Language Instruction and Assessment

Donovan Wright

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Chapter 1

Language Processing in the Brain

Language processing refers to the way humans use words to communicate ideas and feelings, and how such communications are processed and understood. Language processing is considered to be a uniquely human ability that is not produced with the same grammatical understanding or systematicity in even human's closest primate relatives.

Throughout the 20th century the dominant model for language processing in the brain was the Geschwind-Lichteim-Wernicke model, which is based primarily on the analysis of brain damaged patients. However, due to improvements in intra-cortical electrophysiological recordings of monkey and human brains, as well non-invasive techniques such as fMRI, PET, MEG and EEG, a dual auditory pathway has been revealed. In accordance with this model, there are two pathways that connect the auditory cortex to the frontal lobe, each pathway accounting for different linguistic roles. The **auditory ventral stream** pathway is responsible for sound recognition, and is accordingly known as the auditory 'what' pathway. The **auditory dorsal stream** in both humans and non-human primates is responsible for sound localization, and is accordingly known as the auditory 'where' pathway. In humans, this pathway (especially in the left hemisphere) is also responsible for speech production, speech repetition, lip-reading, and phonological working memory and long-term memory. In accordance with the 'from where to what' model of language evolution, the reason the ADS is characterized with

such a broad range of functions is that each indicates a different stage in language evolution.

The division of the two streams first occurs in the auditory nerve where the anterior branch enters the anterior cochlear nucleus in the brainstem which gives rise to the auditory ventral stream. The posterior branch enters the dorsal and posteroventral cochlear nucleus to give rise to the auditory dorsal stream.

Language processing can also occur in relation to signed languages or written content.

Early neurolinguistics models

Throughout the 20th century, our knowledge of language processing in the brain was dominated by the Wernicke-Lichtheim-Geschwind model. The Wernicke-Lichtheim-Geschwind model is primarily based on research conducted on brain-damaged individuals who were reported to possess a variety of language related disorders. In accordance with this model, words are perceived via a specialized word reception center (Wernicke's area) that is located in the left temporoparietal junction. This region then projects to a word production center (Broca's area) that is located in the left inferior frontal gyrus. Because almost all language input was thought to funnel via Wernicke's area and all language output to funnel via Broca's area, it became extremely difficult to identify the basic properties of each region. This lack of clear definition for the contribution of Wernicke's and Broca's regions to human language rendered it extremely difficult to identify their homologues in other primates. With the advent of

the fMRI and its application for lesion mappings, however, it was shown that this model is based on incorrect correlations between symptoms and lesions. The refutation of such an influential and dominant model opened the door to new models of language processing in the brain.

Current neurolinguistics models

Anatomy

In the last two decades, significant advances occurred in our understanding of the neural processing of sounds in primates. Initially by recording of neural activity in the auditory cortices of monkeys and later elaborated via histological staining and fMRI scanning studies, 3 auditory fields were identified in the primary auditory cortex, and 9 associative auditory fields were shown to surround them (Figure 1 top left).

Anatomical tracing and lesion studies further indicated of a separation between the anterior and posterior auditory fields, with the anterior primary auditory fields (areas R-RT) projecting to the anterior associative auditory fields (areas AL-RTL), and the posterior primary auditory field (area A1) projecting to the posterior associative auditory fields (areas CL-CM). Recently, evidence accumulated that indicates homology between the human and monkey auditory fields. In humans, histological staining studies revealed two separate auditory fields in the primary auditory region of Heschl's gyrus, and by mapping the tonotopic organization of the human primary auditory fields with high resolution fMRI and comparing it to the tonotopic organization of the monkey

primary auditory fields, homology was established between the human anterior primary auditory field and monkey area R (denoted in humans as area hR) and the human posterior primary auditory field and the monkey area A1 (denoted in humans as area hA1). Intra-cortical recordings from the human auditory cortex further demonstrated similar patterns of connectivity to the auditory cortex of the monkey. Recording from the surface of the auditory cortex (supra-temporal plane) reported that the anterior Heschl's gyrus (area hR) projects primarily to the middle-anterior superior temporal gyrus (mSTG-aSTG) and the posterior Heschl's gyrus (area hA1) projects primarily to the posterior superior temporal gyrus (pSTG) and the planumtemporale (area PT; Figure 1 top right). Consistent with connections from area hR to the aSTG and hA1 to the pSTG is an fMRI study of a patient with impaired sound recognition (auditory agnosia), who was shown with reduced bilateral activation in areas hR and aSTG but with spared activation in the mSTG-pSTG. This connectivity pattern is also corroborated by a study that recorded activation from the lateral surface of the auditory cortex and reported of simultaneous non-overlapping activation clusters in the pSTG and mSTG-aSTG while listening to sounds.

Downstream to the auditory cortex, anatomical tracing studies in monkeys delineated projections from the anterior associative auditory fields (areas AL-RTL) to ventral prefrontal and premotor cortices in the inferior frontal gyrus (IFG) and amygdala. Cortical recording and functional imaging studies in macaque monkeys further elaborated on this processing stream by showing that acoustic information flows from the anterior auditory cortex to the temporal pole (TP) and then to the IFG. This pathway is commonly referred to as the auditory ventral

stream (AVS; Figure 1, bottom left-red arrows). In contrast to the anterior auditory fields, tracing studies reported that the posterior auditory fields (areas CL-CM) project primarily to dorsolateral prefrontal and premotor cortices (although some projections do terminate in the IFG. Cortical recordings and anatomical tracing studies in monkeys further provided evidence that this processing stream flows from the posterior auditory fields to the frontal lobe via a relay station in the intra-parietal sulcus (IPS).

This pathway is commonly referred to as the auditory dorsal stream (ADS; Figure 1, bottom left-blue arrows). Comparing the white matter pathways involved in communication in humans and monkeys with diffusion tensor imaging techniques indicates of similar connections of the AVS and ADS in the two species (Monkey, Human). In humans, the pSTG was shown to project to the parietal lobe (sylvianparietal-temporal junction-inferior parietal lobule; Spt-IPL), and from there to dorsolateral prefrontal and premotor cortices (Figure 1, bottom right-blue arrows), and the aSTG was shown to project to the anterior temporal lobe (middle temporal gyrus-temporal pole; MTG-TP) and from there to the IFG (Figure 1 bottom right-red arrows).

Auditory ventral stream

The auditory ventral stream (AVS) connects the auditory cortex with the middle temporal gyrus and temporal pole, which in turn connects with the inferior frontal gyrus. This pathway is responsible for sound recognition, and is accordingly known as the auditory 'what' pathway. The functions of the AVS include the following.

Sound recognition

Accumulative converging evidence indicates that the AVS is involved in recognizing auditory objects. At the level of the primary auditory cortex, recordings from monkeys showed higher percentage of neurons selective for learned melodic sequences in area R than area A1, and a study in humans demonstrated more selectivity for heard syllables in the anterior Heschl's gyrus (area hR) than posterior Heschl's gyrus (area hA1). In downstream associative auditory fields, studies from both monkeys and humans reported that the border between the anterior and posterior auditory fields (Figure 1-area PC in the monkey and mSTG in the human) processes pitch attributes that are necessary for the recognition of auditory objects. The anterior auditory fields of monkeys were also demonstrated with selectivity for con-specific vocalizations with intra-cortical recordings. and functional imaging One fMRI monkey study further demonstrated a role of the aSTG in the recognition of individual voices. The role of the human mSTG-aSTG in sound recognition was demonstrated via functional imaging studies that correlated activity in this region with isolation of auditory objects from background noise, and with the recognition of spoken words, voices, melodies, environmental sounds, and non-speech communicative sounds. A meta-analysis of fMRI studies further demonstrated functional dissociation between the left mSTG and aSTG, with the former processing short speech units (phonemes) and the latter processing longer units (e.g., words, environmental sounds). A study that recorded neural activity directly from the left pSTG and aSTG reported that the aSTG, but not pSTG, was more active when the patient listened to speech in her native language than unfamiliar foreign

language. Consistently, electro stimulation to the aSTG of this patient resulted in impaired speech perception (see also for similar results). Intra-cortical recordings from the right and left aSTG further demonstrated that speech is processed laterally to music. An fMRI study of a patient with impaired sound recognition (auditory agnosia) due to brainstem damage was also shown with reduced activation in areas hR and aSTG of both hemispheres when hearing spoken words and environmental sounds. Recordings from the anterior auditory cortex of monkeys while maintaining learned sounds in working memory, and the debilitating effect of induced lesions to this region on working memory recall, further implicate the AVS in maintaining the perceived auditory objects in working memory. In humans, area mSTG-aSTGwas also reported active during rehearsal of heard syllables with MEG. andfMRI The latter study further demonstrated that working memory in the AVS is for the acoustic properties of spoken words and that it is independent to working memory in the ADS, which mediates inner speech. Working memory studies in monkeys also suggest that in monkeys, in contrast to humans, the AVS is the dominant working memory store.

In humans, downstream to the aSTG, the MTG and TP are thought to constitute the semantic lexicon, which is a long-term memory repository of audio-visual representations that are interconnected on the basis of semantic relationships. (See also the reviews by discussing this topic). The primary evidence for this role of the MTG-TP is that patients with damage to this region (e.g., patients with semantic dementia or herpes simplex virus encephalitis) are reported with an impaired ability to describe visual and auditory objects and a tendency to commit semantic errors when naming objects (i.e.,

semantic paraphasia). Semantic paraphasiaswere also expressed by aphasic patients with left MTG-TP damage and were shown to occur in non-aphasic patients after electro-stimulation to this region. or the underlying white matter pathway Two meta-analyses of the fMRI literature also reported that the anterior MTG and TP were consistently active during semantic analysis of speech and text; and an intra-cortical recording study correlated neural discharge in the MTG with the comprehension of intelligible sentences.

Sentence comprehension

In addition to extracting meaning from sounds, the MTG-TP region of the AVS appears to have a role in sentence comprehension, possibly by merging concepts together (e.g., merging the concept 'blue' and 'shirt' to create the concept of a 'blue shirt'). The role of the MTG in extracting meaning from sentences has been demonstrated in functional imaging studies reporting stronger activation in the anterior MTG when proper sentences are contrasted with lists of words, sentences in a foreign or nonsense language, scrambled sentences, sentences with semantic or syntactic violations and sentence-like sequences of environmental sounds. One fMRI study in which participants were instructed to read a story further correlated activity in the anterior MTG with the amount of semantic and syntactic content each sentence contained. An EEG study that contrasted cortical activity while reading sentences with and without syntactic violations in healthy participants and patients with MTG-TP damage, concluded that the MTG-TP in both hemispheres participate in the automatic (rule based) stage of syntactic analysis (ELAN component), and that the left MTG-TP is also involved in a later controlled stage of syntax

analysis (P600 component). Patients with damage to the MTG-TP region have also been reported with impaired sentence comprehension. See review for more information on this topic.

Bilaterality

In contradiction to the Wernicke-Lichtheim-Geschwind model that implicates sound recognition to occur solely in the left hemisphere, studies that examined the properties of the right or left hemisphere in isolation via unilateral hemispheric anesthesia (i.e., the WADA procedure) or intra-cortical recordings from each hemisphere provided evidence that sound recognition is processed bilaterally.

Moreover, a study that instructed patients with disconnected hemispheres (i.e., split-brain patients) to match spoken words to written words presented to the right or left hemifields, reported vocabulary in the right hemisphere that almost matches in size with the left hemisphere (The right hemisphere vocabulary was equivalent to the vocabulary of a healthy 11-years old child).

This bilateral recognition of sounds is also consistent with the finding that unilateral lesion to the auditory cortex rarely results in deficit to auditory comprehension (i.e., auditory agnosia), whereas a second lesion to the remaining hemisphere (which could occur years later) does. Finally, as mentioned earlier, an fMRI scan of an auditory agnosia patient demonstrated bilateral reduced activation in the anterior auditory cortices, and bilateral electro-stimulation to these regions in both hemispheres resulted with impaired speech recognition.

Auditory dorsal stream

The auditory dorsal stream connects the auditory cortex with the parietal lobe, which in turn connects with inferior frontal gyrus. In both humans and non-human primates, the auditory dorsal stream is responsible for sound localization, and is accordingly known as the auditory 'where' pathway. In humans, this pathway (especially in the left hemisphere) is also responsible for speech production, speech repetition, lip-reading, and phonological working memory and long-term memory.

Speech production

Studies of present-day humans have demonstrated a role for the ADS in speech production, particularly in the vocal expression of the names of objects. For instance, in a series of studies in which sub-cortical fibers were directly stimulated interference in the left pSTG and IPL resulted in errors during object-naming tasks, and interference in the left IFG resulted in speech arrest. Magnetic interference in the pSTG and IFG of healthy participants also produced speech errors and speech arrest, respectively One study has also reported that electrical stimulation of the left IPL caused patients to believe that they had spoken when they had not and that IFG stimulation caused patients to unconsciously move their lips. The contribution of the ADS to the process of articulating the names of objects could be dependent on the reception of afferents from the semantic lexicon of the AVS, as an intra-cortical recording study reported of activation in the posterior MTG prior to activation in the Spt-IPL region when patients named objects in pictures Intra-cortical electrical stimulation

studies also reported that electrical interference to the posterior MTG was correlated with impaired object naming

Vocal mimicry

Although sound perception is primarily ascribed with the AVS, the ADS appears associated with several aspects of speech perception. For instance, in a meta-analysis of fMRI studies (Turkeltaub and Coslett, 2010), in which the auditory perception of phonemes was contrasted with closely matching sounds, and the studies were rated for the required level of attention, the authors concluded that attention to phonemes correlates with strong activation in the pSTG-pSTS region. An intra-cortical recording study in which participants were instructed to identify syllables also correlated the hearing of each syllable with its own activation pattern in the pSTG. The involvement of the ADS in both speech perception and production has been further illuminated in several pioneering functional imaging studies that contrasted speech perception with overt or covert speech production. These studies demonstrated that the pSTS is active only during the perception of speech, whereas area Spt is active during both the perception and production of speech. The authors concluded that the pSTS projects to area Spt, which converts the auditory input into articulatory movements. Similar results have been obtained in a study in which participants' temporal and parietal lobes were electrically stimulated. This study reported that electrically stimulating the pSTG region interferes with sentence comprehension and that stimulation of the IPL interferes with the ability to vocalize the names of objects. The authors also reported that stimulation in area Spt and the inferior IPL induced interference during both object-

naming and speech-comprehension tasks. The role of the ADS in speech repetition is also congruent with the results of the other functional imaging studies that have localized activation during speech repetition tasks to ADS regions. An intra-cortical recording study that recorded activity throughout most of the temporal, parietal and frontal lobes also reported activation in the pSTG, Spt, IPL and IFG when speech repetition is contrasted with speech perception. Neuropsychological studies have also found that individuals with speech repetition deficits but preserved auditory comprehension (i.e., conduction aphasia) suffer from circumscribed damage to the Spt-IPL area or damage to the projections that emanate from this area and target the frontal lobe Studies have also reported a transient speech repetition deficit in patients after direct intra-cortical electrical stimulation to this same region. Insight into the purpose of speech repetition in the ADS is provided by longitudinal studies of children that correlated the learning of foreign vocabulary with the ability to repeat nonsense words.

Speech monitoring

In addition to repeating and producing speech, the ADS appears to have a role in monitoring the quality of the speech output. Neuroanatomical evidence suggests that the ADS is equipped with descending connections from the IFG to the pSTG that relay information about motor activity (i.e., corollary discharges) in the vocal apparatus (mouth, tongue, vocal folds). This feedback marks the sound perceived during speech production as self-produced and can be used to adjust the vocal apparatus to increase the similarity between the perceived and emitted calls. Evidence for descending

connections from the IFG to the pSTG has been offered by a study that electrically stimulated the IFG during surgical operations and reported the spread of activation to the pSTG-pSTS-Spt region A study that compared the ability of aphasic patients with frontal, parietal or temporal lobe damage to quickly and repeatedly articulate a string of syllables reported that damage to the frontal lobe interfered with the articulation of both identical syllabic strings ("Bababa") and non-identical syllabic strings ("Badaga"), whereas patients with temporal or parietal lobe damage only exhibited impairment when articulating non-identical syllabic strings. Because the patients with temporal and parietal lobe damage were capable of repeating the syllabic string in the first task, their speech perception and production appears to be relatively preserved, and their deficit in the second task is therefore due to impaired monitoring. Demonstrating the role of the descending ADS connections in monitoring emitted calls, an fMRI study instructed participants to speak under normal conditions or when hearing a modified version of their own voice (delayed first formant) and reported that hearing a distorted version of one's own voice results in increased activation in the pSTG. Further demonstrating that the ADS facilitates motor feedback during mimicry is an intra-cortical recording study that contrasted speech perception and repetition. The authors reported that, in addition to activation in the IPL and IFG, speech repetition is characterized by stronger activation in the pSTG than during speech perception.

Integration of phonemes with lip-movements

Although sound perception is primarily ascribed with the AVS, the ADS appears associated with several aspects of speech

perception. For instance, in a meta-analysis of fMRI studies in which the auditory perception of phonemes was contrasted with closely matching sounds, and the studies were rated for the required level of attention, the authors concluded that attention to phonemes correlates with strong activation in the pSTG-pSTS region. An intra-cortical recording study in which participants were instructed to identify syllables also correlated the hearing of each syllable with its own activation pattern in the pSTG. Consistent with the role of the ADS in discriminating phonemes, studies have ascribed the integration of phonemes and their corresponding lip movements (i.e., visemes) to the pSTS of the ADS. For example, an fMRI study has correlated activation in the pSTS with the McGurk illusion (in which hearing the syllable "ba" while seeing the viseme "ga" results in the perception of the syllable "da"). Another study has found that using magnetic stimulation to interfere with processing in this area further disrupts the McGurk illusion. The association of the pSTS with the audio-visual integration of speech has also been demonstrated in a study that presented participants with pictures of faces and spoken words of varying quality. The study reported that the pSTS selects for the combined increase of the clarity of faces and spoken words. Corroborating evidence has been provided by an fMRI study that contrasted the perception of audio-visual speech with audio-visual non-speech (pictures and sounds of tools). This study reported the detection of speech-selective compartments in the pSTS. In addition, an fMRI study that contrasted congruent audio-visual speech with incongruent speech (pictures of still faces) reported pSTS activation. For a review presenting additional converging evidence regarding the role of the pSTS and ADS in phoneme-visemeintegration see.

Phonological long-term memory

A growing body of evidence indicates that humans, in addition to having a long-term store for word meanings located in the MTG-TP of the AVS (i.e., the semantic lexicon), also have a long-term store for the names of objects located in the Spt-IPL region of the ADS (i.e., the phonological lexicon). For example, a study examining patients with damage to the AVS (MTG damage) or damage to the ADS (IPL damage) reported that MTG damage results in individuals incorrectly identifying objects (e.g., calling a "goat" a "sheep," an example of semantic paraphasia). Conversely, IPL damage results in individuals correctly identifying the object but incorrectly pronouncing its name (e.g., saying "gof" instead of "goat," an example of phonemic paraphasia). Semantic paraphasia errors have also been reported in patients receiving intra-cortical electrical stimulation of the AVS (MTG), and phonemic paraphasia errors have been reported in patients whose ADS (pSTG, Spt, and IPL) received intra-cortical electrical stimulation. Further supporting the role of the ADS in object naming is an MEG study that localized activity in the IPL during the learning and during the recall of object names. A study that induced magnetic interference in participants' IPL while they answered questions about an object reported that the participants were capable of answering questions regarding the object's characteristics or perceptual attributes but were impaired when asked whether the word contained two or three syllables. An MEG study has also correlated recovery from anomia (a disorder characterized by an impaired ability to name objects) with changes in IPL activation. Further supporting the role of the IPL in encoding the sounds of words are studies reporting that, compared to monolinguals, bilinguals have greater

cortical density in the IPL but not the MTG. Because evidence shows that, in bilinguals, different phonological representations of the same word share the same semantic representation, this increase in density in the IPL verifies the existence of the phonological lexicon: the semantic lexicon of bilinguals is expected to be similar in size to the semantic lexicon of monolinguals, whereas their phonological lexicon should be twice the size. Consistent with this finding, cortical density in the IPL of monolinguals also correlates with vocabulary size. Notably, the functional dissociation of the AVS and ADS in object-naming tasks is supported by cumulative evidence from reading research showing that semantic errors are correlated with MTG impairment and phonemic errors with IPL impairment. Based on these associations, the semantic analysis of text has been linked to the inferior-temporal gyrus and MTG, and the phonological analysis of text has been linked to the pSTG-Spt- IPL

Phonological working memory

Working memoryis often treated as the temporary activation of the representations stored in long-term memory that are used for speech (phonological representations). This sharing of resources between working memory and speech is evident by the finding that speaking during rehearsal results in a significant reduction in the number of items that can be recalled from working memory (articulatory suppression). The involvement of the phonological lexicon in working memory is also evidenced by the tendency of individuals to make more errors when recalling words from a recently learned list of phonologically similar words than from a list of phonologically dissimilar words (the phonological similarity effect). Studies

have also found that speech errors committed during reading are remarkably similar to speech errors made during the recall of recently learned, phonologically similar words from working memory. Patients with IPL damage have also been observed to exhibit both speech production errors and impaired working memory Finally, the view that verbal working memory is the result of temporarily activating phonological representations in the ADS is compatible with recent models describing working memory as the combination of maintaining representations in the mechanism of attention in parallel to temporarily activating representations in long-term memory. It has been argued that the role of the ADS in the rehearsal of lists of words is the reason this pathway is active during sentence comprehension For a review of the role of the ADS in working memory, see.

The evolution of language

The auditory dorsal stream also has non-language related functions, such as sound localization and guidance of eye movements. Recent studies also indicate a role of the ADS in localization of family/tribe members, as a study that recorded from the cortex of an epileptic patient reported that the pSTG, but not aSTG, is selective for the presence of new speakers. An fMRI study of fetuses at their third trimester also demonstrated that area Spt is more selective to female speech than pure tones, and a sub-section of Spt is selective to the speech of their mother in contrast to unfamiliar female voices.

It is presently unknown why so many functions are ascribed to the human ADS. An attempt to unify these functions under a single framework was conducted in the 'From where to what' model of language evolution In accordance with this model,

each function of the ADS indicates of a different intermediate phase in the evolution of language. The roles of sound localization and integration of sound location with voices and auditory objects is interpreted as evidence that the origin of speech is the exchange of contact calls (calls used to report location in cases of separation) between mothers and offspring. The role of the ADS in the perception and production of intonations is interpreted as evidence that speech began by modifying the contact calls with intonations, possibly for distinguishing alarm contact calls from safe contact calls. The role of the ADS in encoding the names of objects (phonological long-term memory) is interpreted as evidence of gradual transition from modifying calls with intonations to complete vocal control. The role of the ADS in the integration of lip movements with phonemes and in speech repetition is interpreted as evidence that spoken words were learned by infants mimicking their parents' vocalizations, initially by imitating their lip movements. The role of the ADS in phonological working memory is interpreted as evidence that the words learned through mimicry remained active in the ADS even when not spoken. This resulted with individuals capable of rehearsing a list of vocalizations, which enabled the production of words with several syllables. Further developments in the ADS enabled the rehearsal of lists of words, which provided the infra-structure for communicating with sentences.

