon used in the markets throughout West Africa", in vocabulary and areal features including prosody and phonetics.

- BSL, Auslan and NZSL are usually considered to be a language known as BANZSL. Maritime Sign Language and South African Sign Language are also related to BSL.
- Danish Sign Language and its descendants Norwegian Sign Language and Icelandic Sign Language are largely mutually intelligible with Swedish Sign Language. Finnish Sign Language, and Portuguese Sign Language derive from Swedish SL, though with local admixture in the case of mutually unintelligible Finnish SL. Danish SL has French SL influence and Wittmann (1991) places them in that family, though he proposes that Swedish, Finnish, and Portuguese SL are instead related to British Sign Language.
- Japanese Sign Language, Taiwanese Sign Language and Korean Sign Language are thought to be members of a Japanese Sign Language family.
- French Sign Language family. There are a number of sign languages that emerged from French Sign Language (LSF), or are the result of language contact between local community sign languages and LSF. These include: French Sign Language, Italian Sign Language, Quebec Sign Language, American Sign Language, Irish Sign Language, Russian Sign Language, Dutch Sign Language (NGT), Spanish Sign Language, Mexican Sign Language, Brazilian Sign Language (LIBRAS), Catalan Sign Language, Austrian Sign Language (along with its twin Hungarian Sign Language and its offspring Czech Sign Language) and others.
    - A subset of this group includes languages that have been heavily influenced by American Sign Language (ASL), or are regional varieties of ASL. Bolivian Sign Language is sometimes considered a dialect of ASL. Thai Sign Language is a mixed language derived from ASL and the native sign languages of Bangkok and Chiang Mai, and may be considered part of the ASL family. Others possibly influenced by ASL include Ugandan Sign Language, Kenyan Sign Language, Philippine Sign Language and Malaysian Sign Language.

- German Sign Language (DGS) gave rise to Polish Sign Language; it also at least strongly influenced Israeli Sign Language, though it is unclear whether the latter derives from DGS or from Austrian Sign Language, which is in the French family.
- Lyons Sign Language may be the source of Flemish Sign Language (VGT) though this is unclear.
- According to a SIL report, the sign languages of Russia, Moldova and Ukraine share a high degree of lexical similarity and may be dialects of one language, or distinct related languages. The same report suggested a "cluster" of sign languages centered around Czech Sign Language, Hungarian Sign Language and Slovak Sign Language. This group may also include Romanian, Bulgarian, and Polish sign languages.
- Sign languages of Jordan, Lebanon, Syria, Palestine, and Iraq (and possibly Saudi Arabia) may be part of a sprachbund, or may be one dialect of a larger Eastern Arabic Sign Language.
- Known isolates include Nicaraguan Sign Language, Kata Kolok, Al-Sayyid Bedouin Sign Language and Providence Island Sign Language.

Typology

Linguistic typology (going back on Edward Sapir) is based on word structure and distinguishes morphological classes such as agglutinating/concatenating, inflectional, polysynthetic, incorporating, and isolating ones.

Sign languages vary in word-order typology as there are different word orders in different languages. For example, ÖGS, Japanese Sign Language and so-called Indo-Pakistani Sign Language are Subject-Object-Verb while ASL is Subject-Verb-Object. Influence from the surrounding spoken languages is not improbable.

Sign languages tend to be incorporating classifier languages, where a classifier handshape representing the object is incorporated into those transitive verbs which allow such modification. For a similar group of intransitive verbs (especially motion verbs), it is the subject which is incorporated. Only in a very few sign languages (for instance Japanese Sign Language) are

agents ever incorporated. in this way, since subjects of intransitives are treated similarly to objects of transitives, incorporation in sign languages can be said to follow an ergative pattern.

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