Sign language in the brain

Neuroscientific research has provided a scientific understanding of how sign language is processed in the brain.

There are over 135 discrete sign languages around the world-making use of different accents formed by separate areas of a country.

By resorting to lesion analyses and neuroimaging, neuroscientists have discovered that whether it be spoken or sign language, human brains process language in general, in a similar manner regarding which area of the brain is being used. Lesion analyses are used to examine the consequences of damage to specific brain regions involved in language while neuroimaging explore regions that are engaged in the processing of language.

Previous hypotheses have been made that damage to Broca's area or Wernicke's area does not affect sign language being perceived; however, it is not the case. Studies have shown that damage to these areas are similar in results in spoken language where sign errors are present and/or repeated. In both types of languages, they are affected by damage to the left hemisphere of the brain rather than the right -usually dealing with the arts.

There are obvious patterns for utilizing and processing language. In sign language, Broca's area is activated while processing sign language employs Wernicke's area similar to that of spoken language

There have been other hypotheses about the lateralization of the two hemispheres. Specifically, the right hemisphere was thought to contribute to the overall communication of a language globally whereas the left hemisphere would be dominant in generating the language locally. Through research in aphasias, RHD signers were found to have a problem

maintaining the spatial portion of their signs, confusing similar signs at different locations necessary to communicate with another properly. LHD signers, on the other hand, had similar results to those of hearing patients. Furthermore, other studies have emphasized that sign language is present bilaterally but will need to continue researching to reach a conclusion.

Writing in the brain

There is a comparatively small body of research on the neurology of reading and writing. Most of the studies performed deal with reading rather than writing or spelling, and the majority of both kinds focus solely on the English language. English orthography is less transparent than that of other languages using a Latin script. Another difficulty is that some studies focus on spelling words of English and omit the few logographic characters found in the script.

In terms of spelling, English words can be divided into three categories – regular, irregular, and "novel words" or "nonwords." Regular words are those in which there is a regular, one-to-one correspondence between grapheme and phoneme in spelling. Irregular words are those in which no such correspondence exists. Nonwords are those that exhibit the expected orthography of regular words but do not carry meaning, such as nonce words and onomatopoeia.

An issue in the cognitive and neurological study of reading and spelling in English is whether a single-route or dual-route model best describes how literate speakers are able to read and write all three categories of English words according to

accepted standards of orthographic correctness. Single-route models posit that lexical memory is used to store all spellings of words for retrieval in a single process. Dual-route models posit that lexical memory is employed to process irregular and high-frequency regular words, while low-frequency regular words and nonwords are processed using a sub-lexical set of phonological rules.

The single-route model for reading has found support in computer modelling studies, which suggest that readers identify words by their orthographic similarities to phonologically alike words. However, cognitive and lesion studies lean towards the dual-route model. Cognitive spelling studies on children and adults suggest that spellers employ phonological rules in spelling regular words and nonwords, while lexical memory is accessed to spell irregular words and high-frequency words of all types. Similarly, lesion studies indicate that lexical memory is used to store irregular words and certain regular words, while phonological rules are used to spell nonwords.

More recently, neuroimaging studies using positron emission tomography and fMRI have suggested a balanced model in which the reading of all word types begins in the visual word form area, but subsequently branches off into different routes depending upon whether or not access to lexical memory or semantic information is needed (which would be expected with irregular words under a dual-route model).A 2007 fMRI study found that subjects asked to produce regular words in a spelling task exhibited greater activation in the left posterior STG, an area used for phonological processing, while the spelling of irregular words produced greater activation of areas

used for lexical memory and semantic processing, such as the left IFG and left SMG and both hemispheres of the MTG. Spelling nonwords was found to access members of both pathways, such as the left STG and bilateral MTG and ITG. Significantly, it was found that spelling induces activation in areas such as the left fusiform gyrus and left SMG that are also important in reading, suggesting that a similar pathway is used for both reading and writing. Far less information exists on the cognition and neurology of non-alphabetic and non-English scripts. Every language has a morphological and a phonological component, either of which can be recorded by a writing system. Scripts recording words and morphemes are consideredlogographic, while those recording phonological segments, such as syllabaries and alphabets, are phonographic. Most systems combine the two and have both logographic and phonographic characters.

In terms of complexity, writing systems can be characterized as "transparent" or "opaque" and as "shallow" or "deep." A "transparent" system exhibits an obvious correspondence between grapheme and sound, while in an "opaque" system this relationship is less obvious. The terms "shallow" and "deep" refer to the extent that a system's orthography represents morphemes as opposed to phonological segments. Systems that record larger morphosyntactic or phonological segments, such as logographic systems and syllabaries put greater demand on the memory of users. It would thus be expected that an opaque or deep writing system would put greater demand on areas of the brain used for lexical memory than would a system with transparent or shallow orthography.

Chapter 2

Language Education

Language education – the process and practice of teaching a second or foreign language – is primarily a branch of applied linguistics, but can be an interdisciplinary field.

There are four main learning categories for language education: communicative competencies, proficiencies, cross-cultural experiences, and multiple literacies.

Need

Increasing globalization has created a great need for people in the workforce who can communicate in multiple languages.

Common languages are used in areas such as trade, tourism, international relations, technology, media, and science.

Many countries such as Korea (Kim Yeong-seo, 2009), Japan (Kubota, 1998) and China (Kirkpatrick & Zhichang, 2002) frame education policies to teach at least one foreign language at the primary and secondary school levels. However, some countries such as India, Singapore, Malaysia, Pakistan, and the Philippines use a second official language in their governments.

According to GAO (2010), China has recently been putting enormous importance on foreign language learning, especially the English language.

History

Ancient to medieval period

The need to learn foreign languages is as old as human history itself. In the Ancient Near East, Akkadian was the language of diplomacy, as in the Amarna letters. For many centuries, Latin was the dominant language of education, commerce, religion, and government in much of Europe, but it was displaced for many purposes by French, Italian, and English by the end of the 16th century. John Amos Comenius was one of many people who tried to reverse this trend. He wrote a complete course for learning Latin, covering the entire school curriculum, culminating in his *Opera Didactica Omnia*, 1657.

In this work, Comenius also outlined his theory of language acquisition. He is one of the first theorists to write systematically about how languages are learned and about methods for teaching languages. He held that language acquisition must be allied with sensation and experience. Teaching must be oral.

The schoolroom should have models of things, or else pictures of them. He published the world's first illustrated children's book, *Orbissensualiumpictus*.

The study of Latin gradually diminished from the study of a living language to a mere subject in the school curriculum. This decline demanded a new justification for its study. It was then claimed that the study of Latin developed intellectual ability, and the study of Latin grammar became an end in and of itself.

"Grammar schools" from the 16th to 18th centuries focused on teaching the grammatical aspects of Classical Latin. Advanced students continued grammar study with the addition of rhetoric.

18th century

The study of modern languages did not become part of the curriculum of European schools until the 18th century. Based on the purely academic study of Latin, students of modern languages did much of the same exercises, studying grammatical rules and translating abstract sentences. Oral work was minimal, and students were instead required to memorize grammatical rules and apply these to decode written texts in the target language. This tradition-inspired method became known as the grammar-translation method.

19th and 20th centuries

Innovation in foreign language teaching began in the 19th century and became very rapid in the 20th century. It led to a number of different and sometimes conflicting methods, each claiming to be a major improvement over the previous or contemporary methods. The earliest applied linguists included Jean Manes ca, Heinrich Gottfried Ollendorff (1803–1865), Henry Sweet (1845–1912), Otto Jespersen (1860–1943), and Harold Palmer (1877–1949). They worked on setting language teaching principles and approaches based on linguistic and psychological theories, but they left many of the specific practical details for others to devise.

The history of foreign-language education in the 20th century and the methods of teaching (such as those related below) might appear to be a history of failure. Very few students in U.S. universities who have a foreign language as a major attain "minimum professional proficiency". Even the "reading knowledge" required for a PhD degree is comparable only to what second-year language students read, and only very few researchers who are native English speakers can read and assess information written in languages other than English. Even a number of famous linguists are monolingual.

However, anecdotal evidence for successful second or foreign language learning is easy to find, leading to a discrepancy between these cases and the failure of most language programs. This tends to make the research of second language acquisition emotionally charged. Older methods and approaches such as the grammar translation method and the direct method are dismissed and even ridiculed, as newer methods and approaches are invented and promoted as the only and complete solution to the problem of the high failure rates of foreign language students.

Most books on language teaching list the various methods that have been used in the past, often ending with the author's new method. These new methods are usually presented as coming only from the author's mind, as the authors generally give no credence to what was done before and do not explain how it relates to the new method. For example, descriptive linguists seem to claim unhesitatingly that there were no scientifically based language teaching methods before their work (which led to the audio-lingual method developed for the U.S. Army in World War II). However, there is significant evidence to the

contrary. It is also often inferred or even stated that older methods were completely ineffective or have died out completely, though in reality even the oldest methods are still in use (e.g. the Berlitz version of the direct method). Proponents of new methods have been so sure that their ideas are so new and so correct that they could not conceive that the older ones have enough validity to cause controversy. This was in turn caused by emphasis on new scientific advances, which has tended to blind researchers to precedents in older work.(p. 5)

There have been two major branches in the field of language learning, the empirical and theoretical, and these have almost completely separate histories, with each gaining ground over the other at one time or another. Examples of researchers on the empiricist side are Jesperson, Palmer, and Leonard Bloomfield, who promote mimicry and memorization with pattern drills. These methods follow from the basic empiricist position that language acquisition results from habits formed by conditioning and drilling. In its most extreme form, language learning is seen as much the same as any other learning in any other species, human language being essentially the same as communication behaviors seen in other species.

On the theoretical side are, for example, Francois Gouin, M.D. Berlitz, and Emile B. De Sauzé, whose rationalist theories of language acquisition dovetail with linguistic work done by Noam Chomsky and others. These have led to a wider variety of teaching methods, ranging from the grammar-translation method and Gouin's "series method" to the direct methods of Berlitz and De Sauzé. With these methods, students generate

original and meaningful sentences to gain a functional knowledge of the rules of grammar. This follows from the rationalist position that man is born to think and that language use is a uniquely human trait impossible in other species. Given that human languages share many common traits, the idea is that humans share a universal grammar which is built into our brain structure. This allows us to create sentences that we have never heard before but that can still be immediately understood by anyone who understands the specific language being spoken. The rivalry between the two camps is intense, with little communication or cooperation between them.

21st century

Over time, language education has developed in schools and has become a part of the education curriculum around the world. In some countries, such as the United States, language education (also referred to as World Languages) has become a core subject along with main subjects such as English, Maths and Science.

In some countries, such as Australia, it is so common nowadays for a foreign language to be taught in schools that the subject of language education is referred to LOTE or Language Other Than English. In the majority of English-speaking education centers, French, Spanish, and German are the most popular languages to study and learn. English as a Second Language (ESL) is also available for students whose first language is not English and they are unable to speak it to the required standard.

Teaching foreign language in classrooms

Language education may take place as a general school subject or in a specialized **language school**. There are many methods of teaching languages. Some have fallen into relative obscurity and others are widely used; still others have a small following, but offer useful insights.

While sometimes confused, the terms "approach", "method" and "technique" are hierarchical concepts.

An **approach** is a set of assumptions about the nature of language and language learning, but does not involve procedure or provide any details about how such assumptions should be implemented into the classroom setting. Such can be related to second language acquisition theory.

There are three principal "approaches":

- The structural view treats language as a system of structurally related elements to code meaning (e.g. grammar).
- The functional view sees language as a vehicle to express or accomplish a certain function, such as requesting something.
- The interactive view sees language as a vehicle for the creation and maintenance of social relations, focusing on patterns of moves, acts, negotiation and interaction found in conversational exchanges. This approach has been fairly dominant since the 1980s.

A **method** is a plan for presenting the language material to be learned, and should be based upon a selected approach. In order for an approach to be translated into a method, an instructional system must be designed considering the objectives of the teaching/learning, how the content is to be selected and organized, the types of tasks to be performed, the roles of students, and the roles of teachers.

- Examples of structural methods are grammar translation and the audio-lingual method.
- Examples of functional methods include the oral approach / situational language teaching.
- Examples of interactive methods include the direct method, the series method, communicative language teaching, language immersion, the Silent Way, Suggestopedia, the Natural Approach, Tandem Language Learning, Total Physical Response, Teaching Proficiency through Reading and Storytelling and Dogme language teaching.

A **technique** (or strategy) is a very specific, concrete stratagem or trick designed to accomplish an immediate objective. Such are derived from the controlling method, and less directly, from the approach.

Online and self-study courses

Hundreds of languages are available for self-study, from scores of publishers, for a range of costs, using a variety of methods. The course itself acts as a teacher and has to choose a methodology, just as classroom teachers do.

Audio recordings and books

Audio **recordings** use native speakers, and one strength is helping learners improve their accent. Some recordings have pauses for the learner to speak. Others are continuous so the learner speaks along with the recorded voice, similar to learning a song.

Audio recordings for self-study use many of the methods used in classroom teaching, and have been produced on records, tapes, CDs, DVDs and websites.

Most audio recordings teach words in the target language by using explanations in the learner's own language. An alternative is to use sound effects to show meaning of words in the target language. The only language in such recordings is the target language, and they are comprehensible regardless of the learner's native language.

Language **books**have been published for centuries, teaching vocabulary and grammar. The simplest books are phrasebooks to give useful short phrases for travelers, cooks, receptionists, or others who need specific vocabulary. More complete books include more vocabulary, grammar, exercises, translation, and writing practice.

Also, various other "language learning tools" have been entering the market in recent years.

Internet and software

Software can interact with learners in ways that books and audio cannot:

- Some software records the learner, analyzes the pronunciation, and gives feedback.
- Software can present additional exercises in areas where a particular learner has difficulty, until the concepts are mastered.
- Software can pronounce words in the target language and show their meaning by using pictures instead of oral explanations. The only language in such software is the target language. It is comprehensible regardless of the learner's native language.

Websites provide various services geared toward language education. Some sites are designed specifically for learning languages:

- Some software runs on the web itself, with the advantage of avoiding downloads, and the disadvantage of requiring an internet connection.
- Some publishers use the web to distribute audio, texts and software, for use offline. For example, various travel guides, for example Lonely Planet, offer software supporting language education.
- Some websites offer learning activities such as quizzes or puzzles to practice language concepts.
- Language exchange sites connect users with complementary language skills, such as a native Spanish speaker who wants to learn English with a native English speaker who wants to learn Spanish. Language exchange websites essentially treat *knowledge of a language* as a commodity, and provide a marketlike environment for the commodity to be exchanged. Users typically contact each other

via chat, VoIP, or email. Language exchanges have also been viewed as a helpful tool to aid language learning at language schools. Language exchanges tend to benefit oral proficiency, fluency, colloquial vocabulary acquisition, and vernacular usage, rather than formal grammar or writing skills. Across Australasia, 'Education Perfect' – an online learning site- is frequently used as it enables teachers to monitor students' progress as students gain a "point" for every new word remembered. There is an annual international Education Perfect languages contest held in May.

Many other websites are helpful for learning languages, even though they are designed, maintained and marketed for other purposes:

- All countries have websites in their own languages, which learners elsewhere can use as primary material for study: news, fiction, videos, songs, etc. In a study conducted by the Center for Applied Linguistics, it was noted that the use of technology and media has begun to play a heavy role in facilitating language learning in the classroom. With the help of the internet, students are readily exposed to foreign media (music videos, television shows, films) and as a result, teachers are taking heed of the internet's influence and are searching for ways to combine this exposure into their classroom teaching.
- Translation sites let learners find the meaning of foreign text or create foreign translations of text from their native language.

- Speech synthesis or text to speech (TTS) sites and software let learners hear pronunciation of arbitrary written text, with pronunciation similar to a native speaker.
- Course development and learning management systems such as Moodle are used by teachers, including language teachers.
- Web conferencing tools can bring remote learners together; e.g.Elluminate Live.
- Players of computer games can practice a target language when interacting in massively multiplayer online games and virtual worlds. In 2005, the virtual world Second Life started to be used for foreign language tuition, sometimes with entire businesses being developed. In addition, Spain's language and cultural institute Instituto Cervantes has an "island" on Second Life.

Some Internet content is free, often from government and nonprofit sites such as BBC Online, Book2, Foreign Service Institute, with no or minimal ads. Some are ad-supported, such as newspapers and YouTube. Some require a payment.

Learning strategies

Language learning strategies have attracted increasing focus as a way of understanding the process of language acquisition.

Listening as a way to learn

Clearly listening is used to learn, but not all language learners employ it consciously. Listening to understand is one level of

listening but focused listening is not something that most learners employ as a strategy. Focused listening is a strategy in listening that helps students listen attentively with no distractions. Focused listening is very important when learning a foreign language as the slightest accent on a word can change the meaning completely.

Reading as a way to learn

Many people read to understand but the strategy of reading text to learn grammar and discourse styles can also be employed.

Speaking as a way to learn

Alongside listening and reading exercises, practicing conversation skills is an important aspect of language acquisition. Language learners can gain experience in speaking foreign languages through in-person language classes, language meet-ups, university language exchange programs, joining online language learning communities (e.g. Conversation Exchange and Tandem), and traveling to a country where the language is spoken.

Learning vocabulary

Translation and rote memorization have been the two strategies that have been employed traditionally. There are other strategies that also can be used such as guessing, based on looking for contextual clues, spaced repetition with a use of various apps, games and tools (e.g. DuoLingo, LingoMonkey and Vocabulary Stickers). Knowledge about how the brain

works can be utilized in creating strategies for how to remember words.

Learning Esperanto

Esperanto, the most widely used international auxiliary language, was founded by L. L. Zamenhof, a Polish-Jewish ophthalmologist, in 1887, aimed to eliminate language barriers in the international contacts. Esperanto is an artificial language created on the basis of the Indo-European languages, absorbing the reasonable factors of commonality of the Germanic languages. Esperanto is completely consistent in its speech and writing. The stress of every word is fixed on the penultimate syllable. By learning twenty-eight letters and mastering the phonetic rules, one can read and write any words. With further simplification and standardization, Esperanto becomes more easily mastered than other languages. Ease of learning helps one build the confidence and learning Esperanto, as a learning strategy, constitutes a good introduction to foreign language study.

Teaching strategies

Blended learning

Blended learning combines face-to-face teaching with distance education, frequently electronic, either computer-based or web-based. It has been a major growth point in the ELT (English Language Teaching) industry over the last ten years.

Some people, though, use the phrase 'Blended Learning' to refer to learning taking place while the focus is on other

activities. For example, playing a card game that requires calling for cards may allow blended learning of numbers (1 to 10).

Skill teaching

When talking about language skills, the four basic ones are: listening, speaking, reading and writing. However, other, more socially based skills have been identified more recently such as summarizing, describing, narrating etc. In addition, more general learning skills such as study skills and knowing how one learns have been applied to language classrooms.

In the 1970s and 1980s, the four basic skills were generally taught in isolation in a very rigid order, such as listening before speaking. However, since then, it has been recognized that we generally use more than one skill at a time, leading to more integrated exercises. Speaking is a skill that often is underrepresented in the traditional classroom. This is due to the fact that it is considered harder to teach and test. There are numerous texts on teaching and testing writing but relatively few on speaking.

More recent textbooks stress the importance of students working with other students in pairs and groups, sometimes the entire class. Pair and group work give opportunities for more students to participate more actively. However, supervision of pairs and groups is important to make sure everyone participates as equally as possible. Such activities also provide opportunities for peer teaching, where weaker learners can find support from stronger classmates.

Sandwich technique

In foreign language teaching, the **sandwich technique** is the oral insertion of an idiomatic translation in the mother tongue between an unknown phrase in the learned language and its repetition, in order to convey meaning as rapidly and completely as possible. The mother tongue equivalent can be given almost as an aside, with a slight break in the flow of speech to mark it as an intruder.

When modeling a dialogue sentence for students to repeat, the teacher not only gives an oral mother tongue equivalent for unknown words or phrases, but repeats the foreign language phrase before students imitate it: L2 => L1 => L2. For example, a German teacher of English might engage in the following exchange with the students:

- Teacher: "Let me try – lass michversuchen – let me try."
- Students: "Let me try."

Mother tongue mirroring

Mother tongue mirroring is the adaptation of the time-honoured technique of literal translation or word-for word translation for pedagogical purposes. The aim is to make foreign constructions salient and transparent to learners and, in many cases, spare them the technical jargon of grammatical analysis. It differs from literal translation and interlinear text as used in the past since it takes the progress learners have made into account and only focuses upon a specific structure at a time. As a didactic device, it can only be used to the

extent that it remains intelligible to the learner, unless it is combined with a normal idiomatic translation. This technique is seldom referred to or used these days.

Back-chaining

Back-chaining is a technique used in teaching oral language skills, especially with polysyllabic or difficult words. The teacher pronounces the last syllable, the student repeats, and then the teacher continues, working backwards from the end of the word to the beginning. For example, to teach the name 'Mussorgsky' a teacher will pronounce the last syllable:*-sky,* and have the student repeat it. Then the teacher will repeat it with *-sorg-* attached before: *-sorg-sky,* and all that remains is the first syllable: *Mus-sorg-sky.*

Code Switching

Code switching is a special linguistic phenomenon that the speaker consciously alternates two or more languages according to different time, places, contents, objects and other factors. Code switching shows its functions while one is in the environment that mother tongue are not playing a dominant role in students' life and study, such as the children in the bilingual family or in the immigrant family. That is to say, the capability of using code switching, relating to the transformation of phonetics, words, language structure, expression mode, thinking mode, cultural differences and so on, is needed to be guided and developed in the daily communication environment. Most people learn foreign language in the circumstance filled with the using of their native language so that their ability of code switching cannot

be stimulated, and thus the efficiency of foreign language acquisition would decrease. Therefore, as a teaching strategy, code switching is used to help students better gain conceptual competences and to provide rich semantic context for them to understand some specific vocabularies.

By region

Practices in language education may vary by region however the underlying understandings which drive it are fundamentally similar. Rote repetition, drilling, memorisation and grammar conjugating are used the world over. Sometimes there are different preferences teaching methods by region. Language immersion is popular in some European countries, but is not used very much in the United States, in Asia or in Australia.

By different life stage

Early childhood education

Early childhood education (**ECE**), also known as **nursery education**, is a branch of education theory that relates to the teaching of children (formally and informally) from birth up to the age of eight. Traditionally, this is up to the equivalent of third grade. ECE is described as an important period in child development.

ECE emerged as a field of study during the Enlightenment, particularly in European countries with high literacy rates. It continued to grow through the nineteenth century as universal

primary education became a norm in the Western world. In recent years, early childhood education has become a prevalent public policy issue, as funding for preschool and pre-K is debated by municipal, state, and federal lawmakers. Governing entities are also debating the central focus of early childhood education with debate on developmental appropriate play versus strong academic preparation curriculum in reading, writing, and math. The global priority placed on early childhood education is underscored with targets of the United Nations Sustainable Development Goal 4.

ECE is also a professional designation earned through a post-secondary education program. For example, in Ontario, Canada, the designations ECE (Early Childhood Educator) and RECE (Registered Early Childhood Educator) may only be used by registered members of the College of Early Childhood Educators, which is made up of accredited child careprofessionals who are held accountable to the College's standards of practice.

History

The history of early childhood care and education (ECCE) refers to the development of care and education of children from birth through eight years old throughout history. ECCE has a global scope, and caring for and educating young children has always been an integral part of human societies. Arrangements for fulfilling these societal roles have evolved over time and remain varied across cultures, often reflecting family and community structures as well as the social and economic roles of women and men. Historically, such arrangements have largely been informal, involving family,

household and community members. After a 20th-century characterized by constant change, including a monumental campaign urging for greater women's rights, women were motivated to pursue a college education and join the workforce. Nevertheless, mothers still face the same challenges as the generations that preceded them on how to care for young children while away at work. The formalization of these arrangements emerged in the nineteenth century with the establishment of kindergartens for educational purposes and day nurseries for care in much of Europe and North America, Brazil, China, India, Jamaica and Mexico.

Context

While the first two years of a child's life are spent in the creation of a child's first "sense of self", most children are able to differentiate between themselves and others by their second year.

This differentiation is crucial to the child's ability to determine how they should function in relation to other people. Parents can be seen as a child's first teacher and therefore an integral part of the early learning process.

Early childhood attachment processes—those that occur from birth to age 2—can be influential to future education. With proper guidance and exploration, children begin to become more comfortable with their environment if they have steady relationships to guide them. Parents who are consistent with response times and emotions will properly make this attachment early on. If this attachment is not made, there can be detrimental effects on the child in their future relationships

and independence. There are proper techniques that parents and caregivers can use to establish these relationships, which will in turn allow children to be more comfortable exploring their environment.

Education for young students can help them excel academically and socially. With exposure and organized lesson plans, children can learn anything they want to.

The tools they learn to use during these beginning years will provide lifelong benefits to their success. Developmentally, having structure and freedom, children are able to reach their full potential.

Teaching certification

Teachers seeking to be early childhood educators must obtain certification, among other requirements. "An early childhood education certification denotes that a teacher has met a set of standards that shows they understand the best ways to educate young students aged 3 to 8." There are early childhood education programs across the United States that have a certification that is pre-K to grade 3.

There are also programs now that have a duel certification in pre-K to grade 3 and special education from pre-K to grade 8. Other certifications are urban tracks in pre-k to grade 3that have an emphasis on urban schools and preparing teachers to teach in those school environments. These tracks typically take four years to complete and in the end, provide students with their certifications to teach in schools. These tracks give students in the field experience in multiple different types of

classrooms as they learn how to become teachers. An example of a school that has these tracks is Indiana University of Pennsylvania.

Early childhood educators must have knowledge in the developmental changes during early childhood and the subjects being taught in an early childhood classroom. These subjects include language arts and reading, mathematics, and some social studies and science. Early childhood educators must also be able to manage classroom behavior. Positive reinforcement is one popular method for managing behavior in young children. Teacher certification laws vary by state in the United States. In Connecticut, for example, these requirements include a bachelor's degree, 36 hours of special education courses, passing scores on the Praxis II Examination and Connecticut Foundations of Reading Test and a criminal history background check.

For State of Early Childhood Education Bornfreund, 2011;Kauerz, 2010 says that the teacher education and certification requirements do not manifest the research about how to best support development and learning for children in kindergarten through third grade. States are requiring educators who work in open pre-kindergarten to have specific preparation in early childhood education. As per the State of Pre-School Yearbook (Barnett et al., 2015), 45 states require their educators to have a specialization in early childhood education, and 30 states require no less than a bachelor's qualification. As indicated by NAEYC state profiles (NAEYC, 2014), just 14 states require kindergarten instructors to be confirmed in early youth; in the rest of the states, kindergarten educators might be authorized in basic training. Fewer states

require ECE affirmation for first-grade educators (Fields and Mitchell, 2007). Staff working in early childhood education hold varying job titles, ranging from:

- Early Years Practitioner
- Child Development Officer
- Early Learning and Childcare Practitioner
- Nursery Nurse
- Early Years Officer
- Early Childhood Educator
- Nursery / Early Years Teacher
- Educational Leader

with promotional opportunities to the posts of:

- Senior Early Years Practitioner
- Equity and Excellence Lead Practitioner
- Depute Head of Establishment
- Head of Establishment
- Principal Early Years Practitioner

Learning through play

Early childhood education often focuses on learning through play, based on the research and philosophy of Jean Piaget, which posits that play meets the physical, intellectual, language, emotional, and social needs (PILES) of children. Children's curiosity and imagination naturally evoke learning when unfettered. Learning through play will allow a child to develop cognitively. This is the earliest form of collaboration among children. In this, children learn through their interactions with others. Thus, children learn more efficiently

and gain more knowledge through activities such as dramatic play, art, and social games.

According to a study by Alharabi and Alzahrani (2020), "the epistemology in children's play, learning, and development is that young children grow quickly, and as they adapt, play experiences provide a natural and developmentally appropriate pathway for authentic learning". There is much evidence driving a worldwide awareness that in the first six years of life, young children developmentally take in every part of their surroundings and their playful explorations actually form their biological neuronal mass. Children at these early ages are most engaged, and therefore learning at a higher rate, during unstructured free play.

Tassonisuggests that "some play opportunities will develop specific individual areas of development, but many will develop several areas." Thus, it is important that practitioners promote children's development through play by using various types of play on a daily basis. Allowing children to help get snacks ready helps develop math skills (one-to-one ratio, patterns, etc.), leadership, and communication. Key guidelines for creating a play-based learning environment include providing a safe space, correct supervision, and culturally aware, trained teachers who are knowledgeable about the Early Years Foundation.

Davy states that the British Children's Act of 1989 links to play-work as the act works with play workers and sets the standards for the setting such as security, quality and staff ratios. Learning through play has been seen regularly in practice as the most versatile way a child can learn. Margaret

McMillan (1860-1931) suggested that children should be given free school meals, fruit and milk, and plenty of exercise to keep them physically and emotionally healthy. Rudolf Steiner (1861–1925) believed that play time allows children to talk, socially interact, use their imagination and intellectual skills. Maria Montessori (1870–1952) believed that children learn through movement and their senses and after doing an activity using their senses. The benefits of being active for young children include physical benefits (healthy weight, bone strength, cardiovascular fitness), stress relief, improved social skills and improved sleep. When young students have group play time it also helps them to be more empathetic towards each other.

Allowing children to learn through play is integral to early childhood development allowing them to develop language skills, improve social skills, solidify emotional regulation, and increase their cognitive skills in preparation for their future upcoming academic challenges. The opportunity for unstructured free play is most important in early childhood education settings due to the availability of peers for playmates and having access to teacher prepared environments rich in exploratory materials.

In a 2021 article, Montessori researchers and trainers Aida Macia-Gual and Laura Domingo-Penafiel sought to identify societal demands on children in early childhood education brought on by the ever increasing push for academic achievement at an earlier age. The authors use the established Montessori principles in early childhood education in their study with established early childhood goals of acquisitions of emotional-regulation and child centered investigations to

identify societal demands and concluded that "When children are in a prepared environment that stimulates them, they can develop their abilities with no barriers and this means that higher goals can be achieved" and they will be stronger academically as a result. They argue that the established Montessori principles of a carefully educator constructed environment provides experiences and learning opportunities for the young child to process the world around them and to find their own fit.

In a more contemporary approach, organizations such as the National Association of the Education of Young Children (NAEYC) promote child-guided learning experiences, individualized learning, and developmentally appropriate learning as tenets of early childhood education. A study by the Ohio State University also analyzed the effects of implementing board games in elementary classrooms. This study found that implementing board games in the classroom "helped students develop social skills that transferred to other areas." Specific outcomes included students being more helpful, cooperative and thoughtful with other students. Negative outcomes included children feeling excluded and showing frustration with game rules.

A study conducted In Norway analyzed the benefits of risky unstructured free play in early childhood education. This study suggests important benefits and improvements in several developmental goals including self-regulation and improved motor skills. The authors of the study argue that the implementation of opportunities for outdoor unstructured free and risky play increases children's interactions with the physical environment encouraging development vital to future

success. They claim that their research shows that including the opportunity for risky play is beneficial, but that the beliefs of parents and teachers about risk complicate the implementation in the early childhood educational setting. Their observations led them to conclude that the risk factors in unstructured free play, especially outdoors, can increase the positive effects of the play.

Piaget provides an explanation for why learning through play is such a crucial aspect of learning as a child. However, due to the advancement of technology, the art of play has started to dissolve and has transformed into "playing" through technology. Greenfield, quoted by the author, Stuart Wolpert, in the article "*Is Technology Producing a Decline in Critical Thinking and Analysis?"*, states, "No media is good for everything. If we want to develop a variety of skills, we need a balanced media diet. Each medium has costs and benefits in terms of what skills each develops." Technology is beginning to invade the art of play and a balance needs to be found.

Opposition

Many oppose the theory of learning through play because they think children are not gaining new knowledge. In reality, play is the first way children learn to make sense of the world at a young age. Research suggests that the way children play and interact with concepts at a young age could help explain the differences in social and cognitive interactions later.

These pressures to implement more stringent early structured curriculum are evident in the UK as well. In their 2017 report titled, Bold Beginnings, Ofsted, the Office for Standards in

Education, argued for less free play and more reading in math in the Readiness Year for 4-5 year olds equivalent to US kindergarten. Ofsted's report pushed for a stronger academic curriculum in Reception Year with more standardized testing, systematic synthetic phonics instruction, and increased direct teaching time every day in writing and mathematics. The report went so far as to say that "Some headteachers did not believe in the notion of 'free play'". Those teachers seemed to view free play as too "rosy" and with an unrealistic view of childhood.

In opposition to the Bold Beginnings report, Beard (2018) published a report on a Cambridge study that compared two groups of children. One group began formal reading lessons with phonics emphasis at age five and the other group did not begin until age seven. The study found that there was no difference at all in the reading ability of the two groups of children by age eleven. However, the study did conclude that "the children who started at five developed less positive atitudes to reading and showed poorer text comprehension than those who started later."

When learning what behavior to associate with a set action can help lead children on to a more capable future. As children watch adults interact around them, they pick up on their slight nuances, from facial expressions to their tone of voice. They are exploring different roles, learning how things work, and learning to communicate and work with others. These things cannot be taught by a standard curriculum, but have to be developed through the method of play. Many preschools understand the importance of play and have designed their curriculum around that to allow children to have more freedom. Once these basics are learned at a young age, it sets

children up for success throughout their schooling and their life. Based on their Tools of the Mind curriculum for early childhood education centers and Sesame Workshop, Bodrova and Leong (2019) argue for including more play in early childhood education, but increasing guided play experiences to encourage academic development.

They argue that instead of more unstructured free play, children should be guided through the full span of developmental play by qualified educators to be successful in future academic settings. Instead of replacing all unstructured free play, Bodrova and Leong advocate for supplementing play time with these guided experiences that can be sued to bring children success in early education skills such as building background knowledge while developing emotional control and self-regulation based on Vygotsky's theories of play.

Another supplement to unstructured free play is Mindfulness Intervention as proposed by Regina Lai Tong Lee, et al. in their 2020 study. The authors argue that while unstructured free play is vital to early childhood education, it becomes more beneficial when paired with guided mindfulness intervention with a well trained educator. Their mindfulness intervention solution is offered as a way to make unstructured free play more beneficial and to possibly decrease the pattern of disruptive behavior that often follows periods of unstructured free play in transition to other activities.

Many say that those who succeed in kindergarten know when and how to control their impulses. They can follow through when a task is difficult and listen to directions for a few minutes. These skills are linked to self-control, which is within

the social and emotional development that is learned over time through play among other things.

Theories of child development

- The Developmental Interaction Approach is based on the theories of Jean Piaget, Erik Erikson, John Dewey, and Lucy Sprague Mitchell. The approach focuses on learning through discovery. Jean Jacques Rousseau recommended that teachers should exploit individual children's interests to make sure each child obtains the information most essential to his personal and individual development. The five developmental domains of childhood development include: To meet those developmental domains, a child has a set of needs that must be met for learning. Maslow's hierarchy of needs showcases the different levels of needs that must be met the chart to the right showcases these needs.
- Physical: the way in which a child develops biological and physical functions, including eyesight and motor skills
- Social: the way in which a child interacts with others Children develop an understanding of their responsibilities and rights as members of families and communities, as well as an ability to relate to and work with others.
- Emotional: the way in which a child creates emotional connections and develops self-confidence. Emotional connections develop when children relate to other people and share feelings.

- Language: the way in which a child communicates, including how they present their feelings and emotions, both to other people and to themselves. At 3 months, children employ different cries for different needs. At 6 months they can recognize and imitate the basic sounds of spoken language. In the first 3 years, children need to be exposed to communication with others in order to pick up language. "Normal" language development is measured by the rate of vocabulary acquisition.
- Cognitive skills: the way in which a child organizes information. Cognitive skills include problem solving, creativity, imagination and memory. They embody the way in which children make sense of the world. Piaget believed that children exhibit prominent differences in their thought patterns as they move through the stages of cognitive development: sensorimotor period, the pre-operational period, and the operational period.

Vygotsky's socio-cultural learning theory

Russian psychologist Lev Vygotsky proposed a "socio-cultural learning theory" that emphasized the impact of social and cultural experiences on individual thinking and the development of mental processes. Vygotsky's theory emerged in the 1930s and is still discussed today as a means of improving and reforming educational practices. In Vygotsky's theories of learning, he also postulated the theory of the zone of proximal development. This theory ties in with children building off prior knowledge and gaining new knowledge related to skills they already have. In the theory it describes how new

knowledge or skills are taken in if they are not fully learned but are starting to emerge. A teacher or older friend lends support to a child learning a skill, be it building a block castle, tying a shoe, or writing one's name. As the child becomes more capable of the steps of the activity, the adult or older child withdraws supports gradually, until the child is competent completing the process on his/her own. This is done within that activity's zone—the distance between where the child is, and where he potentially will be. In each zone of proximal development, they build on skills and grow by learning more skills in their proximal development range. They build on the skills by being guided by teachers and parents. They must build from where they are in their zone of proximal development.

Vygotsky argued that since cognition occurs within a social context, our social experiences shape our ways of thinking about and interpreting the world. People such as parents, grandparents, and teachers play the roles of what Vygotsky described as knowledgeable and competent adults. Although Vygotsky predated social constructivists, he is commonly classified as one.

Social constructivists believe that an individual's cognitive system is a resditional learning time. Vygotsky advocated that teachers facilitate rather than direct student learning. Teachers should provide a learning environment where students can explore and develop their learning without direct instruction. His approach calls for teachers to incorporate students' needs and interests. It is important to do this because students' levels of interest and abilities will vary and there needs to be differentiation.

However, teachers can enhance understandings and learning for students. Vygotsky states that by sharing meanings that are relevant to the children's environment, adults promote cognitive development as well. Their teachings can influence thought processes and perspectives of students when they are in new and similar environments. Since Vygotsky promotes more facilitation in children's learning, he suggests that knowledgeable people (and adults in particular), can also enhance knowledges through cooperative meaning-making with students in their learning. Vygotsky's approach encourages guided participation and student exploration with support. Teachers can help students achieve their cognitive development levels through consistent and regular interactions of collaborative knowledge-making learning processes.

Piaget's constructivist theory

Jean Piaget's constructivist theory gained influence in the 1970s and '80s. Although Piaget himself was primarily interested in a descriptive psychology of cognitive development, he also laid the groundwork for a constructivist theory of learning. Piaget believed that learning comes from within: children construct their own knowledge of the world through experience and subsequent reflection. He said that "if logic itself is created rather than being inborn, it follows that the first task of education is to form reasoning." Within Piaget's framework, teachers should guide children in acquiring their own knowledge rather than simply transferring knowledge.

According to Piaget's theory, when young children encounter new information, they attempt to accommodate and assimilate it into their existing understanding of the world.

Accommodation involves adapting mental schemas and representations to make them consistent with reality. Assimilation involves fitting new information into their pre-existing schemas. Through these two processes, young children learn by equilibrating their mental representations with reality. They also learn from mistakes.

A Piagetian approach emphasizes experiential education; in school, experiences become more hands-on and concrete as students explore through trial and error. Thus, crucial components of early childhood education include exploration, manipulating objects, and experiencing new environments. Subsequent reflection on these experiences is equally important.

Piaget's concept of reflective abstraction was particularly influential in mathematical education. Through reflective abstraction, children construct more advanced cognitive structures out of the simpler ones they already possess. This allows children to develop mathematical constructs that cannot be learned through equilibration – making sense of experiences through assimilation and accommodation – alone.

According to Piagetian theory, language and symbolic representation is preceded by the development of corresponding mental representations. Research shows that the level of reflective abstraction achieved by young children was found to limit the degree to which they could represent physical quantities with written numerals. Piaget held that children can invent their own procedures for the four arithmetical operations, without being taught any conventional rules.

Piaget's theory implies that computers can be a great educational tool for young children when used to support the design and construction of their projects. McCarrick and Xiaoming found that computer play is consistent with this theory. However, Plowman and Stephen found that the effectiveness of computers is limited in the preschool environment; their results indicate that computers are only effective when directed by the teacher. This suggests, according to the constructivist theory, that the role of preschool teachers is critical in successfully adopting computers as they existed in 2003.

Kolb's experiential learning theory

David Kolb's experiential learning theory, which was influenced by John Dewey, Kurt Lewin and Jean Piaget, argues that children need to experience things to learn: "The process whereby knowledge is created through the transformation of experience. Knowledge results from the combinations of grasping and transforming experience."

The experimental learning theory is distinctive in that children are seen and taught as individuals. As a child explores and observes, teachers ask the child probing questions. The child can then adapt prior knowledge to learning new information.

Kolb breaks down this learning cycle into four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Children observe new situations, think about the situation, make meaning of the situation, then test that meaning in the world around them.

Practical implications of early childhood education

In recent decades, studies have shown that early childhood education is critical in preparing children to enter and succeed in the (grade school) classroom, diminishing their risk of social-emotional mental health problems and increasing their self-sufficiency later in their lives. In other words, the child needs to be taught to rationalize everything and to be open to interpretations and critical thinking. There is no subject to be considered taboo, starting with the most basic knowledge of the world that they live in, and ending with deeper areas, such as morality, religion and science. Visual stimulus and response time as early as 3 months can be an indicator of verbal and performance IQ at age 4 years. When parents value ECE and its importance their children generally have a higher rate of attendance. This allows children the opportunity to build and nurture trusting relationships with educators and social relationships with peers.

By providing education in a child's most formative years, ECE also has the capacity to pre-emptively begin closing the educational achievement gap between low and high-income students before formal schooling begins. Children of low socioeconomic status (SES) often begin school already behind their higher SES peers; on average, by the time they are three, children with high SES have three times the number of words in their vocabularies as children with low SES. Participation in ECE, however, has been proven to increase high school graduation rates, improve performance on standardized tests,

and reduce both grade repetition and the number of children placed in special education.

A study was conducted by the Aga Khan Development Network's Madrasa Early Childhood Programme on the impact that early childhood education had on students' performance in grade school. Looking specifically at students who attended the Madrasa Early Childhood schools (virtually all of whom came from economically disadvantaged backgrounds), the study found that they had consistently ranked in the top 20% in grade 1 classes. The study also concluded that any formal early childhood education contributed to higher levels of cognitive development in language, mathematics, and non-verbal reasoning skills.

Especially since the first wave of results from the Perry Preschool Project were published, there has been widespread consensus that the quality of early childhood education programs correlate with gains in low-income children's IQs and test scores, decreased grade retention, and lower special education rates.

Several studies have reported that children enrolled in ECE increase their IQ scores by 4–11 points by age five, while a Milwaukee study reported a 25-point gain. In addition, students who had been enrolled in the Abecedarian Project, an often-cited ECE study, scored significantly higher on reading and math tests by age fifteen than comparable students who had not participated in early childhood programs. In addition, 36% of students in the Abecedarian Preschool Study treatment group would later enroll in four-year colleges compared to 14% of those in the control group.

In 2017, researchers reported that children who participate in ECE graduate high school at significantly greater rates than those who do not. Additionally, those who participate in ECE require special education and must repeat a grade at significantly lower rates than their peers who did not receive ECE. The NIH asserts that ECE leads to higher test scores for students from preschool through age 21, improved grades in math and reading, and stronger odds that students will keep going to school and attend college.

Nathaniel Hendren and Ben Sprung-Keyser, two Harvard economists, found high Marginal Values of Public Funds (MVPFs) for investments in programs supporting the health and early education of children, particularly those that reach children from low-income families. The average MVPF for these types of initiatives is over 5, while the MVPFs for programs for adults generally range from 0.5 to 2.

Beyond benefitting societal good, ECE also significantly impacts the socioeconomic outcomes of individuals. For example, by age 26, students who had been enrolled in Chicago Child-Parent Centers were less likely to be arrested, abuse drugs, and receive food stamps; they were more likely to have high school diplomas, health insurance and full-time employment. Studies also show that ECE heightens social engagement, bolsters lifelong health, reduces the incidence of teen pregnancy, supports mental health, decreases the risk of heart disease, and lengthens lifespans.

The World Bank's 2019 World Development Report on *The Changing Nature of Work* identifies early childhood development programs as one of the most effective ways

governments can equip children with the skills they will need to succeed in future labor markets.

According to a 2020 study in the Journal of Political Economy by Clemson University economist Jorge Luis García, Nobel laureate James J. Heckman and University of Southern California economists Duncan Ermini Leaf and María José Prados, every dollar spent on a high-quality early-childhood programs led to a return of $7.3 over the long-term.

The Perry Preschool Project

The Perry Preschool Project, which was conducted in the 1960s in Ypsilanti, Michigan, is the oldest social experiment in the field of early childhood education and has heavily influenced policy in the United States and across the globe. The experiment enrolled 128 three- and four-year-old African-American children with cognitive disadvantage from low-income families, who were then randomly assigned to treatment and control groups. The intervention for children in the treatment group included active learning preschool sessions on weekdays for 2.5 hours per day. The intervention also included weekly visits by the teachers to the homes of the children for about 1.5 hours per visit to improve parent-child interactions at home.

Initial evaluations of the Perry intervention showed that the preschool program failed to significantly boost an IQ measure. However, later evaluations that followed up the participants for more than fifty years have demonstrated the long-term economic benefits of the program, even after accounting for the small sample size of the experiment, flaws in its randomization

procedure, and sample attrition. There is substantial evidence of large treatment effects on the criminal convictions of male participants, especially for violent crime, and their earnings in middle adulthood. Research points to improvements in non-cognitive skills, executive functioning, childhood home environment, and parental attachment as potential sources of the observed long-term impacts of the program. The intervention's many benefits also include improvements in late-midlife health for both male and female participants. Perry promoted educational attainment through two avenues: total years of education attained and rates of progression to a given level of education.

This pattern is particularly evident for females. Treated females received less special education, progressed more quickly through grades, earned higher GPAs, and attained higher levels of education than their control group counterparts.

Research also demonstrates spillover effects of the Perry program on the children and siblings of the original participants. A study concludes, "The children of treated participants have fewer school suspensions, higher levels of education and employment, and lower levels of participation in crime, compared with the children of untreated participants. Impacts are especially pronounced for the children of male participants.

These treatment effects are associated with improved childhood home environments." The study also documents beneficial impacts on the male siblings of the original participants. Evidence from the Perry Preschool Project is noteworthy

because it advocates for public spending on early childhood programs as an economic investment in a society's future, rather than in the interest of social justice.

International agreements

The first World Conference on Early Childhood Care and Education took place in Moscow from 27 to 29 September 2010, jointly organized by UNESCO and the city of Moscow. The overarching goals of the conference are to:

- Reaffirm ECCE as a right of all children and as the basis for development
- Take stock of the progress of Member States towards achieving the EFA Goal 1
- Identify binding constraints toward making the intended equitable expansion of access to quality ECCE services
- Establish, more concretely, benchmarks and targets for the EFA Goal 1 toward 2015 and beyond
- Identify key enablers that should facilitate Member States to reach the established targets
- Promote global exchange of good practices

According to UNESCO, a **preschool curriculum** is one that delivers educational content through daily activities and furthers a child's physical, cognitive, and social development. Generally, preschool curricula are only recognized by governments if they are based on academic research and reviewed by peers.

Preschool for Child Rights have pioneered into preschool curricular areas and is contributing into child rights through their preschool curriculum.

Curricula in early childhood care and education

Curricula in early childhood care and education (ECCE) is the driving force behind any ECCE programme. It is 'an integral part of the engine that, together with the energy and motivation of staff, provides the momentum that makes programmes live'. It follows therefore that the quality of a programmeis greatly influenced by the quality of its curriculum. In early childhood, these may be programs for children or parents, including health and nutrition interventions and prenatal programs, as well as center-based programs for children.

Barriers and challenges

Children's learning potential and outcomes are negatively affected by exposure to violence, abuse and child labour. Thus, protecting young children from violence and exploitation is part of broad educational concerns. Due to difficulties and sensitivities around the issue of measuring and monitoring child protection violations and gaps in defining, collecting and analysing appropriate indicators, data coverage in this area is scant. However, proxy indicators can be used to assess the situation. For example, ratification of relevant international conventions indicates countries' commitment to child

protection. By April 2014, 194 countries had ratified the CRC3; and 179 had ratified the 1999 International Labour Organization's Convention (No. 182) concerning the elimination of the worst forms of child labour. However, many of these ratifications are yet to be given full effect through actual implementation of concrete measures. Globally, 150 million children aged 5–14 are estimated to be engaged in child labour. In conflict-affected poor countries, children are twice as likely to die before their fifth birthday compared to those in other poor countries. In industrialized countries, 4 per cent of children are physically abused each year and 10 per cent are neglected or psychologically abused.

In both developed and developing countries, children of the poor and the disadvantaged remain the least served. This exclusion persists against the evidence that the added value of early childhood care and education services are higher for them than for their more affluent counterparts, even when such services are of modest quality. While the problem is more intractable in developing countries, the developed world still does not equitably provide quality early childhood care and education services for all its children. In many European countries, children, mostly from low-income and immigrant families, do not have access to good quality early childhood care and education.

Orphan education

A lack of education during the early childhood years for orphans is a worldwide concern. Orphans are at higher risk of "missing out on schooling, living in households with less food security, and suffering from anxiety and depression."

Education during these years has the potential to improve a child's "food and nutrition, health care, social welfare, and protection." This crisis is especially prevalent in Sub-Saharan Africa which has been heavily impacted by the aids epidemic. UNICEFreports that "13.3 million children (0–17 years) worldwide have lost one or both parents to AIDS. Nearly 12 million of these children live in sub-Saharan Africa." Government policies such as the Free Basic Education Policy have worked to provide education for orphan children in this area, but the quality and inclusiveness of this policy has brought criticism.

Notable early childhood educators

- Fred Rogers
- Charles Eugene Beatty
- Friedrich Fröbel
- Elizabeth Harrison
- David P. Weikart
- Juan Sánchez Muliterno, President of The World Association of Early Childhood Educators
- Maria Montessori

Compulsory education

Compulsory education, for most people, is the period that they have access to a second or foreign language for the first time. In this period, the most professional foreign language education and academic atmosphere are provided to the students. They can get help and motivation from teachers and be activated by the peers at any time. One would be able to

undergo a lot of specialized learning in order to truly master a great number of rules of vocabulary, grammar and verbal communication.

Adult education

Learning a foreign language during adulthood means one is pursuing a higher value of themself by obtaining a new skill. At this stage, individuals have already developed the ability to supervise themself learning a language. However, at the same time, the pressure is also an obstacle for adults.

Elderly education

Compared to other life stages, this period is the hardest to learn a new language due to gradual brain deterioration and memory loss. Notwithstanding its difficulty, language education for seniors can slow this brain degeneration and active ageing.

Language study holidays

An increasing number of people are now combining holidays with language study in the native country. This enables the student to experience the target culture by meeting local people. Such a holiday often combines formal lessons, cultural excursions, leisure activities, and a homestay, perhaps with time to travel in the country afterwards. Language study holidays are popular across Europe (Malta & UK being the most popular because almost everyone speaks English as a first language) and Asia due to the ease of transportation and variety of nearby countries. These holidays have become

increasingly more popular in Central and South America in such countries as Guatemala, Ecuador and Peru. As a consequence of this increasing popularity, several international language education agencies have flourished in recent years. Though education systems around the world invest enormous sums of money into language teaching the outcomes in terms of getting students to actually speak the language(s) they are learning outside the classroom are often unclear.

With the increasing prevalence of international business transactions, it is now important to have multiple languages at one's disposal. This is also evident in businesses outsourcing their departments to Eastern Europe.

Minority language education

Minority language education policy

The principal policy arguments in favor of promoting minority language education are the need for multilingual workforces, intellectual and cultural benefits and greater inclusion in global information society. Access to education in a minority language is also seen as a human right as granted by the European Convention on Human Rights and Fundamental Freedoms, the European Charter for Regional or Minority Languages and the UN Human Rights Committee. Bilingual Education has been implemented in many countries including the United States, in order to promote both the use and appreciation of the minority language, as well as the majority language concerned.

Materials and e-learning for minority language education

Suitable resources for teaching and learning minority languages can be difficult to find and access, which has led to calls for the increased development of materials for minority language teaching.

The internet offers opportunities to access a wider range of texts, audios and videos. Language learning 2.0 (the use of web 2.0 tools for language education) offers opportunities for material development for lesser-taught languages and to bring together geographically dispersed teachers and learners.

Acronyms and abbreviations

- **ALL**: Apprenticeship Language Learning
- **CALL**: computer-assisted language learning
- **CLIL**: content and language integrated learning
- **CELI**: Certificato di Conoscenzadella Lingua Italiana
- **CLL**: community language learning
- **DELE**: Diploma de EspañolcomoLenguaExtranjera
- **DELF**: diplômed'étudesen langue française
- **EFL**: English as a foreign language
- **EAL/D**: English as an additional language or dialect
- **EAP**: English for academic purposes
- **ELL**: English language learning
- **ELT**: English language teaching
- **ESL**: English as a second language
- **ESP**: English for specific purposes English for specific purposes
- **FLL**: foreign language learning

- **FLT**: foreign language teaching
- **HLL**: heritage language learning
- **IATEFL**: International Association of Teachers of English as a Foreign Language International Association of Teachers of English as a Foreign Language
- **L1**: first language, native language, mother tongue
- **L2**: second language (or any additional language)
- **LDL**: LernendurchLehren (German for learning by teaching)
- **LOTE**: Languages Other Than English
- **SLA**: second language acquisition
- **TELL**: technology-enhanced language learning
- **TEFL**: teaching English as a foreign language
- **TEFLA**: teaching English as a foreign language to adults
- **TESOL**: teaching English to speakers of other languages
- **TEYL**: teaching English to young learners
- **TPR**: Total Physical Response
- **TPRS**: Teaching Proficiency through Reading and Storytelling
- UNIcert is a European language education system of many universities based on the Common European Framework of Reference for Languages.
- See also English language learning and teaching for information on language teaching acronyms and abbreviations which are specific to English

Chapter 3

Second-language Acquisition

Second-language acquisition (**SLA**), sometimes called **second-language learning** — otherwise referred to as **L2** (**language 2**) **acquisition**, is the process by which people learn a second language. Second-language acquisition is also the scientific discipline devoted to studying that process. The field of second-language acquisition is a sub-discipline of applied linguistics but also receives research attention from a variety of other disciplines, such as psychology and education.

A central theme in SLA research is that of *interlanguage:* the idea that the language that learners use is not simply the result of differences between the languages that they already know and the language that they are learning, but a complete language system in its own right, with its own systematic rules. This interlanguage gradually develops as learners are exposed to the targeted language. The order in which learners acquire features of their new language stays remarkably constant, even for learners with different native languages and regardless of whether they have had language instruction. However, languages that learners already know can have a significant influence on the process of learning a new one. This influence is known as *language transfer*.

The primary factor driving SLA appears to be the language input that learners receive. Learners become more advanced the longer they are immersed in the language they are learning and the more time they spend voluntarily reading. The input hypothesis developed by linguist Stephen Krashen theorizes

that comprehensible input alone is necessary for second language acquisition. Krashen makes a distinction between language acquisition and language learning (the acquisition–learning distinction), claiming that acquisition is a subconscious process, whereas learning is a conscious one. According to this hypothesis, the acquisition process in L2 (Language 2) is the same as L1 (Language 1) acquisition. Learning, on the other hand, refers to conscious learning and analysis of the language being learned. Krashen argues that consciously learned language rules play a limited role in language use, serving as a monitor that could check second language output for form — assuming the learner has time, sufficient knowledge, and inclination (the monitor hypothesis). Subsequent work, by other researchers, on the interaction hypothesis and the comprehensible output hypothesis, has suggested that opportunities for output and interaction may also be necessary for learners to reach more advanced levels.

Research on how exactly learners acquire a new language spans several different areas. Focus is directed toward providing proof of whether basic linguistic skills are innate (nature), acquired (nurture), or a combination of the two attributes. Cognitive approaches to SLA research deal with the processes in the brain that underpin language acquisition, for example how paying attention to language affects the ability to learn it, or how language acquisition is related to short-term and long-term memory. Sociocultural approaches reject the notion that SLA is a purely psychological phenomenon and attempt to explain it in a social context. Some key social factors that influence SLA are the level of immersion, connection to the L2 community, and gender. Linguistic approaches consider language separately from other kinds of

knowledge and attempt to use findings from the wider study of linguistics to explain SLA. There is also a considerable body of research about how SLA can be affected by individual factors such as age and learning strategies. A commonly discussed topic regarding age in SLA is the critical period hypothesis, which suggests that individuals lose the ability to fully learn a language after a particular age in childhood. Another topic of interest in SLA is the differences between adult and child learners. Learning strategies are commonly categorized as learning or communicative strategies and are developed to improve their respective acquisition skills. Affective factors are emotional factors that influence an individual's ability to learn a new language. Common affective factors that influence acquisition are anxiety, personality, social attitudes, and motivation.

Individuals may also lose a language through a process called second-language attrition. This is often caused by lack of use or exposure to a language over time. The severity of attrition depends on a variety of factors including level of proficiency, age, social factors, and motivation at the time of acquisition. Finally, classroom research deals with the effect that language instruction has on acquisition.

Definitions

Second language refers to any language learned in addition to a person's first language; although the concept is named*second*-language acquisition, it can also incorporate the learning of third, fourth, or subsequent languages. Second-language acquisition refers to what learners do; it does not refer to practices in language teaching, although teaching can

affect acquisition. The term *acquisition* was originally used to emphasize the non-conscious nature of the learning process, but in recent years*learning* and *acquisition* have become largely synonymous.

SLA can incorporate heritage language learning, but it does not usually incorporate bilingualism. Most SLA researchers see bilingualism as being the end result of learning a language, not the process itself, and see the term as referring to native-like fluency. Writers in fields such as education and psychology, however, often use bilingualism loosely to refer to all forms of multilingualism. SLA is also not to be contrasted with the acquisition of a foreign language; rather, the learning of second languages and the learning of foreign languages involve the same fundamental processes in different situations.

Research background

The academic discipline of second-language acquisition is a sub-discipline of applied linguistics. It is broad-based and relatively new. As well as the various branches of linguistics, second-language acquisition is also closely related to psychology and education. To separate the academic discipline from the learning process itself, the terms *second-language acquisition research*, *second-language studies*, and *second-language acquisition studies* are also used.

SLA research began as an interdisciplinary field; because of this, it is difficult to identify a precise starting date. However, two papers in particular are seen as instrumental to the development of the modern study of SLA: Pit Corder's 1967 essay *The Significance of Learners' Errors* and Larry Selinker's

1972 article *Interlanguage*. The field saw a great deal of development in the following decades. Since the 1980s, SLA has been studied from a variety of disciplinary perspectives, and theoretical perspectives. In the early 2000s, some research suggested an equivalence between the acquisition of human languages and that of computer languages (e.g. Java) by children in the 5 to 11 year age window, though this has not been widely accepted amongst educators. Significant approaches in the field today are systemic functional linguistics, sociocultural theory, cognitive linguistics, Noam Chomsky's universal grammar, skill acquisition theory and connectionism.

There has been much debate about exactly how language is learned and many issues are still unresolved. There are many theories of second-language acquisition, but none are accepted as a complete explanation by all SLA researchers. Due to the interdisciplinary nature of the field of SLA, this is not expected to happen in the foreseeable future. Although attempts have been made to provide a more unified account that tries to bridge first language acquisition and second language learning research.

Stages

Stephen Krashen divides the process of second-language acquisition into five stages: preproduction, early production, speech emergence, intermediate fluency, and advanced fluency. The first stage, preproduction, is also known as the silent period. Learners at this stage have a receptive vocabulary of up to 500 words, but they do not yet speak their second language. Not all learners go through a silent period. Some learners start

speaking straight away, although their output may consist of imitation rather than creative language use. Others may be required to speak from the start as part of a language course. For learners that do go through a silent period, it may last around three to six months.

The second of Krashen's stages of acquisition is early production, during which learners are able to speak in short phrases of one or two words. They can also memorize chunks of language, although they may make mistakes when using them. Learners typically have both an active and receptive vocabulary of around 1000 words. This stage normally lasts for around six months.

The third stage is speech emergence. Learners' vocabularies increase to around 3000 words during this stage, and they can communicate using simple questions and phrases. They may often make grammatical errors.

The fourth stage is intermediate fluency. At this stage, learners have a vocabulary of around 6000 words, and can use more complicated sentence structures. They are also able to share their thoughts and opinions. Learners may make frequent errors with more complicated sentence structures.

The final stage is advanced fluency, which is typically reached somewhere between five and ten years of learning the language. Learners at this stage can function at a level close to native speakers.

Krashen has also developed a number of hypotheses discussing the nature of second language learners' thought processes and the development of self-awareness during second language

acquisition. The most prominent of these hypotheses are Monitor Theory and the Affective Filter hypothesis.

Language difficulty and learning time

The time taken to reach a high level of proficiency can vary depending on the language learned. In the case of native English speakers, some estimates were provided by the *Foreign Service Institute* (FSI) of the U.S. Department of State — which compiled approximate learning expectations for a number of languages for their professional staff (native English speakers who generally already know other languages). *Category I Languages* include e.g. Italian and Swedish (24 weeks or 600 class hours) and French (30 weeks or 750 class hours). *Category II Languages* include German, Haitian Creole, Indonesian, Malay, Swahili (approx. 36 weeks or 900 class hours). *Category III Languages* include a lot of languages like Finnish, Polish, Russian, Tagalog, Vietnamese and many others (approx. 44 weeks, 1100 class hours).

Of the 63 languages analyzed, the five most difficult languages to reach proficiency in speaking and reading, requiring 88 weeks (2200 class hours, *Category IV Languages*), are Arabic, Cantonese, Mandarin, Japanese, and Korean. The Foreign Service Institute and the National Virtual Translation Center both note that Japanese is typically more difficult to learn than other languages in this group.

There are other rankings of language difficulty as the one by *The British Foreign Office Diplomatic Service Language Centre*

which lists the difficult languages in Class I (Cantonese, Japanese, Korean, Mandarin); the easier languages are in Class V (e.g. Afrikaans, Bislama, Catalan, French, Spanish, Swedish).

The bottleneck hypothesis

The bottleneck hypothesis strives to identify components of grammar that are easier or more difficult to acquire than others. It argues that functional morphology is the bottleneck of language acquisition, meaning that it is more difficult than other linguistic domains such as syntax, semantics, and phonology because it combines syntactic, semantic, and phonological features that affect the meaning of a sentence. For example, knowledge of the formation of the past tense in English requires both phonological patterns such as allomorphs at the end of the verb and irregular verb forms.

Article acquisition is also difficult for L1 speakers of languages without articles, such as Korean and Russian. One study compared learner judgments of a syntactic feature, V2, and a morphological property, subject-verb agreement, using an acceptability judgment task. Researchers found that while Norwegian speakers who are intermediate and advanced learners of English could successfully assess the grammaticality of V2, they had significantly more difficulty with subject-verb agreement, which is predicted by the bottleneck hypothesis.

Cognitive and scientific reasons for the importance of this theory aside, the bottleneck hypothesis can also be of practical benefit as educators can maximize their time and focus on

difficult problems in SLA classroom settings rather than placing attention on concepts that can be grasped with relative ease.

The cumulative effects hypothesis

This hypothesis claims that second-language acquisition may impose extra difficulties on children with specific language impairment (SLI), whose language delay extends into their school years due to deficits in verbal memory and processing mechanisms in comparison to children with typical development (TD).

Existing research on individuals with SLI and bilingualism has been limited and thus there is a need for data showing how to support bilingual development in children with SLI. “Cumulative” refers to the combination of the effects of both internal deficits in language learning and external complications in input and experience caused by bilingualism, which could in turn overwhelm the learner with SLI.

The theory predicts that bilingual children with SLI will be disadvantaged, falling behind both their monolingual peers with SLI and bilingual peers with TD. Paradis' longitudinal study examined the acquisition of tense morphology over time in children with SLI who are learning English as a second language. The study found that the acquisition profile for children with SLI is similar to those reported for monolinguals with SLI and TD, showing inconsistencies with CEH. This has provided evidence that SLA will not negatively harm children with SLI and could in fact be beneficial.

Comparisons with first-language acquisition

Adults who learn a second language differ from children learning their first language in at least three ways: children are still developing their brains whereas adults have mature minds, and adults have at least a first language that orients their thinking and speaking. Although some adult second-language learners reach very high levels of proficiency, pronunciation tends to be non-native. This lack of native pronunciation in adult learners is explained by the critical period hypothesis. When a learner's speech plateaus, it is known as fossilization.

Some errors that second-language learners make in their speech originate in their first language. For example, Spanish speakers learning Englishmay say "Is raining" rather than "It is raining", leaving out the subject of the sentence. This kind of influence of the first language on the second is known as *negative*language transfer. French speakers learning English, however, do not usually make the same mistake of leaving out "it" in "It is raining." This is because pronominal and impersonal sentence subjects can be omitted (or as in this case, are not used in the first place) in Spanish but not in French. The French speaker knowing to use a pronominal sentence subject when speaking English is an example of *positive* language transfer. Not all errors occur in the same ways; even two individuals with the same native language learning the same second language still have the potential to utilize different parts of their native language. Likewise, these

same two individuals may develop near-native fluency in different forms of grammar. Also, when people learn a second language, the way they speak their first language changes in subtle ways. These changes can be with any aspect of language, from pronunciation and syntax to the gestures the learner makes and the language features they tend to notice. For example, French speakers who spoke English as a second language pronounced the /t/ sound in French differently from monolingual French speakers.

This kind of change in pronunciation has been found even at the onset of second-language acquisition; for example, English speakers pronounced the English /p t k/ sounds, as well as English vowels, differently after they began to learn Korean. These effects of the second language on the first led Vivian Cook to propose the idea of multi-competence, which sees the different languages a person speaks not as separate systems, but as related systems in their mind.

Learner language

Learner language is the written or spoken language produced by a learner. It is also the main type of data used in second-language acquisition research. Much research in second-language acquisition is concerned with the internal representation of a language in the mind of the learner, and in how those representations change over time. It is not yet possible to inspect these representations directly with brain scans or similar techniques, so SLA researchers are forced to make inferences about these rules from learners' speech or writing.

Interlanguage

Originally, attempts to describe learner language were based on comparing different languages and on analyzing learners' errors. However, these approaches were unable to predict all the errors that learners made when in the process of learning a second language. For example, Serbo-Croat speakers learning English may say "What does Pat doing now?", although this is not a valid sentence in either language. Additionally, Yip found that ergative verbs in English are regularly mis-passivized by L2 learners of English whose first language is Mandarin. For instance, even advanced learners may form utterances such as "what was happened?" despite the fact that this construction has no obvious source in neither L1 nor L2. This could be because L2 speakers interpret ergatives as transitive, as these are the only types of verbs that allow passivization in English.

To explain this kind of systematic error, the idea of the *interlanguage*was developed. An interlanguage is an emerging language system in the mind of a second-language learner. A learner's interlanguage is not a deficient version of the language being learned filled with random errors, nor is it a language purely based on errors introduced from the learner's first language. Rather, it is a language in its own right, with its own systematic rules. It is possible to view most aspects of language from an interlanguage perspective, including grammar, phonology, lexicon, and pragmatics. There are three different processes that influence the creation of interlanguages:

- *Language transfer*. Learners fall back on their mother tongue to help create their language system.

Transfer can be positive, i.e. promote learning, or negative, i.e. lead to mistakes. In the latter case, linguists also use the term interference error.

- *Overgeneralization*. Learners use rules from the second language in roughly the same way that children overgeneralise in their first language. For example, a learner may say "I goed home", overgeneralizing the English rule of adding *-ed* to create past tense verb forms. English children also produce forms like *goed*, *sticked*, and *bringed*. German children equally overextend regular past tense forms to irregular forms.
- *Simplification*. Learners use a highly simplified form of language, similar to speech by children or in pidgins. This may be related to linguistic universals.

The concept of interlanguage has become very widespread in SLA research, and is often a basic assumption made by researchers.

Sequences in the acquisition of English inflectional morphology

In the 1970s, several studies investigated the order in which learners acquired different grammatical structures. These studies showed that there was little change in this order among learners with different first languages. Furthermore, it showed that the order was the same for adults and children, and that it did not even change if the learner had language lessons. This supported the idea that there were factors other than language transfer involved in learning second languages, and was a strong confirmation of the concept of interlanguage.

However, the studies did not find that the orders were exactly the same. Although there were remarkable similarities in the order in which all learners learned second-language grammar, there were still some differences among individuals and among learners with different first languages. It is also difficult to tell when exactly a grammatical structure has been learned, as learners may use structures correctly in some situations but not in others. Thus it is more accurate to speak of *sequences* of acquisition, in which specific grammatical features in a language are acquired before or after certain others but the overall order of acquisition is less rigid. For example, if neither feature B nor feature D can be acquired until feature A has been acquired (feature B and D depend on A) and feature C depends on B, but D does not depend on B (or, therefore, on C), then acquisition orders (A, B, C, D) and (A, D, B, C) are possible, as they are both valid topological orderings.

Learnability and teachability

Learnability has emerged as a theory explaining developmental sequences that crucially depend on learning principles, which are viewed as fundamental mechanisms of language acquisition within learnability theory. Some examples of learning principles include the uniqueness principle and the subset principle. The uniqueness principle refers to learners' preference for one-to-one mapping between form and meaning, while the subset principle posits that learners are conservative in that they begin with the narrowest hypothesis space that is compatible with available data. Both of these principles have been used to explain children's ability to evaluate grammaticality in spite of the lack of explicit negative evidence. They have also been used to explain errors in SLA, as

the creation of supersets could signal over-generalization, causing acceptance or production of ungrammatical sentences.

Pienemann'steachability hypothesis is based on the idea that there is a hierarchy on stages of acquisition and instruction in SLA should be compatible to learners' current acquisitional status. Recognizing learners' developmental stages is important as it enables teachers to predict and classify learning errors. This hypothesis predicts that L2 acquisition can only be promoted when learners are ready to acquire given items in a natural context. One goal of learnability theory is to figure out which linguistic phenomena are susceptible to fossilization, wherein some L2 learners continue to make errors in spite of the presence of relevant input.

Variability

Although second-language acquisition proceeds in discrete sequences, it does not progress from one step of a sequence to the next in an orderly fashion. There can be considerable variability in features of learners' interlanguage while progressing from one stage to the next. For example, in one study by Rod Ellis, a learner used both "No look my card" and "Don't look my card" while playing a game of bingo. A small fraction of variation in interlanguage is *free variation*, when the learner uses two forms interchangeably. However, most variation is *systemic variation*, variation that depends on the context of utterances the learner makes. Forms can vary depending on linguistic context, such as whether the subject of a sentence is a pronoun or a noun; they can vary depending on social context, such as using formal expressions with superiors and informal expressions with friends; and also, they can vary

depending on psycholinguistic context, or in other words, on whether learners have the chance to plan what they are going to say. The causes of variability are a matter of great debate among SLA researchers.

Language transfer

One important difference between first-language acquisition and second-language acquisition is that the process of second-language acquisition is influenced by languages that the learner already knows. This influence is known as *language transfer*. Language transfer is a complex phenomenon resulting from interaction between learners' prior linguistic knowledge, the target-language input they encounter, and their cognitive processes. Language transfer is not always from the learner's native language; it can also be from a second language, or a third. Neither is it limited to any particular domain of language; language transfer can occur in grammar, pronunciation, vocabulary, discourse, and reading.

Language transfer often occurs when learners sense a similarity between a feature of a language they already know and a feature of the interlanguage they have developed. If this happens, the acquisition of more complicated language forms may be delayed in favor of simpler language forms that resemble those of the language the learner is familiar with. Learners may also decline to use some language forms at all if they are perceived as being too distant from their first language.

Language transfer has been the subject of several studies, and many aspects of it remain unexplained. Various hypotheses

have been proposed to explain language transfer, but there is no single widely accepted explanation of why it occurs.

Some linguists prefer to use cross-linguistic influence to describe this phenomenon. Studies on bilingual children find bidirectional cross-linguistic influence; for example, Nicoladis (2012) reported that bilingual children aged three to four produce French-like periphrastic constructions e.g. "the hat of the dog" and ungrammatical English-like reversed possessive structures e.g. "*chien chapeau*" (dog hat) significantly more than their monolingual peers. Though periphrastic constructions are expected as they are grammatical in both English and French, reversed possessives in French are ungrammatical and thus unexpected. In a study exploring cross-linguistic influence in word order by comparing Dutch-English bilingual and English monolingual children, Unsworth found that bilingual children were more likely to accept incorrect V2 word orders in English than monolinguals with both auxiliary and main verbs. Dominance was a predictor of this phenomenon; Dutch-dominant children showed less sensitivity to word order than English-dominant ones, though this effect was small and there was individual variation.

Language dominance

The term language dominance can be defined in terms of differences in frequency of use and differences in proficiency in bilinguals. How basic or advanced a speaker's L2 level will be is determined by a complex range of environmental, individual and other factors. Language dominance may change over time through the process of language attrition, in which some L2 skills begin to match or even overtake those of L1. Research

suggests a correlation between amount of language exposure and cross-linguistic influence; language dominance is considered to have an impact on the direction of transfer.

One study found that transfer is asymmetrical and predicted by dominance, as Cantonese dominant children showed clear syntactic transfer in many areas of grammar from Cantonese to English but not vice versa. MLU, mean length of utterance, is a common measurement of linguistic productivity and language dominance in children.

Input and interaction

The primary factor affecting language acquisition appears to be the input that the learner receives. Stephen Krashen took a very strong position on the importance of input, asserting that comprehensible input is all that is necessary for second-language acquisition. Krashen pointed to studies showing that the length of time a person stays in a foreign country is closely linked with their level of language acquisition. Further evidence for input comes from studies on reading: large amounts of free voluntary reading have a significant positive effect on learners' vocabulary, grammar, and writing. Input is also the mechanism by which people learn languages according to the universal grammar model.

The type of input may also be important. One tenet of Krashen's theory is that input should not be grammatically sequenced. He claims that such sequencing, as found in language classrooms where lessons involve practicing a "structure of the day", is not necessary, and may even be harmful. While input is of vital importance, Krashen's

assertion that *only* input matters in second-language acquisition has been contradicted by more recent research. For example, students enrolled in French-language immersion programs in Canada still produced non-native-like grammar when they spoke, even though they had years of meaning-focused lessons and their listening skills were statistically native-level. Output appears to play an important role, and among other things, can help provide learners with feedback, make them concentrate on the form of what they are saying, and help them to automatize their language knowledge. These processes have been codified in the theory of comprehensible output.

Researchers have also pointed to interaction in the second language as being important for acquisition. According to Long's interaction hypothesis the conditions for acquisition are especially good when interacting in the second language; specifically, conditions are good when a breakdown in communication occurs and learners must negotiate for meaning. The modifications to speech arising from interactions like this help make input more comprehensible, provide feedback to the learner, and push learners to modify their speech.

Factors and approaches to SLA

Cognitive factors

Much modern research in second-language acquisition has taken a cognitive approach. Cognitive research is concerned with the mental processes involved in language acquisition,

and how they can explain the nature of learners' language knowledge. This area of research is based in the more general area of cognitive science, and uses many concepts and models used in more general cognitive theories of learning. As such, cognitive theories view second-language acquisition as a special case of more general learning mechanisms in the brain. This puts them in direct contrast with linguistic theories, which posit that language acquisition uses a unique process different from other types of learning.

The dominant model in cognitive approaches to second-language acquisition, and indeed in all second-language acquisition research, is the computational model. The computational model involves three stages. In the first stage, learners retain certain features of the language input in short-term memory. (This retained input is known as *intake*.) Then, learners convert some of this intake into second-language knowledge, which is stored in long-term memory. Finally, learners use this second-language knowledge to produce spoken output. Cognitive theories attempt to codify both the nature of the mental representations of intake and language knowledge, and the mental processes that underlie these stages.

In the early days of second-language acquisition research on interlanguage was seen as the basic representation of second-language knowledge; however, more recent research has taken a number of different approaches in characterizing the mental representation of language knowledge. There are theories that hypothesize that learner language is inherently variable, and there is the functionalist perspective that sees acquisition of language as intimately tied to the function it provides. Some

researchers make the distinction between *implicit* and *explicit* language knowledge, and some between *declarative* and *procedural* language knowledge. There have also been approaches that argue for a *dual-mode system* in which some language knowledge is stored as rules, and other language knowledge as items.

The mental processes that underlie second-language acquisition can be broken down into micro-processes and macro-processes. Micro-processes include attention; working memory; integration and restructuring. Restructuring is the process by which learners change their interlanguage systems; and *monitoring* is the conscious attending of learners to their own language output. Macro-processes include the distinction between intentional learning and incidental learning; and also the distinction between explicit and implicit learning. Some of the notable cognitive theories of second-language acquisition include the nativization model, the multidimensional model and processability theory, emergentist models, the competition model, and skill-acquisition theories.

Other cognitive approaches have looked at learners' speech production, particularly learners' speech planning and communication strategies. Speech planning can have an effect on learners' spoken output, and research in this area has focused on how planning affects three aspects of speech: complexity, accuracy, and fluency. Of these three, planning effects on fluency has had the most research attention. Communication strategies are conscious strategies that learners employ to get around any instances of communication breakdown they may experience. Their effect on second-

language acquisition is unclear, with some researchers claiming they help it, and others claiming the opposite.

An important idea in recent cognitive approaches is the way that learning itself changes over development. For example, connectionist models that explain L1 language phenomena in different languages (e.g., Japanese, English) can also be used to develop L2 models by first training on the L1 (e.g., Korean) and then training on the L2 (e.g. English). By using different learning rates for syntax and lexical learning that change over development, the model can explain sensitive period effects and differences in the effect of language exposure on different types of learners.

Sociocultural factors

From the early days of the discipline researchers have also acknowledged that social aspects play an important role. There have been many different approaches to sociolinguistic study of second-language acquisition, and indeed, according to Rod Ellis, this plurality has meant that "sociolinguistic SLA is replete with a bewildering set of terms referring to the social aspects of L2 acquisition". Common to each of these approaches, however, is a rejection of language as a purely psychological phenomenon; instead, sociolinguistic research views the social context in which language is learned as essential for a proper understanding of the acquisition process.

Ellis identifies three types of social structure that affect acquisition of second languages: sociolinguistic setting, specific social factors, and situational factors. Sociolinguistic setting refers to the role of the second language in society,

such as whether it is spoken by a majority or a minority of the population, whether its use is widespread or restricted to a few functional roles, or whether the society is predominantly bilingual or monolingual. Ellis also includes the distinction of whether the second language is learned in a natural or an educational setting. Specific social factors that can affect second-language acquisition include age, gender, social class, and ethnic identity, with ethnic identity being the one that has received most research attention. Situational factors are those that vary between each social interaction. For example, a learner may use more polite language when talking to someone of higher social status, but more informal language when talking with friends.

Immersion programs provide a sociolinguistic setting that facilitates second-language acquisition. Immersion programs are educational programs where children are instructed in an L2 language. Although the language of instruction is the L2 language, the curriculum parallels that of non-immersion programs and clear support exists in the L1 language, as the teachers are all bilingual. The goal of these programs is to develop a high level of proficiency in both the L1 and L2 languages. Students in immersion programs have been shown to have greater levels of proficiency in their second language than students who receive second language education only as a subject in school. This is especially true in terms of their receptive skills. Also, students who join immersion programs earlier generally have greater second-language proficiency than their peers who join later. However, students who join later have been shown to gain native-like proficiency. Although immersion students' receptive skills are especially strong, their productive skills may suffer if they spend the majority of their

time listening to instruction only. Grammatical skills and the ability to have precise vocabulary are particular areas of struggle. It is argued that immersion is necessary, but not sufficient for the development of native-like proficiency in a second language. Opportunities to engage in sustained conversation, and assignments that encourage syntactical, as well as semantic development help develop the productive skills necessary for bilingual proficiency.

A learner's sense of connection to their in-group, as well as to the community of the target language emphasize the influence of the sociolinguistic setting, as well as social factors within the second-language acquisition process. Social Identity Theory argues that an important factor for second language acquisition is the learner's perceived identity in relation to the community of the language being learned, as well as how the community of the target language perceives the learner.

Whether or not a learner feels a sense of connection to the community or culture of the target language helps determine their social distance from the target culture. A smaller social distance is likely to encourage learners to acquire the second language, as their investment in the learning process is greater. Conversely, a greater social distance discourages attempts to acquire the target language. However, negative views not only come from the learner, but the community of the target language might feel greater social distance to the learner, limiting the learner's ability to learn the language. Whether or not bilingualism is valued by the culture or community of the learner is an important indicator for the motivation to learn a language.

Gender, as a social factor, also influences SLA. Females have been found to have higher motivation and more positive attitudes than males for second-language acquisition. However, females are also more likely to present higher levels of anxiety, which may inhibit their ability to efficiently learn a new language.

There have been several models developed to explain social effects on language acquisition. Schumann's Acculturation Model proposes that learners' rate of development and ultimate level of language achievement is a function of the "social distance" and the "psychological distance" between learners and the second-language community. In Schumann's model the social factors are most important, but the degree to which learners are comfortable with learning the second language also plays a role. Another sociolinguistic model is Gardner's socio-educational model, which was designed to explain classroom language acquisition. Gardner's model focuses on the emotional aspects of SLA, arguing that positive motivation contributes to an individuals willingness to learn L2; furthermore, the goal of an individual to learn a L2 is based on the idea that the individual has a desire to be part of a culture, in other words, part of a (the targeted language) mono-linguistic community. Factors, such as *integrativeness* and *attitudes towards the learning situation* drive motivation. The outcome of positive motivation is not only linguistic, but non-linguistic, such that the learner has met the desired goal. Although there are many critics of Gardner's model, nonetheless many of these critics have been influenced by the merits that his model holds. The inter-group model proposes "ethnolinguistic vitality" as a key construct for second-language acquisition. Language socialization is an approach

with the premise that "linguistic and cultural knowledge are *constructed* through each other", and saw increased attention after the year 2000. Finally, Norton's theory of social identity is an attempt to codify the relationship between power, identity, and language acquisition.

A unique approach to SLA is Sociocultural theory. It was originally developed by Lev Vygotsky and his followers. Central to Vygotsky's theory is the concept of a zone of proximal development (ZPD). The ZPD notion states that social interaction with more advanced target language users allows one to learn language at a higher level than if they were to learn language independently. Sociocultural theory has a fundamentally different set of assumptions to approaches to second-language acquisition based on the computational model. Furthermore, although it is closely affiliated with other social approaches, it is a theory of mind and not of general social explanations of language acquisition. According to Ellis, "It is important to recognize... that this paradigm, despite the label 'sociocultural' does not seek to explain how learners acquire the cultural values of the L2 but rather how knowledge of an L2 is internalized through experiences of a sociocultural nature."

Linguistic factors

Linguistic approaches to explaining second-language acquisition spring from the wider study of linguistics. They differ from cognitive approaches and sociocultural approaches in that they consider linguistic knowledge to be unique and distinct from any other type of knowledge. The linguistic research tradition in second-language acquisition has

developed in relative isolation from the cognitive and sociocultural research traditions, and as of 2010 the influence from the wider field of linguistics was still strong. Two main strands of research can be identified in the linguistic tradition: generative approaches informed by universal grammar, and typological approaches.

Typological universals are principles that hold for all the world's languages. They are found empirically, by surveying different languages and deducing which aspects of them could be universal; these aspects are then checked against other languages to verify the findings. The interlanguages of second-language learners have been shown to obey typological universals, and some researchers have suggested that typological universals may constrain interlanguage development.

The theory of universal grammar was proposed by Noam Chomsky in the 1950s, and has enjoyed considerable popularity in the field of linguistics. It focuses on describing the linguistic competence of an individual. He believed that children not only acquire language by learning descriptive rules of grammar; he claimed that children *creatively* play and form words as they learn language, creating meaning of these words, as opposed to the mechanism of memorizing language. It consists of a set of *principles*, which are universal and constant, and a set of *parameters*, which can be set differently for different languages. The "universals" in universal grammar differ from typological universals in that they are a mental construct derived by researchers, whereas typological universals are readily verifiable by data from world languages. It is widely accepted among researchers in the universal

grammar framework that all first-language learners have access to universal grammar; this is not the case for second-language learners, however, and much research in the context of second-language acquisition has focused on what level of access learners may have. there is ongoing debate among generative linguists surrounding whether L2-users have full or partial access to universal grammar. This can be seen through acceptability judgment tests. For example, one study found that during a comprehension task, while English L1 speakers learning Spanish may accept the imperfect aspect in appropriate conditions, even at higher levels of proficiency, they do not reject the use of the Preterite tense in continuous and habitual contexts.

Universal grammar theory can account for some of the observations of SLA research. For example, L2-users often display knowledge about their L2 that they have not been exposed to. L2-users are often aware of ambiguous or ungrammatical L2 units that they have not learned from any external source, nor from their pre-existing L1 knowledge. This unsourced knowledge suggests the existence of a universal grammar. Another piece of evidence that generative linguists tend to use is the poverty of the stimulus, which states that children acquiring language lack sufficient data to fully acquire all facets of grammar in their language, causing a mismatch between input and output. The fact that children are only exposed to positive evidence yet have intuition about which word strings are ungrammatical may also be indicative of universal grammar. However, L2 learners have access to negative evidence as they are explicitly taught about ungrammaticality through corrections or grammar teaching.

Individual variation

There is considerable variation in the rate at which people learn second languages, and in the language level that they ultimately reach. Some learners learn quickly and reach a near-native level of competence, but others learn slowly and get stuck at relatively early stages of acquisition, despite living in the country where the language is spoken for several years. The reason for this disparity was first addressed with the study of language learning aptitude in the 1950s, and later with the *good language learner studies* in the 1970s. More recently research has focused on a number of different factors that affect individuals' language learning, in particular strategy use, social and societal influences, personality, motivation, and anxiety. The relationship between age and the ability to learn languages has also been a subject of long-standing debate.

Age

The issue of age was first addressed with the critical period hypothesis. The strict version of this hypothesis states that there is a cut-off age at about 12, after which learners lose the ability to fully learn a language. However, the exact age marking the end of the critical period is debated, and ranges from age 6 to 13, with many arguing that it is around the onset of puberty. This strict version has since been rejected for second-language acquisition, as some adult and adolescent learners have been observed who reach native-like levels of pronunciation and general fluency faster than young children. However, in general, adolescent and adult learners of a second-

language rarely achieve the native-like fluency that children who acquire both languages from birth display, despite often progressing faster in the initial stages. This has led to speculation that age is indirectly related to other, more central factors that affect language learning.

Children who acquire two languages from birth are called simultaneous bilinguals. In these cases, both languages are spoken to the children by their parents or caregivers and they grow up knowing the two languages. These children generally reach linguistic milestones at the same time as their monolingual peers. Children who do not learn two languages from infancy, but learn one language from birth, and another at some point during childhood, are referred to as sequential bilinguals. People often assume that a sequential bilingual's first language is their most proficient language, but this is not always the case. Over time and experience, a child's second language may become his or her strongest. This is especially likely to happen if a child's first language is a minority language spoken at home, and the child's second language is the majority language learned at school or in the community before the age of five. Proficiency for both simultaneous and sequential bilinguals is dependent upon the child's opportunities to engage in meaningful conversations in a variety of contexts.

Often simultaneous bilinguals are more proficient in their languages than sequential bilinguals. One argument for this is that simultaneous bilinguals develop more distinct representations of their languages, especially with regards tophonological and semantic levels of processing. This would cause learners to have more differentiation between the

languages, leading them to be able to recognize the subtle differences between the languages that less proficient learners would struggle to recognize. Learning a language earlier in life would help develop these distinct representations of language, as the learner's first language would be less established. Conversely, learning a language later in life would lead to more similar semantic representations.

Although child learners more often acquire native-like proficiency, older child and adult learners often progress faster in the initial stages of learning. Older child and adult learners are quicker at acquiring the initial grammar knowledge than child learners, however, with enough time and exposure to the language, children surpass their older peers. Once surpassed, older learners often display clear language deficiencies compared to child learners. This has been attributed to having a solid grasp on the first language or mother tongue they were first immersed into. Having this cognitive ability already developed can aid the process of learning a second language since there is a better understanding of how language works. For this same reason interaction with family and further development of the first language is encouraged along with positive reinforcement. The exact language deficiencies that occur past a certain age are not unanimously agreed upon. Some believe that only pronunciation is affected, while others believe other abilities are affected as well. However, some differences that are generally agreed upon include older learners having a noticeable accent, a smaller vocabulary, and making several linguistic errors.

One explanation for this difference in proficiency between older learners and younger learners involves Universal Grammar.

Universal Grammar is a debated theory that suggests that people have innate knowledge of universal linguistic principles that is present from birth. These principles guide children as they learn a language, but its parameters vary from language to language. The theory assumes that, while Universal Grammar remains into adulthood, the ability to reset the parameters set for each language is lost, making it more difficult to learn a new language proficiently. Since older learners would already have an established native language, the language acquisition process is very different for them, than young learners. The rules and principles that guide the use of the learners' native language plays a role in the way the second language is developed.

Some nonbiological explanations for second-language acquisition age differences include variations in social and psychological factors, such as motivation; the learner's linguistic environment; and the level of exposure. Even with less advantageous nonbiological influences, many young children attain a greater level of proficiency in their second language than older learners with more advantageous nonbiologicalinfluences.

Strategies

Considerable attention has been paid to the strategies learners use to learn a second language. Strategies have been found to be of critical importance, so much so that *strategic competence* has been suggested as a major component of communicative competence. Strategies are commonly divided into *learning strategies* and *communicative strategies*, although there are other ways of categorizing them. Learning strategies are

techniques used to improve learning, such as mnemonics or using a dictionary. Communicative strategies are strategies a learner uses to convey meaning even when he or she doesn't have access to the correct form, such as using pro-forms like *thing*, or using non-verbal means such as gestures. If learning strategies and communicative strategies are used properly language acquisition is successful. Some points to keep in mind while learning an additional language are: providing information that is of interest to the student, offering opportunities for the student to share their knowledge and teaching appropriate techniques for the uses of the learning resources available.

Another strategy may include intentional ways to acquire or improve their second language skills. Adult immigrants and/or second language learners seeking to acquire a second language can engage in different activities to receive and share knowledge as well as improve their learning; some of these include:

- incidental or informal learning (*media resources, family/friend interactions, work interactions*)
- purposeful learning (*self-study, taking language classes*)
- pursuing formal education

Affective factors

The learner's attitude to the learning process has also been identified as being critically important to second-language acquisition. Anxiety in language-learning situations has been almost unanimously shown to be detrimental to successful

learning. Anxiety interferes with the mental processing of language because the demands of anxiety-related thoughts create competition for mental resources. This results in less available storage and energy for tasks required for language processing. Not only this, but anxiety is also usually accompanied by self-deprecating thoughts and fear of failure, which can be detrimental to an individual's ability to learn a new language. Learning a new language provides a unique situation that may even produce a specific type of anxiety, called language anxiety, that affects the quality of acquisition. Also, anxiety may be detrimental for SLA because it can influence a learner's ability to attend to, concentrate on, and encode language information. It may affect speed and accuracy of learning. Further, the apprehension created as a result of anxiety inhibits the learner's ability to retrieve and produce the correct information.

A related factor, personality, has also received attention. There has been discussion about the effects of extravert and introvert personalities. Extraverted qualities may help learners seek out opportunities and people to assist with L2 learning, whereas introverts may find it more difficult to seek out such opportunities for interaction. However, it has also been suggested that, while extraverts might experience greater fluency, introverts are likely to make fewer linguistic errors. Further, while extraversion might be beneficial through its encouragement of learning autonomously, it may also present challenges as learners may find reflective and time-management skills to be difficult. However, one study has found that there were no significant differences between extraverts and introverts on the way they achieve success in a second language.

Other personality factors, such as conscientiousness, agreeableness, and openness influence self-regulation, which helps L2 learners engage, process meaning, and adapt their thoughts, feelings, and actions to benefit the acquisition process. SLA research has shown conscientiousness to be associated with time-management skills, metacognition, analytic learning, and persistence; agreeableness to effort; and openness to elaborative learning, intelligence, and metacognition. Both genetics and the learner's environment impact the personality of the learner, either facilitating or hindering an individual's ability to learn.

Social attitudes such as gender roles and community views toward language learning have also proven critical. Language learning can be severely hampered by cultural attitudes, with a frequently cited example being the difficulty of Navajo children in learning English.

Also, the motivation of the individual learner is of vital importance to the success of language learning. Motivation is influenced by goal salience, valence, and self-efficacy. In this context, goal salience is the importance of the L2 learner's goal, as well as how often the goal is pursued; valence is the value the L2 learner places on SLA, determined by desire to learn and attitudes about learning the L2; and self-efficacy is the learner's own belief that he or she is capable of achieving the linguistic goal. Studies have consistently shown that *intrinsic motivation*, or a genuine interest in the language itself, is more effective over the long term than *extrinsic motivation*, as in learning a language for a reward such as high grades or praise. However, motivation is dynamic and, as a L2 learner's fluency develops, their extrinsic motivation may

evolve to become more intrinsic. Learner motivation can develop through contact with the L2 community and culture, as learners often desire to communicate and identify with individuals in the L2 community. Further, a supportive learning environment facilitates motivation through the increase in self-confidence and autonomy. Learners in a supportive environment are more often willing to take on challenging tasks, thus encouraging L2 development.

Attrition

Attrition is the loss of proficiency in a language caused by a lack of exposure to or use of a language. It is a natural part of the language experience as it exists within a dynamic environment. As the environment changes, the language adapts. One way it does this is by using L1 as a tool to navigate the periods of change associated with acquisition and attrition. A learner's L2 is not suddenly lost with disuse, but its communicative functions are slowly replaced by those of the L1.

Similar to second-language acquisition, second-language attrition occurs in stages. However, according to the regression hypothesis, the stages of attrition occur in reverse order of acquisition. With acquisition, receptive skills develop first, and then productive skills, and with attrition, productive skills are lost first, and then receptive skills.

Age, proficiency level, and social factors play a role in the way attrition occurs. Most often younger children are quicker than adults to lose their L2 when it is left unused. However, if a child has established a high level of proficiency, it may take

them several years to lose the language. Proficiency level seems to play the largest role in the extent of attrition. For very proficient individuals, there is a period of time where very little, if any, attrition is observed. For some, residual learning might even occur, which is the apparent improvement within the L2. Within the first five years of language disuse, the total percentage of language knowledge lost is less for a proficient individual than for someone less proficient. A cognitive psychological explanation for this suggests that a higher level of proficiency involves the use of schemas, or mental representations for linguistic structures. Schemas involve deeper mental processes for mental retrieval that are resistant to attrition. As a result, information that is tied to this system is less likely to experience less extreme attrition than information that is not. Finally, social factors may play an indirect role in attrition. In particular, motivation and attitude influence the process. Higher levels of motivation, and a positive attitude toward the language and the corresponding community may lessen attrition. This is likely due to the higher level of competence achieved in L2 when the learner is motivated and has a positive attitude.

Classroom second-language acquisition

While considerable SLA research has been devoted to language learning in a natural setting, there have also been efforts made to investigate second-language acquisition in the classroom. This kind of research has a significant overlap with language education, and it is mainly concerned with the effect that

instruction has on the learner. It also explores what teachers do, the classroom context, the dynamics of classroom communication. It is both qualitative and quantitative research.

The research has been wide-ranging. There have been attempts made to systematically measure the effectiveness of language teaching practices for every level of language, from phonetics to pragmatics, and for almost every current teaching methodology. This research has indicated that many traditional language-teaching techniques are extremely inefficient. Cited in Ellis 1994It is generally agreed that pedagogy restricted to teaching grammar rules and vocabulary lists does not give students the ability to use the L2 with accuracy and fluency. Rather, to become proficient in the second language, the learner must be given opportunities to use it for communicative purposes.

Another area of research has been on the effects of corrective feedback in assisting learners. This has been shown to vary depending on the technique used to make the correction, and the overall focus of the classroom, whether on formal accuracy or on communication of meaningful content. There is also considerable interest in supplementing published research with approaches that engage language teachers in action research on learner language in their own classrooms. As teachers become aware of the features of learner language produced by their students, they can refine their pedagogical intervention to maximize interlanguage development.

If one wishes to acquire a language in a classroom setting only, one needs to consider the category language one wishes to

acquire; the category of the desired language will determine how many hours or weeks to devote to study.

There are three main categories of languages. Category I languages are “cognate languages” like French, Spanish, and Swedish; category II languages are Finnish, Russian, and Vietnamese; category III languages are Arabic, Chinese, Japanese, and Korean. As such, the languages are categorized by their similarity to English. Respectively, category I languages require 24 weeks or 600 classroom hours to achieve proficiency; category II languages require 44 weeks or 1,100 hours; category III languages require 88 weeks or 2,200 hours .

Moreover, one can achieve proficiency in a foreign language in a classroom setting so long as one acknowledges the time commitment necessary.

Chapter 4

Language Acquisition

Language acquisition is the process by which humans acquire the capacity to perceive and comprehend language (in other words, gain the ability to be aware of language and to understand it), as well as to produce and use words and sentences to communicate.

Language acquisition involves structures, rules and representation. The capacity to use language successfully requires one to acquire a range of tools including phonology, morphology, syntax, semantics, and an extensive vocabulary. Language can be vocalized as in speech, or manual as in sign. Human language capacity is represented in the brain. Even though human language capacity is finite, one can say and understand an infinite number of sentences, which is based on a syntactic principle called recursion. Evidence suggests that every individual has three recursive mechanisms that allow sentences to go indeterminately. These three mechanisms are:*relativization*, *complementation* and *coordination*.

There are two main guiding principles in first-language acquisition: speech perception always precedes speech production, and the gradually evolving system by which a child learns a language is built up one step at a time, beginning with the distinction between individual phonemes.

Linguists who are interested in child language acquisition have for many years questioned how language is acquired. Lidz et al. state "The question of how these structures are acquired, then,

is more properly understood as the question of how a learner takes the surface forms in the input and converts them into abstract linguistic rules and representations."

Language acquisition usually refers to **first-language acquisition**, which studies infants' acquisition of their native language, whether that be spoken language or signed language, though it can also refer to **bilingual first language acquisition** (BFLA), which refers to an infant's simultaneous acquisition of two native languages. This is distinguished from *second-language acquisition*, which deals with the acquisition (in both children and adults) of additional languages. In addition to speech, reading and writing a language with an entirely different script compounds the complexities of true foreign language literacy. Language acquisition is one of the quintessential human traits.

History

Some early observation-based ideas about language acquisition were proposed by Plato, who felt that word-meaning mapping in some form was innate. Additionally, Sanskrit grammarians debated for over twelve centuries whether humans' ability to recognize the meaning of words was god-given (possibly innate) or passed down by previous generations and learned from already established conventions: a child learning the word for *cow* by listening to trusted speakers talking about cows.

Philosophers in ancient societies were interested in how humans acquired the ability to understand and produce language well before empirical methods for testing those theories were developed, but for the most part they seemed to

regard language acquisition as a subset of man's ability to acquire knowledge and learn concepts.

Empiricists, like Thomas Hobbes and John Locke, argued that knowledge (and, for Locke, language) emerge ultimately from abstracted sense impressions. These arguments lean towards the "nurture" side of the argument: that language is acquired through sensory experience, which led to Rudolf Carnap'sAufbau, an attempt to learn all knowledge from sense datum, using the notion of "remembered as similar" to bind them into clusters, which would eventually map into language.

Proponents of behaviorism argued that language may be learned through a form of operant conditioning. In B. F. Skinner's *Verbal Behavior* (1957), he suggested that the successful use of a sign, such as a word or lexical unit, given a certain stimulus, reinforces its "momentary" or contextual probability. Since operant conditioning is contingent on reinforcement by rewards, a child would learn that a specific combination of sounds stands for a specific thing through repeated successful associations made between the two. A "successful" use of a sign would be one in which the child is understood (for example, a child saying "up" when he or she wants to be picked up) and rewarded with the desired response from another person, thereby reinforcing the child's understanding of the meaning of that word and making it more likely that he or she will use that word in a similar situation in the future. Some empiricist theories of language acquisition include the statistical learning theory. Charles F. Hockett of language acquisition, relational frame theory, functionalist linguistics, social interactionist theory, and usage-based language acquisition.

Skinner's behaviorist idea was strongly attacked by Noam Chomsky in a review article in 1959, calling it "largely mythology" and a "serious delusion." Arguments against Skinner's idea of language acquisition through operant conditioning include the fact that children often ignore language corrections from adults. Instead, children typically follow a pattern of using an irregular form of a word correctly, making errors later on, and eventually returning to the proper use of the word. For example, a child may correctly learn the word "gave" (past tense of "give"), and later on use the word "gived". Eventually, the child will typically go back to using the correct word, "gave". Chomsky claimed the pattern is difficult to attribute to Skinner's idea of operant conditioning as the primary way that children acquire language. Chomsky argued that if language were solely acquired through behavioral conditioning, children would not likely learn the proper use of a word and suddenly use the word incorrectly. Chomsky believed that Skinner failed to account for the central role of syntactic knowledge in language competence. Chomsky also rejected the term "learning", which Skinner used to claim that children "learn" language through operant conditioning. Instead, Chomsky argued for a mathematical approach to language acquisition, based on a study of syntax.

As a typically human phenomenon

The capacity to acquire and use language is a key aspect that distinguishes humans from other beings. Although it is difficult to pin down what aspects of language are uniquely human, there are a few design features that can be found in all known forms of human language, but that are missing from

forms of animal communication. For example, many animals are able to communicate with each other by signaling to the things around them, but this kind of communication lacks the arbitrariness of human vernaculars (in that there is nothing about the sound of the word "dog" that would hint at its meaning). Other forms of animal communication may utilize arbitrary sounds, but are unable to combine those sounds in different ways to create completely novel messages that can then be automatically understood by another. Hockett called this design feature of human language "productivity". It is crucial to the understanding of human language acquisition that humans are not limited to a finite set of words, but, rather, must be able to understand and utilize a complex system that allows for an infinite number of possible messages. So, while many forms of animal communication exist, they differ from human language in that they have a limited range of vocabulary tokens, and the vocabulary items are not combined syntactically to create phrases.

Herbert S. Terrace conducted a study on a chimpanzee known as NimChimpsky in an attempt to teach him American Sign Language. This study was an attempt to further research done with a chimpanzee named Washoe, who was reportedly able to acquire American Sign Language. However, upon further inspection, Terrace concluded that both experiments were failures. While Nim was able to acquire signs, he never acquired a knowledge of grammar, and was unable to combine signs in a meaningful way. Researchers noticed that "signs that seemed spontaneous were, in fact, cued by teachers", and not actually productive. When Terrace reviewed Project Washoe, he found similar results. He postulated that there is a fundamental difference between animals and humans in their

motivation to learn language; animals, such as in Nim's case, are motivated only by physical reward, while humans learn language in order to "create a new type of communication".

In another language acquisition study, Jean-Marc-Gaspard Itard attempted to teach Victor of Aveyron, a feral child, how to speak. Victor was able to learn a few words, but ultimately never fully acquired language. Slightly more successful was a study done on Genie, another child never introduced to society. She had been entirely isolated for the first thirteen years of her life by her father. Caretakers and researchers attempted to measure her ability to learn a language. She was able to acquire a large vocabulary, but never acquired grammatical knowledge. Researchers concluded that the theory of a critical period was true; Genie was too old to learn how to speak productively, although she was still able to comprehend language.

General approaches

A major debate in understanding language acquisition is how these capacities are picked up by infants from the linguistic input. Input in the linguistic contextis defined as "All words, contexts, and other forms of language to which a learner is exposed, relative to acquired proficiency in first or second languages". Nativists such as Chomsky have focused on the hugely complex nature of human grammars, the finiteness and ambiguity of the input that children receive, and the relatively limited cognitive abilities of an infant. From these characteristics, they conclude that the process of language acquisition in infants must be tightly constrained and guided by the biologically given characteristics of the human brain.

Otherwise, they argue, it is extremely difficult to explain how children, within the first five years of life, routinely master the complex, largely tacit grammatical rules of their native language. Additionally, the evidence of such rules in their native language is all indirect— adult speech to children cannot encompass all of what children know by the time they've acquired their native language.

Other scholars, however, have resisted the possibility that infants' routine success at acquiring the grammar of their native language requires anything more than the forms of learning seen with other cognitive skills, including such mundane motor skills as learning to ride a bike. In particular, there has been resistance to the possibility that human biology includes any form of specialization for language. This conflict is often referred to as the "nature and nurture" debate. Of course, most scholars acknowledge that certain aspects of language acquisition must result from the specific ways in which the human brain is "wired" (a "nature" component, which accounts for the failure of non-human species to acquire human languages) and that certain others are shaped by the particular language environment in which a person is raised (a "nurture" component, which accounts for the fact that humans raised in different societies acquire different languages). The as-yet unresolved question is the extent to which the specific cognitive capacities in the "nature" component are also used outside of language.

Emergentism

Emergentist theories, such as Brian MacWhinney'scompetition model, posit that language acquisition is a cognitive process

that emerges from the interaction of biological pressures and the environment. According to these theories, neither nature nor nurture alone is sufficient to trigger language learning; both of these influences must work together in order to allow children to acquire a language.

The proponents of these theories argue that general cognitive processes subserve language acquisition and that the end result of these processes is language-specific phenomena, such as word learning and grammar acquisition.

The findings of many empirical studies support the predictions of these theories, suggesting that language acquisition is a more complex process than many have proposed.

Empiricism

Although Chomsky's theory of a generative grammar has been enormously influential in the field of linguistics since the 1950s, many criticisms of the basic assumptions of generative theory have been put forth by cognitive-functional linguists, who argue that language structure is created through language use. These linguists argue that the concept of a language acquisition device (LAD) is unsupported by evolutionary anthropology, which tends to show a gradual adaptation of the human brain and vocal cords to the use of language, rather than a sudden appearance of a complete set of binary parameters delineating the whole spectrum of possible grammars ever to have existed and ever to exist. On the other hand, cognitive-functional theorists use this anthropological data to show how human beings have evolved the capacity for grammar and syntax to meet our demand for linguistic

symbols. (Binary parameters are common to digital computers, but may not be applicable to neurological systems such as the human brain.)

Further, the generative theory has several constructs (such as movement, empty categories, complex underlying structures, and strict binary branching) that cannot possibly be acquired from any amount of linguistic input. It is unclear that human language is actually *anything like* the generative conception of it. Since language, as imagined by nativists, is unlearnably complex, subscribers to this theory argue that it must, therefore, be innate. Nativists hypothesize that some features of syntactic categories exist even before a child is exposed to any experience - categories on which children map words of their language as they learn their native language. A different theory of language, however, may yield different conclusions. While all theories of language acquisition posit some degree of innateness, they vary in how much value they place on this innate capacity to acquire language. Empiricism places less value on the innate knowledge, arguing instead that the input, combined with both general and language-specific learning capacities, is sufficient for acquisition.

Since 1980, linguists studying children, such as Melissa Bowerman and Asifa Majid, and psychologists following Jean Piaget, like Elizabeth Bates and Jean Mandler, came to suspect that there may indeed be many learning processes involved in the acquisition process, and that ignoring the role of learning may have been a mistake.

In recent years, the debate surrounding the nativist position has centered on whether the inborn capabilities are language-

specific or domain-general, such as those that enable the infant to visually make sense of the world in terms of objects and actions.

The anti-nativist view has many strands, but a frequent theme is that language emerges from usage in social contexts, using learning mechanisms that are a part of an innate general cognitive learning apparatus. This position has been championed by David M. W. Powers, Elizabeth Bates, Catherine Snow, AnatNinio, Brian MacWhinney, Michael Tomasello, Michael Ramscar, William O'Grady, and others. Philosophers, such as Fiona Cowie and Barbara Scholz with Geoffrey Pullum have also argued against certain nativist claims in support of empiricism.

The new field of cognitive linguistics has emerged as a specific counter to Chomsky's Generative Grammar and to Nativism.

Statistical learning

Some language acquisition researchers, such as Elissa Newport, Richard Aslin, and Jenny Saffran, emphasize the possible roles of general learning mechanisms, especially statistical learning, in language acquisition. The development of connectionist models that when implemented are able to successfully learn words and syntactical conventions supports the predictions of statistical learning theories of language acquisition, as do empirical studies of children's detection of word boundaries. In a series of connectionist model simulations, Franklin Chang has demonstrated that such a domain general statistical learning mechanism could explain a wide range of language structure acquisition phenomena.

Statistical learning theory suggests that, when learning language, a learner would use the natural statistical properties of language to deduce its structure, including sound patterns, words, and the beginnings of grammar. That is, language learners are sensitive to how often syllable combinations or words occur in relation to other syllables. Infants between 21 and 23 months old are also able to use statistical learning to develop "lexical categories", such as an animal category, which infants might later map to newly learned words in the same category. These findings suggest that early experience listening to language is critical to vocabulary acquisition.

The statistical abilities are effective, but also limited by what qualifies as input, what is done with that input, and by the structure of the resulting output. One should also note that statistical learning (and more broadly, distributional learning) can be accepted as a component of language acquisition by researchers on either side of the "nature and nurture" debate. From the perspective of that debate, an important question is whether statistical learning can, by itself, serve as an alternative to nativist explanations for the grammatical constraints of human language.

Chunking

The central idea of these theories is that language development occurs through the incremental acquisition of meaningful chunks of elementary constituents, which can be words, phonemes, or syllables. Recently, this approach has been highly successful in simulating several phenomena in the acquisition of syntactic categories and the acquisition of phonological knowledge.

Chunking theories of language acquisition constitute a group of theories related to statistical learning theories, in that they assume that the input from the environment plays an essential role; however, they postulate different learning mechanisms.

Researchers at the Max Planck Institute for Evolutionary Anthropology have developed a computer model analyzing early toddler conversations to predict the structure of later conversations. They showed that toddlers develop their own individual rules for speaking, with 'slots' into which they put certain kinds of words. A significant outcome of this research is that rules inferred from toddler speech were better predictors of subsequent speech than traditional grammars.

This approach has several features that make it unique: the models are implemented as computer programs, which enables clear-cut and quantitative predictions to be made; they learn from naturalistic input—actual child-directed utterances; and attempt to create their own utterances, the model was tested in languages including English, Spanish, and German. Chunking for this model was shown to be most effective in learning a first language but was able to create utterances learning a second language.

Relational frame theory

Relational frame theory (**RFT**) is a psychological theory of human language. It was developed originally by Steven C. Hayes of University of Nevada, Reno and has been extended in research, notably by Dermot Barnes-Holmes and colleagues of Ghent University.

Relational frame theory argues that the building block of human language and higher cognition is relating, i.e. the human ability to create bidirectional links between things. It can be contrasted with associative learning, which discusses how animals form links between stimuli in the form of the strength of associations in memory. However, relational frame theory argues that natural human language typically specifies not just the strength of a link between stimuli but also the type of relation as well as the dimension along which they are to be related. For example, a tennis ball is not just associated with an orange, but can be said to be the same shape, but a different colour and not edible. In the preceding sentence, 'same', 'different' and 'not' are cues in the environment that specify the type of relation between the stimuli, and 'shape', 'colour' and 'edible' specify the dimension along which each relation is to be made. Relational frame theory argues that while there are an arbitrary number of types of relations and number of dimensions along which stimuli can be related, the core unit of relating is an essential building block for much of what is commonly referred to as human language or higher cognition.

Several hundred studies have explored many testable aspects and implications of the theory such as the emergence of specific frames in childhood, how individual frames can be combined to create verbally complex phenomena such as metaphors and analogies, and how the rigidity or automaticity of relating within certain domains is related to psychopathology. In attempting to describe a fundamental building block of human language and higher cognition, RFT explicitly states that its goal is to provide a general theory of psychology that can provide a bedrock for multiple domains

and levels of analysis. Relational frame theory focuses on how humans learn language (i.e., communication) through interactions with the environment and is based on a philosophical approach referred to as functional contextualism.

Introduction

Relational frame theory (RFT) is a behavioral theory of human language. It is rooted in functional contextualism and focused on predicting and influencing verbal behavior with precision, scope and depth.

Relational framing is relational responding based on arbitrarily applicable relations and arbitrary stimulus functions. The relational responding is subject to mutual entailment, combinatorial mutual entailment and transformation of stimulus functions. The relations and stimulus functions are controlled by contextual cues.

Contextual cues and stimulus functions

In human language a word, sentence or a symbol (e.g. stimulus) can have a different meaning (e.g. functions), depending on context. In terms of RFT, it is said that in human language a stimulus can have different stimulus functions depending on contextual cues.

Take these two sentences for example:

- This task is a piece of cake.
- Yes, I would like a piece of that delicious cake you've made.

In the sentences above the stimulus "cake" has two different functions. The stimulus "cake" has a figurative function in the presence of the contextual cues "this task; is; piece of". Whereas in the presence of the contextual cues "I; would like; delicious; you've made" the stimulus "cake" has a more literal function. The functions of stimuli are called stimulus functions, C_{func} for short.

When stimulus function refer to physical properties of the stimulus, such as quantity, colour, shape, etc., they are called nonarbitrary stimulus functions. When a stimulus function refers to non-physical properties of the stimulus, such as value, they are called arbitrary stimulus functions. For example, a one dollar bill. The value of the one dollar bill is an arbitrary stimulus function, but the colour green is a nonarbitrary stimulus function of the one dollar bill.

Arbitrarily applicable relational responding

Arbitrarily applicable relational responding is a form of relational responding.

Relational responding

Relational responding is a response to one stimulus in relation to other available stimuli. For example, a lion who picks the *largest* piece of meat. The deer who picks the *strongest* male of the pack. In contrast if an animal would always pick the same drinking spot, it's not relational responding (it's not related to other stimuli in the sense of best/worst/larger/smaller, etc.). These examples of relational responding are based on the physical properties of the stimuli. When relational responding

is based on the physical properties of the stimuli, such as shape, size, quantity, etc., it's called nonarbitrarily relational responding (NARR).

Arbitrarily applicable relational responding

Arbitrarily applicable relational responding refers to responding based on relations that are arbitrarily applied between the stimuli. That is to say the relations applied between the stimuli are not supported by the physical properties of said stimuli, but for example based on social convention or social whim. For example, the sound "cow" refers to the animal in the English language. But in another language the same animal is referred by a totally different sound. For example, in Dutch is called "koe" (pronounced as coo). The word "cow" or "koe" has nothing to do with the physical properties of the animal itself. It's by social convention that the animal is named this way. In terms of RFT it's said that the relation between the word cow and the actual animal is arbitrarily applied. We can even change these arbitrarily applied relations: Just look at the history of any language, where meanings of words, symbols and complete sentence can change over time and place.

Arbitrarily applicable relational responding is responding based on arbitrarily applied relations.

Mutual entailment

Mutual entailment refers to deriving a relation between two stimuli based on a given relation between those same two stimuli: Given the relation A to B, the relation B to A can be

derived. For example, Joyce is standing in front of Peter. The relation trained is stimulus A in front of stimulus B. One can derive that Peter is behind Joyce. The derived relation is stimulus B is behind stimulus A.

Another example: Jared is older than Jacob. One could derive that Jacob is younger than Jared. Relation trained: stimulus A is older than stimulus B. Relation derived: stimulus B is younger than stimulus A.

Combinatorial mutual entailment

Combinatorial mutual entailment refers to deriving relations between two stimuli, given the relations of those two stimuli with a third stimulus: Given the relation, A to B and B to C, the relations A to C and C to A can be derived.

To go on with the examples above:

Joyce is standing in front of Peter and Peter is standing in front of Lucy. The relations trained in this example are: stimulus A in front of B and stimulus B in front of C. With this it can be derived that Joyce is standing in front of Lucy and Lucy is standing behind Joyce. The derived relations are A is in front of C and C is behind A.

John is older than Jared and Jared is older than Jacob. Stimulus A is older than stimulus B and stimulus B is older than stimulus C. It can be derived that Jacob is younger than Jared and Jared is younger than John. The derived relation becomes stimulus A is older than stimulus C and stimulus C is younger than stimulus A.

Notice that the relations between A and C were never given. They can be derived from the other relations.

Transfer and transformation of stimulus function

A stimulus can have different functions depending on contextual cues. However a stimulus function can change based on the arbitrary relations with that stimulus.

For example, this relational frame: A is more than B and B is more than C.

For now the stimulus functions of these letters are rather neutral. But as soon as C would be labeled 'as very valuable' and 'nice to have', then A would become more attractive than C, based on the relations. Before there was stated anything about C being valuable, A had a rather neutral stimulus function. After giving C a attractive stimulus function, A has become attractive. The attractive stimulus function has been transferred from C to A through the relations between A, B and C. And A has had a transformation of stimulus function from neutral to attractive.

The same can be done with aversive stimulus function as danger instead of valuable, in saying that C is dangerous, A becomes more dangerous than C based on the relations.

Development

RFT is a behavioral account of language and higher cognition. In his 1957 book *Verbal Behavior*, B.F. Skinner presented an interpretation of language. However, this account was intended

to be an interpretation as opposed to an experimental research program, and researchers commonly acknowledge that the research products are somewhat limited in scope. For example, Skinner's behavioral interpretation of language has been useful in some aspects of language training in developmentally disabled children, but it has not led to a robust research program in the range of areas relevant to language and cognition, such as problem-solving, reasoning, metaphor, logic, and so on. RFT advocates are fairly bold in stating that their goal is an experimental behavioral research program in all such areas, and RFT research has indeed emerged in a large number of these areas, including grammar.

In a review of Skinner's book, linguist Noam Chomsky argued that the generativity of language shows that it cannot simply be learned, that there must be some innate "language acquisition device".

Many have seen this review as a turning point, when cognitivism took the place of behaviorism as the mainstream in psychology. Behavior analysts generally viewed the criticism as somewhat off point, but it is undeniable that psychology turned its attention elsewhere and the review was very influential in helping to produce the rise of cognitive psychology.

Despite the lack of attention from the mainstream, behavior analysis is alive and growing. Its application has been extended to areas such as language and cognitive training. Behavior analysis has long been extended as well to animal training, business and school settings, as well as hospitals and areas of research.

RFT distinguishes itself from Skinner's work by identifying and defining a particular type of operant conditioning known as *arbitrarily applicable derived relational responding* (AADRR). In essence, the theory argues that language is not associative but is learned and relational. For example, young children learn relations of coordination between names and objects; followed by relations of difference, opposition, before and after, and so on. These are "frames" in the sense that once relating of that kind is learned, any event can be related in that way mutually and in combination with other relations, given a cue to do so. This is a learning process that to date appears to occur only in humans possessing a capacity for language: to date relational framing has not yet been shown unambiguously in non-human animals despite many attempts to do so. AADRR is theorized to be a pervasive influence on almost all aspects of human behavior. The theory represents an attempt to provide a more empirically progressive account of complex human behavior while preserving the naturalistic approach of behavior analysis.

Evidence

Approximately 300 studies have tested RFT ideas. Supportive data exists in the areas needed to show that an action is "operant" such as the importance of multiple examples in training derived relational responding, the role of context, and the importance of consequences. Derived relational responding has also been shown to alter other behavioral processes such as classical conditioning, an empirical result that RFT theorists point to in explaining why relational operants modify existing behavioristic interpretations of complex human

behavior. Empirical advances have also been made by RFT researchers in the analysis and understanding of such topics as metaphor, perspective taking, and reasoning.

Proponents of RFT often indicate the failure to establish a vigorous experimental program in language and cognition as the key reason why behavior analysis fell out of the mainstream of psychology despite its many contributions, and argue that RFT might provide a way forward. The theory is still somewhat controversial within behavioral psychology, however. At the current time the controversy is not primarily empirical since RFT studies publish regularly in mainstream behavioral journals and few empirical studies have yet claimed to contradict RFT findings. Rather the controversy seems to revolve around whether RFT is a positive step forward, especially given that its implications seem to go beyond many existing interpretations and extensions from within this intellectual tradition.

Applications

Acceptance and commitment therapy

RFT has been argued to be central to the development of the psychotherapeutic tradition known as acceptance and commitment therapy and clinical behavior analysis more generally. Indeed, the psychologist Steven C Hayes was involved with the creation of both acceptance and commitment therapy and RFT, and has credited them as inspirations for one another. However, the extent and exact nature of the interaction between RFT as basic behavioral science and

applications such as ACT has been an ongoing point of discussion within the field.

Gender constructs

Queer theorist and ACT therapist Alex Stitt observed how relational frames within a person's language development inform their cognitive associations pertaining to gender identity, gender role, and gender expression. How rigid or flexible a person is with their relational frames, Stitt proposed, will determine how adaptable their concept of gender is within themselves, and how open they are to gender diversity. Children, for example, may adhere to the rigid hierarchical frame "males are boys, and boys have short hair" leading to the false inference that anyone who has short hair is male. Likewise, children may adhere to oppositional frames, leading to false notions like the opposite of a lemon is a lime, the opposite of a cat is a dog, or the opposite of a man is a woman. Stitt observes that adults struggling with gender related issues within themselves, often hyperfocus on causal frames in an attempt to explain gender variance, or frames of comparison and distinction, potentially resulting in feelings of isolation and alienation.

Autism spectrum disorder

RFT provides conceptual and procedural guidance for enhancing the cognitive and language development capability (through its detailed treatment and analysis of derived relational responding and the transformation of function) of early intensive behavior intervention (EIBI) programs for young children with autism and related disorders. The Promoting the

Emergence of Advanced Knowledge (PEAK) Relational Training System is heavily influenced by RFT.

Evolution science

More recently, RFT has also been proposed as a way to guide discussion of language processes within evolution science, whether within evolutionary biology or evolutionary psychology, toward a more informed understanding of the role of language in shaping human social behavior. The effort at integrating RFT into evolution science has been led by, among others, Steven C. Hayes, a co-developer of RFT, and David Sloan Wilson, an evolutionary biologist at Binghamton University. For example, in 2011, Hayes presented at a seminar at Binghamton, on the topic of "Symbolic Behavior, Behavioral Psychology, and the Clinical Importance of Evolution Science", while Wilson likewise presented at a symposium at the annual conference in Parma, Italy, of the Association for Contextual Behavioral Science, the parent organization sponsoring RFT research, on the topic of "Evolution for Everyone, Including Contextual Psychology". Hayes, Wilson, and colleagues have recently linked RFT to the concept of a symbotype and an evolutionarily sensible way that relational framing could have developed has been described.

Social interactionism

Social interactionist theory (SIT) is an explanation of language development emphasizing the role of social interaction between the developing child and linguistically

knowledgeable adults. It is based largely on the socio-cultural theories of Soviet psychologist, Lev Vygotsky.

Initial stages

Approach to language acquisition research has focused on three areas, namely the cognitive approach to language acquisition or the developmental cognitive theory of Jean Piaget, the information processing approach or the information processing model of Brian MacWhinney and Elizabeth Bates (the competition model), and the social interactionist approach or social interaction model of Lev Vygotsky (socio-cultural theory). Although the initial research was essentially descriptive in an attempt to describe language development from the stand point of social development, more recently, researchers have been attempting to explain a few varieties of acquisition in which learner factors lead to differential acquisition by the process of socialization; called the theory of "social interactionist approach".

Socio-cultural theory

Vygotsky, a psychologist and social constructivist, laid the foundation for the interactionists view of language acquisition. According to Vygotsky, social interaction plays an important role in the learning process and proposed the zone of proximal development (ZPD) where learners construct the new language through socially mediated interaction. Vygotsky's social-development theory was adopted and made prominent in the Western world though by Jerome Bruner who laid the

foundations of a model of language development in the context of adult-child interaction.

Under the social interactionist approach, a child's language development occurs within the child's construction of a social world, also known as the "social-cognitive model". (Behaviorism, by contrast, emphasizes the role of stimulus-response conditioning in language acquisition.)

Under SIT, the deepest level of representation specifies the communicative intent primarily and semantic content secondarily. This approach to language acquisition theory combines the "traditional behavioral" approach and "linguistic-semantic" approach to language production. Under SIT, language acquisition is thought to occur differently than under other predominant theories. It emphasizes how environment shapes acquisition. This is more relevant with regard to children's acquisition than with adult acquisition. Two open questions remain for SIT. One, how does a child's *knowledge* change in the course of development? Two, how is- or how was- the existing language system of an adult formed?

Social integrationists describe a dynamic system where typically children cue their parents into supplying the appropriate language experience that children require for language advancement. In essence, it turns in supplying of supportive communicative structure that allows efficient communication despite its primitives. (By contrast, the behavioral approach posits that children are passive beneficiaries of the language training techniques employed by their parents. Also by contrast, the linguistic approach posits

that children are active language processors of whose maturing neural systems guide development.)

Current strand

Social-interactionists, such as Alison Gopnik, Andrew Meltzoff, AnatNinio, Roy Pea, Catherine Snow, and Ernest Moerk theorize that interaction with adults plays an important part in children's language acquisition. However, some researchers such as Bambi B. Schieffelin and Elinor Ochs claim that the empirical data on which theories of social interactionism are based have often been over-representative of middle class American and European parent-child interactions. Anthropological studies of other human cultures, as well as low-educated Western families, suggests rather that many of the world's children are *not* spoken to in a manner documented for educated Western families, but nevertheless grow up to be fully fluent language users. Many researchers now take this into account in their analyses.

In addition, social interactionists criticize the claim made by Noam Chomsky according to which the linguistic input children are presented with by adults addressing them, is full of errors and discontinuities. Another argument of nativists on which interactionists provide contrary empirical evidence is the availability of negative feedback on, and corrections of, children's errors. Moerk (1994) conducted a meta-analysis of 40 studies and found substantial evidence that corrections do indeed play a role. From this work, corrections are not only abundant butcontingent on the mistakes of the child. (seebehavior analysis of child development).

Syntax, morphology, and generative grammar

As syntax began to be studied more closely in the early 20th century in relation to language learning, it became apparent to linguists, psychologists, and philosophers that knowing a language was not merely a matter of associating words with concepts, but that a critical aspect of language involves knowledge of how to put words together; sentences are usually needed in order to communicate successfully, not just isolated words.

A child will use short expressions such as *Bye-bye Mummy* or *All-gone milk*, which actually are combinations of individual nouns and an operator, before s/he begins to produce gradually more complex sentences. In the 1990s, within the principles and parameters framework, this hypothesis was extended into a maturation-based structure building model of child language regarding the acquisition of functional categories. In this model, children are seen as gradually building up more and more complex structures, with lexical categories (like noun and verb) being acquired before functional-syntactic categories (like determiner and complementiser). It is also often found that in acquiring a language, the most frequently used verbs are irregular verbs. In learning English, for example, young children first begin to learn the past tense of verbs individually. However, when they acquire a "rule", such as adding *-ed* to form the past tense, they begin to exhibit occasional overgeneralization errors (e.g. "runned", "hitted") alongside correct past tense forms. One influential proposal regarding the origin of this type of error suggests that the adult state of grammar stores each irregular verb form in memory and also includes a "block" on the use of

the regular rule for forming that type of verb. In the developing child's mind, retrieval of that "block" may fail, causing the child to erroneously apply the regular rule instead of retrieving the irregular.

A Merge (linguistics)-based Theory

In Bare-Phrase structure (Minimalist Program), since theory-internal considerations define the specifier position of an internal-merge projection (phases vP and CP) as the only type of host which could serve as potential landing-sites for move-based elements displaced from lower down within the base-generated VP structure – e.g., A-movement such as passives (["The apple was eaten by [John (ate the apple)"]]), or raising ["Some work does seem to remain [(There) does seem to remain (some work)"]])—as a consequence, any strong version of a Structure building model of child language which calls for an exclusive "external-merge/argument structure stage" prior to an "internal-merge/scope-discourse related stage" would claim that young children's stage-1 utterances lack the ability to generate and host elements derived via movement operations. In terms of a Merge-based theory of language acquisition, complements and specifiers are simply notations for first-merge (= "complement-of" [head-complement]), and later second-merge (= "specifier-of" [specifier-head], with merge always forming to a head. First-merge establishes only a set {a, b} and is not an ordered pair—e.g., an {N, N}-compound of 'boat-house' would allow the ambiguous readings of either 'a kind of house' and/or 'a kind of boat'. It is only with second-merge that order is derived out of a set {a {a, b}} which yields the recursive properties of syntax—e.g., a 'house-boat' {house {house, boat}} now reads unambiguously only as a 'kind of

boat'. It is this property of recursion that allows for projection and labeling of a phrase to take place; in this case, that the Noun 'boat' is the Head of the compound, and 'house' acting as a kind of specifier/modifier. External-merge (first-merge) establishes substantive 'base structure' inherent to the VP, yielding theta/argument structure, and may go beyond the lexical-category VP to involve the functional-category light verb vP. Internal-merge (second-merge) establishes more formal aspects related to edge-properties of scope and discourse-related material pegged to CP. In a Phase-based theory, this twin vP/CP distinction follows the "duality of semantics" discussed within the Minimalist Program, and is further developed into a dual distinction regarding a probe-goal relation. As a consequence, at the "external/first-merge-only" stage, young children would show an inability to interpret readings from a given ordered pair, since they would only have access to the mental parsing of a non-recursive set. (See Roeper for a full discussion of recursion in child language acquisition). In addition to word-order violations, other more ubiquitous results of a first-merge stage would show that children's initial utterances lack the recursive properties of inflectional morphology, yielding a strict Non-inflectional stage-1, consistent with an incremental Structure-building model of child language.

Generative grammar, associated especially with the work of Noam Chomsky, is currently one of the approaches to explaining children's acquisition of syntax. Its leading idea is that human biology imposes narrow constraints on the child's "hypothesis space" during language acquisition. In the principles and parameters framework, which has dominated generative syntax since Chomsky's (1980) *Lectures on*

Government and Binding: The Pisa Lectures, the acquisition of syntax resembles ordering from a menu: the human brain comes equipped with a limited set of choices from which the child selects the correct options by imitating the parents' speech while making use of the context.

An important argument which favors the generative approach, is the poverty of the stimulus argument. The child's input (a finite number of sentences encountered by the child, together with information about the context in which they were uttered) is, in principle, compatible with an infinite number of conceivable grammars. Moreover, rarely can children rely on corrective feedback from adults when they make a grammatical error; adults generally respond and provide feedback regardless of whether a child's utterance was grammatical or not, and children have no way of discerning if a feedback response was intended to be a correction. Additionally, when children do understand that they are being corrected, they don't always reproduce accurate restatements. Yet, barring situations of medical abnormality or extreme privation, all children in a given speech-community converge on very much the same grammar by the age of about five years. An especially dramatic example is provided by children who, for medical reasons, are unable to produce speech and, therefore, can never be corrected for a grammatical error but nonetheless, converge on the same grammar as their typically-developing peers, according to comprehension-based tests of grammar.

Considerations such as those have led Chomsky, Jerry Fodor, Eric Lenneberg and others to argue that the types of grammar the child needs to consider must be narrowly constrained by human biology (the nativist position). These innate constraints

are sometimes referred to as universal grammar, the human "language faculty", or the "language instinct".

Representation in the brain

Recent advances in functional neuroimaging technology have allowed for a better understanding of how language acquisition is manifested physically in the brain. Language acquisition almost always occurs in children during a period of rapid increase in brain volume. At this point in development, a child has many more neural connections than he or she will have as an adult, allowing for the child to be more able to learn new things than he or she would be as an adult.

Sensitive period

Language acquisition has been studied from the perspective of developmental psychology and neuroscience, which looks at learning to use and understand language parallel to a child's brain development. It has been determined, through empirical research on developmentally normal children, as well as through some extreme cases of language deprivation, that there is a "sensitive period" of language acquisition in which human infants have the ability to learn any language. Several researchers have found that from birth until the age of six months, infants can discriminate the phonetic contrasts of all languages. Researchers believe that this gives infants the ability to acquire the language spoken around them. After this age, the child is able to perceive only the phonemes specific to the language being learned. The reduced phonemic sensitivity enables children to build phonemic categories and recognize

stress patterns and sound combinations specific to the language they are acquiring. As Wilder Penfield noted, "Before the child begins to speak and to perceive, the uncommitted cortex is a blank slate on which nothing has been written. In the ensuing years much is written, and the writing is normally never erased. After the age of ten or twelve, the general functional connections have been established and fixed for the speech cortex." According to the sensitive or critical period models, the age at which a child acquires the ability to use language is a predictor of how well he or she is ultimately able to use language. However, there may be an age at which becoming a fluent and natural user of a language is no longer possible; Penfield and Roberts (1959) cap their sensitive period at nine years old. The human brain may be automatically wired to learn languages, but this ability does not last into adulthood in the same way that it exists during childhood. By around age 12, language acquisition has typically been solidified, and it becomes more difficult to learn a language in the same way a native speaker would. Just like children who speak, deaf children go through a critical period for learning language. Deaf children who acquire their first language later in life show lower performance in complex aspects of grammar. At that point, it is usually a second language that a person is trying to acquire and not a first.

Assuming that children are exposed to language during the critical period, acquiring language is almost never missed by cognitively normal children. Humans are so well-prepared to learn language that it becomes almost impossible not to. Researchers are unable to experimentally test the effects of the sensitive period of development on language acquisition, because it would be unethical to deprive children of language

until this period is over. However, case studies on abused, language-deprivedchildren show that they exhibit extreme limitations in language skills, even after instruction.

At a very young age, children can distinguish different sounds but cannot yet produce them. During infancy, children begin to babble. Deaf babies babble in the same patterns as hearing babies do, showing that babbling is not a result of babies simply imitating certain sounds, but is actually a natural part of the process of language development. Deaf babies do, however, often babble less than hearing babies, and they begin to babble later on in infancy—at approximately 11 months as compared to approximately 6 months for hearing babies.

Prelinguistic language abilities that are crucial for language acquisition have been seen even earlier than infancy. There have been many different studies examining different modes of language acquisition prior to birth. The study of language acquisition in fetuses began in the late 1980s when several researchers independently discovered that very young infants could discriminate their native language from other languages. In *Mehler et al. (1988)*, infants underwent discrimination tests, and it was shown that infants as young as 4 days old could discriminate utterances in their native language from those in an unfamiliar language, but could not discriminate between two languages when neither was native to them. These results suggest that there are mechanisms for fetal auditory learning, and other researchers have found further behavioral evidence to support this notion. Fetus auditory learning through environmental habituation has been seen in a variety of different modes, such as fetus learning of familiar melodies (Hepper, 1988), story fragments (DeCasper& Spence, 1986),

recognition of mother's voice (Kisilevsky, 2003), and other studies showing evidence of fetal adaptation to native linguistic environments (Moon, Cooper & Fifer, 1993).

Prosody is the property of speech that conveys an emotional state of the utterance, as well as the intended form of speech, for example, question, statement or command. Some researchers in the field of developmental neuroscience argue that fetal auditory learning mechanisms result solely from discrimination of prosodic elements. Although this would hold merit in an evolutionary psychology perspective (i.e. recognition of mother's voice/familiar group language from emotionally valent stimuli), some theorists argue that there is more than prosodic recognition in elements of fetal learning. Newer evidence shows that fetuses not only react to the native language differently from non-native languages, but that fetuses react differently and can accurately discriminate between native and non-native vowel sounds (Moon, Lagercrantz, &Kuhl, 2013). Furthermore, a 2016 study showed that newborn infants encode the edges of multisyllabic sequences better than the internal components of the sequence (Ferry et al., 2016). Together, these results suggest that newborn infants have learned important properties of syntactic processing in utero, as demonstrated by infant knowledge of native language vowels and the sequencing of heard multisyllabic phrases. This ability to sequence specific vowels gives newborn infants some of the fundamental mechanisms needed in order to learn the complex organization of a language. From a neuroscientific perspective, neural correlates have been found that demonstrate human fetal learning of speech-like auditory stimuli that most other studies have been analyzing (Partanen et al., 2013). In a study conducted by

Partanen et al. (2013), researchers presented fetuses with certain word variants and observed that these fetuses exhibited higher brain activity in response to certain word variants as compared to controls. In this same study, "a significant correlation existed between the amount of prenatal exposure and brain activity, with greater activity being associated with a higher amount of prenatal speech exposure," pointing to the important learning mechanisms present before birth that are fine-tuned to features in speech (Partanen et al., 2013).

Vocabulary acquisition

The capacity to acquire the ability to incorporate the pronunciation of new words depends upon many factors. First, the learner needs to be able to hear what they are attempting to pronounce. Also required is the capacity to engage in speech repetition. Children with reduced ability to repeat non-words (a marker of speech repetition abilities) show a slower rate of vocabulary expansion than children with normal ability. Several computational models of vocabulary acquisition have been proposed. Various studies have shown that the size of a child's vocabulary by the age of 24 months correlates with the child's future development and language skills. A lack of language richness by this age has detrimental and long-term effects on the child's cognitive development, which is why it is so important for parents to engage their infants in language. If a child knows fifty or fewer words by the age of 24 months, he or she is classified as a late-talker, and future language development, like vocabulary expansion and the organization of grammar, is likely to be slower and stunted.

Two more crucial elements of vocabulary acquisition are word segmentation and statistical learning (described above). Word segmentation, or the ability to break down words into syllables from fluent speech can be accomplished by eight-month-old infants. By the time infants are 17 months old, they are able to link meaning to segmented words.

Recent evidence also suggests that motor skills and experiences may influence vocabulary acquisition during infancy. Specifically, learning to sit independently between 3 and 5 months of age has been found to predict receptive vocabulary at both 10 and 14 months of age, and independent walking skills have been found to correlate with language skills at around 10 to 14 months of age. These findings show that language acquisition is an embodied process that is influenced by a child's overall motor abilities and development. Studies have also shown a correlation between socioeconomic status and vocabulary acquisition.

Meaning

Children learn, on average, ten to fifteen new word meanings each day, but only one of these can be accounted for by direct instruction. The other nine to fourteen word meanings must have been acquired in some other way. It has been proposed that children acquire these meanings through processes modeled by latent semantic analysis; that is, when they encounter an unfamiliar word, children use contextual information to guess its rough meaning correctly. A child may expand the meaning and use of certain words that are already part of its mental lexicon in order to denominate anything that is somehow related but for which it does not know the specific

word. For instance, a child may broaden the use of *mummy* and *dada* in order to indicate anything that belongs to its mother or father, or perhaps every person who resembles its own parents; another example might be to say *rain* while meaning *I don't want to go out*.

There is also reason to believe that children use various heuristics to infer the meaning of words properly. Markman and others have proposed that children assume words to refer to objects with similar properties ("cow" and "pig" might both be "animals") rather than to objects that are thematically related ("cow" and "milk" are probably not both "animals"). Children also seem to adhere to the "whole object assumption" and think that a novel label refers to an entire entity rather than to one of its parts. This assumption along with other resources, such as grammar and morphological cues or lexical constraints, may help aid the child in acquiring word meaning, but conclusions based on such resources may sometimes conflict.

Genetic and neurocognitive research

According to several linguists, neurocognitive research has confirmed many standards of language learning, such as: "learning engages the entire person (cognitive, affective, and psychomotor domains), the human brain seeks patterns in its searching for meaning, emotions affect all aspects of learning, retention and recall, past experience always affects new learning, the brain's working memory has a limited capacity, lecture usually results in the lowest degree of retention, rehearsal is essential for retention, practice [alone] does not make perfect, and each brain is unique" (Sousa, 2006, p. 274).

In terms of genetics, the gene ROBO1 has been associated with phonological buffer integrity or length.

Genetic research has found two major factors predicting successful language acquisition and maintenance. These include inherited intelligence, and the lack of genetic anomalies that may cause speech pathologies, such as mutations in the FOXP2 gene which cause verbal dyspraxia. The role of inherited intelligence increases with age, accounting for 20% of IQ variation in infants, and for 60 % in adults. It affects a vast variety of language-related abilities, from spatio-motor skills to writing fluency. There have been debates in linguistics, philosophy, psychology, and genetics, with some scholars arguing that language is fully or mostly innate, but the research evidence points to genetic factors only working in interaction with environmental ones.

Although it is difficult to determine without invasive measures which exact parts of the brain become most active and important for language acquisition, fMRI and PET technology has allowed for some conclusions to be made about where language may be centered. Kuniyoshi Sakai has proposed, based on several neuroimaging studies, that there may be a "grammar center" in the brain, whereby language is primarily processed in the left lateral premotor cortex (located near the pre central sulcus and the inferior frontal sulcus). Additionally, these studies have suggested that first language and second language acquisition may be represented differently in the cortex. In a study conducted by Newman et al., the relationship between cognitive neuroscience and language acquisition was compared through a standardized procedure involving native speakers of English and native

Spanish speakers who all had a similar length of exposure to the English language (averaging about 26 years). It was concluded that the brain does in fact process languages differently, but rather than being related to proficiency levels, language processing relates more to the function of the brain itself.

During early infancy, language processing seems to occur over many areas in the brain. However, over time, it gradually becomes concentrated into two areas – Broca's area and Wernicke's area.

Broca's area is in the left frontal cortex and is primarily involved in the production of the patterns in vocal and sign language. Wernicke's area is in the left temporal cortex and is primarily involved in language comprehension. The specialization of these language centers is so extensive that damage to them can result in aphasia.

Artificial intelligence

Some algorithms for language acquisition are based on statistical machine translation. Language acquisition can be modeled as a machine learning process, which may be based on learning semantic parsers or grammar induction algorithms.

Prelingual deafness

Prelingual deafness is defined as hearing loss that occurred at birth or before an individual has learned to speak. In the United States, 2 to 3 out of every 1000 children are born deaf

or hard of hearing. Even though it might be presumed that deaf children acquire language in different ways since they are not receiving the same auditory input as hearing children, many research findings indicate that deaf children acquire language in the same way that hearing children do and when given the proper language input, understand and express language just as well as their hearing peers. Babies who learn sign language produce signs or gestures that are more regular and more frequent than hearing babies acquiring spoken language. Just as hearing babies babble, deaf babies acquiring sign language will babble with their hands, otherwise known as manual babbling. Therefore, as many studies have shown, language acquisition by deaf children parallel the language acquisition of a spoken language by hearing children because humans are biologically equipped for language regardless of the modality.

Signed language acquisition

Deaf children's visual-manual language acquisition not only parallel spoken language acquisition but by the age of 30 months, most deaf children that were exposed to a visual language had a more advanced grasp with subject-pronoun copy rules than hearing children.

Their vocabulary bank at the ages of 12–17 months exceed that of a hearing child's, though it does even out when they reach the two-word stage. The use of space for absent referents and the more complex handshapes in some signs prove to be difficult for children between 5 and 9 years of age because of motor development and the complexity of remembering the spatial use.

Cochlear implants

Other options besides sign language for kids with prelingual deafness include the use of hearing aids to strengthen remaining sensory cells or cochlear implants to stimulate the hearing nerve directly. Cochlear Implants are hearing devices that are placed behind the ear and contain a receiver and electrodes which are placed under the skin and inside the cochlea.

Despite these developments, there is still a risk that prelingually deaf children may not develop good speech and speech reception skills. Although cochlear implants produce sounds, they are unlike typical hearing and deaf and hard of hearing people must undergo intensive therapy in order to learn how to interpret these sounds. They must also learn how to speak given the range of hearing they may or may not have. However, deaf children of deaf parents tend to do better with language, even though they are isolated from sound and speech because their language uses a different mode of communication that is accessible to them; the visual modality of language.

Although cochlear implants were initially approved for adults, now there is pressure to implant children early in order to maximize auditory skills for mainstream learning which in turn has created controversy around the topic. Due to recent advances in technology, cochlear implants allow some deaf people to acquire some sense of hearing. There are interior and exposed exterior components that are surgically implanted. Those who receive cochlear implants earlier on in life show more improvement on speech comprehension and language.

Spoken language development does vary widely for those with cochlear implants though due to a number of different factors including: age at implantation, frequency, quality and type of speech training. Some evidence suggests that speech processing occurs at a more rapid pace in some prelingually deaf children with cochlear implants than those with traditional hearing aids. However, cochlear implants may not always work.

Research shows that people develop better language with a cochlear implant when they have a solid first language to rely on to understand the second language they would be learning. In the case of prelingually deaf children with cochlear implants, a signed language, like American Sign Language would be an accessible language for them to learn to help support the use of the cochlear implant as they learn a spoken language as their L2. Without a solid, accessible first language, these children run the risk of language deprivation, especially in the case that a cochlear implant fails to work. They would have no access to sound, meaning no access to the spoken language they are supposed to be learning. If a signed language was not a strong language for them to use and neither was a spoken language, they now have no access to any language and run the risk of missing their critical period.

Chapter 5

English-language Learner

English-Language Learner (often abbreviated as **ELL**) is a term used in some English-speaking countries such as the US and Canada to describe a person who is learning the English language and has a native language that is not English. Some educationaladvocates, especially in the United States, classify theses students as non-native English speakers or emergent bilinguals.

Various other terms are also used to refer to students who are not proficient in English, such as English as a Second Language (ESL), English as an Additional Language (EAL), limited English proficient (LEP), Culturally and Linguistically Diverse (CLD), non-native English speaker, bilingual students, heritage language, emergent bilingual, and language-minority students.

The legal term that is used in federal legislation is 'limited English proficient'. The instruction and assessment of students, their cultural background, and the attitudes of classroom teachers towards ELLs have all been found to be factors in the achievement of these students.

Several methods have been suggested to effectively teach ELLs, including integrating their home cultures into the classroom, involving them in language-appropriate content-area instruction early on, and integrating literature into their learning programs.

History of English-Language Learners

The term "English Language Learner" was first used by Mark LaCelle-Peterson and Charlene Rivera in their 1994 study. He defined ELL students as students whose first language is not English, including both limited and higher levels of language proficiency. The term ELL emphasizes that students are mastering another language, something many monolingual students in American schools may never attempt outside of the limited proficiency gained from foreign language class requirements. In adopting the term, LaCelle-Peterson and Rivera gave analogies of other conventional educational terms. The authors believed that just as we refer to advanced teaching candidates as "student teachers" rather than "limited teaching proficient individuals," the term ELL underscores what students are *learning* instead of their limitations.

Since 1872, an English-only instruction law had been in place in the United States. It was not until 1967, that the legislation was overturned by SB53, a policy signed for California public schools to allow other languages in instruction. A year later, after SB53 garnered support by the immigrant community, the Bilingual Education Act (Title VII) was passed. Nationally, public schools were then provided funding for programs that met the educational needs of ELL.

Not long after the installment of Title VII, the "taxpayers revolt" came to fruition and California's Proposition 13 was drafted. It proposed funding cuts for large portions of California's public schools, backed by those who disapproved

of immigrant progress. In opposition to this, cases like Castaneda v Pickard fought for educational equality and standards focused on developing ELL students, as well as an overall sound plan for school districts. An additional setback occurred in California in 1998 when Proposition 227 passed, banning bilingual education yet again. To combat this, education advocates in the Bay Area began to open all-inclusive schools to promote the acceptance of ELL students.

Methods of Instruction

There are various forms of ELL instruction. Fast-track to English programs encourage students to use English as quickly as possible and offer little to no native language support. In transition-bilingual programs, instruction begins in the student's native language and then switches to English in elementary or middle school. In dual language programs (also known as two-way bilingual or two-way immersion programs), students become fluent simultaneously in their native language and English. Sheltered instruction is another approach in which integrates language and content instruction in the mainstream classroom environment.

In a five-week study by J. Huang, research showed that "classroom instruction appeared to play an important role in integrating language skills development and academic content learning." This study also highlighted that the "students acquire linguistic/literacy skills and scientific knowledge hand in hand as they assume various communicative and social roles within carefully planned language activities." By tying scientific content in English, the students were able to improve

their language development between drafts and build upon their existing knowledge of scientific content as well.

"Push-in" programs versus "Pull-out" programs

Two specific models of instruction include the push-in program and the pull-out program. The push-in program includes the English teacher coming into the classroom to aid the English Language Learner. The benefit of this method is that students remain integrated in the classroom with their native English-speaking peers. This method does not isolate or single out ELL students; However, this method can present challenges in co-teaching, as the educators must work together to collaborate in the classroom. In schools using a push-in style of teaching, educators disagree over whether ELL students should be encouraged or permitted to participate in additional foreign language classes, such as French. Some educators argue that learning another additional language while learning English might be too challenging for ELLs, or that ELLs should focus on their English proficiency before attempting further languages. Other educators insist that foreign language classes are the only classes that put ELL students on a level playing field with their peers, and furthermore that research may suggest that ELL students perform better in foreign language classes than their peers.

The push-out program entails the ELL student learning in a separate classroom with the English teacher. The benefit of such a method is that ELL students receive individualized, focused training. Unfortunately, this method can isolate ELL students from the rest of their peers, leaving them feeling left out from the community.

Scaffolding

Scaffolding theory was developed in 1976 by Jerome Bruner. Bruner adapts Lev Vygotsky's zone of proximal development theory to child development. In the context of aiding ELL students, scaffolding is seen as a way to offer more support to ELL students initially through additional strategies and approaches, which are gradually removed as the student gains independence and proficiency. Different scaffolding strategies include associating English vocabulary to visuals, drawing back to a student's prior knowledge, pre-teaching difficult vocabulary before assigning readings they appear in, and encouraging questions from students, whether they be content-related or to ensure comprehension. All of these additional areas of support are to be gradually removed, so that students become more independent, even if that means no longer needing some of these associations or seeking them out for themselves.

Labor-Based Grading

In Asao Inoue's work "Labor-Based Grading Contracts," he proposes an alternative to traditional content-based or quality-based methods of assessment in writing classrooms. Inoue outlines his own innovative classroom design, which assigns grades based on set standards for how much work is put into each assignment through quantitative methods such as word counts. High marks are earned by students who go above the baseline requirements, which earn students a "B" on the A-F grading scale. The intent behind Inoue's design is that students are rewarded for their efforts rather than deterred, and students who traditionally score poorly when graded on

quality (such as ELL students) are equally capable of receiving a certain grade as any other student, despite any educational setbacks or challenges they endure. A unique aspect to the labor-based grading design is that students collaborate as a class to decide what the terms on conditions of grading scales are. This way, all student's voices are heard and considered when developing a method of evaluation for their work.

Issues in schools

Assessment

The federal No Child Left Behind Act (NCLB) requires all ELLs attending public schools from grades K-12 to be assessed in multiple language domains, such as listening, reading, writing, and speaking. The NCLB Act also requires ELL students to partake in statewide standardized testing. However, there is an achievement gap between ELLs and their native English-speaking peers. This achievement gap persists not only in language-based disciplines, but also in the math, science, and social science subjects. Research in this area suggests that ELL students' content-based assessment outcomes might be confounded by language barriers, since they are not only being exposed to new material, but they are learning this new material in a language that they may still be gaining proficiency in.

Teachers

Attitudes of educators play a major role in the ESL classroom. Estimates suggest that approximately 45% of teachers in

America have ELL students in their classrooms; however, it is not uncommon for teachers have negative perceptions of ELL students in their classrooms. These negative perceptions are informed by a bias that ELL students are not adequately trying or that they are personally at fault for their language barrier. Research shows that the negative attitudes of teachers may stem from lack of time to address unique ELL student classroom needs, added teacher workload when working with ELL students in mainstream classrooms, and personal feelings of professional insufficiency to work with ELL students. Research indicates that only 12% of K-12 teachers in United States have training in working with ELL students.

In research conducted by Jenelle R. Reeves, she writes "Teachers' language-acquisition misconceptions may color their attitudes towards ELLs and ELL inclusion, leading educators to misdiagnose learning difficulties or misattribute student failure to lack of intelligence or effort".By providing a positive learning environment, this will have an effect on the students' overall success in terms of linguistic, social, cognitive, and academic developments. In terms of teacher preparation, Garcia, O. & Menken, K. suggest that it is necessary for the ELL Teacher to engage in inward self-reflection before acting outwardly. In their piece "Moving Forward: Ten Guiding Principles for Teachers", they propose that because Language Teachers often act as informal policymakers, it is imperative that they first understand their own "ways of languaging" and preconceptions about languages and language learners. It could be detrimental, they conclude, for a language teacher to enter the classroom without the necessary reflection and self-awareness, as these teachers could unknowingly impose systems of linguistic discrimination (linguicism).

Culture

A study to examine anti-racist pedagogy within predominantly white versus predominantly Mexican classrooms concluded that Mexican elementary-level students had a firmer grasp on cultural inequalities . According to the findings, the social and cultural maturity of the Mexican students is a direct result of having faced the inequalities themselves. Another study on Caucasian first-grade teachers and their ELL students indicated biases that ultimately affected students' desire to learn. A combination of misinformation, stereotypes, and individual reservations can alter teachers' perception when working with culturally diverse or non-native English speakers. Teachers are placed in the position to teach English-learning students, sometimes without the necessary training, as mentioned above. From a Walden University study, a handful of teachers at an elementary school expressed not having the energy, training, or time to perform for these students.

An ESL teacher, in a study called "Losing Strangeness to Mediate ESL Teaching", "connects culture to religious celebrations and holidays and the fusion invites students to share their knowledge". This has encouraged students to open up and talk about their cultural backgrounds and traditions. "Teachers who encourage CLD students to maintain their cultural or ethnic ties promote their personal and academic success." Students should not feel that they need to lose their identity in the classroom, but rather that they gain knowledge from both their culture and the world around them. It have been proven to be beneficial to bring culture into the ESL classroom in order for the students to feel a sense of worth in

school and in their lives. Similarly, the sharing one different cultural backgrounds can benefit other students in the mainstream classroom who may not have the cultural maturity or dual identities that these students are able to shed a light on.

Another reason that an ESL student may be struggling to join discussions and engage in class could be attributed to whether they come from a culture where speaking up to an authority figure (like a teacher or a professor) is discouraged. This makes classes that are graded based on participation especially challenging for these students. Strategies that can mitigate this discomfort or misunderstanding of expectations include offering surveys or reflective writing prompts, that are collected after class, inquiring about student's educational and cultural backgrounds and past learning experiences. Regardless of how much training an instructor has on teaching ELL students, being open to learning about them as an individual rather than a part of a larger group and making efforts towards tailoring and personalizing their learning experience can contribute to the student's overall success.

Outside of the classroom, ELL students are otherwise institutionally marginalized, as well. They often sit at separate lunch tables and are under-recognized in school assemblies.

Prompts and Expectations

Aside from linguistic gaps, the adjustment to American scholarly expectations, writing genres, and prompts can all be jarring and even contradictory to an ELL individual's academic experiences from their home country. An example of this is

how American writing prompts tend to be multiple pages long, with extensive details and examples. Many collegiate ELLs can be overwhelmed and confused by all of the additional information, making it difficult to decipher all of the different parts that their writing needs to address. Another example is found in how students from other countries may be unfamiliar with sharing their opinions, or criticizing the government in any form, even if this is a requirement for an essay or a speech. According to a survey by Lin (2015), "Many [ELL students] indicated that they had problems adjusting their ways of writing in their first language to American thought patterns. Students still thought in their first language and used the rhetorical patterns of their first language to write English essays... Because writing patterns or styles are not only cognitively but also culturally embedded, many ELL writers in this study found it takes a significant amount of time to adapt to different thinking patterns when communicating through written English."

Enriching the Classroom Environment

In order to maintain an environment that is beneficial for both the teacher and the student, culture, literature, and other disciplines should be integrated systematically into the instruction. Postponing content-area instruction until CLD students gain academic language skills bridges the linguistic achievement gap between the learners and their native-English speaking peers. Relating to culture, teachers need to integrate it into the lesson, in order for the students to feel a sense of

appreciation and a feeling of self-worth rather than ostracization. Students will benefit substantially from the use of literature in instruction, as well. "Reading texts that match learner interests and English proficiency provide learners with comprehensible language input—a chance to learn new vocabulary in context and to see the syntax of the language." Students can also gain additional motivation and enjoyment from the addition of literature.

By integrating other disciplines into the lesson, it will make the content more significant to the learners and will create higher order thinking skills across the areas. Introducing language in other contexts focuses not only on learning a second language, but using that language as a medium to learn mathematics, science, social studies, or other academic subjects. These varying approaches aid ELL students' awareness "that English is not just an object of academic interest nor merely a key to passing an examination; instead, English becomes a real means of interaction and sharing among people". Therefore, students will be able to communicate across the curriculum, acquire higher level skills, and be successful in their daily lives.

Strategies for Supporting English-Language Learners in the Classroom and Beyond

Incorporating technology is one strategy for supporting English-Language Learners in the classroom. The internet makes it possible for students to view videos of activities, events, and places around the world instantaneously. Viewing these activities can help English-Language Learners develop an understanding of new concepts while at the same time building

topic related schema (background knowledge). Introducing students to media literacy and accessible materials can also aid them in their future academic endeavors and establish research skills early on.

Experiential learning is another strategy to support ELL students. The teacher can provide opportunities for English Language Learners to acquire vocabulary and build knowledge through hands-on learning. This can include activities such as science experiments and art projects, which are tactile ways that encourage students to create solutions to proposed problems or tasks.

A strategy that requires more involvement from educators is supporting the students outside of the school setting. To respond to deficiencies in the public school system, educators and student activists have created spaces that work to uplift ELL and their families. Labeled as family-school-community partnerships, these spaces have sought out cultural and linguistic responsiveness through encouraging participation and addressing needs outside of school. It is an interpretation of growth through art and community bonding meant to prime student development.

The Future of English-Language Learners

While there have been several advancements in both the rights and the strategies and support offered in the United States and Canada for English-Language learning students, there is still much work to be done. Despite International students (who

often make up the bulk of ELL students in higher education, in addition to immigrants) being sought out as sources of profit and their boosts of collegiate diversity statistics, there are not always additional funding and resources curated to support these students at their respective institutions. With efforts like U.S. President Donald J. Trump's proposed deportation of International students as a result of 2020's COVID-19 pandemic, and the ongoing debate whether to continue to support pathways to citizenship and achievement by the children of undocumented immigrants, such as DACA, there are still many hinderances to this group of students occurring today. Adoption of socially-just classroom pedagogies such as those proposed by Asao Inoue, and the re-examination of the privileges inherent in the existence of "Standard Academic English" are current steps towards a trajectory of inclusion and tolerance for these groups of students in both K-12 and higher education.

Chapter 6

Writing Research

Research is "creative and systematic work undertaken to increase the stock of knowledge". It involves the collection, organization, and analysis of information to increase understanding of a topic or issue. A research project may be an expansion on past work in the field. To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects or the project as a whole.

The primary purposes of basic research (as opposed to applied research) are documentation, discovery, interpretation, and the research and development (R&D) of methods and systems for the advancement of human knowledge. Approaches to research depend on epistemologies, which vary considerably both within and between humanities and sciences. There are several forms of research: scientific, humanities, artistic, economic, social, business, marketing, practitioner research, life, technological, etc. The scientific study of research practices is known as meta-research.

Definitions

Research has been defined in a number of different ways, and while there are similarities, there does not appear to be a single, all-encompassing definition that is embraced by all who engage in it.

One definition of research is used by the OECD, "Any creative systematic activity undertaken in order to increase the stock of

knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications."

Another definition of research is given by John W. Creswell, who states that "research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: pose a question, collect data to answer the question, and present an answer to the question.

The Merriam-Webster Online Dictionary defines research in more detail as "studious inquiry or examination; *especially* : investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws"

Forms of research

Original research, also called **primary research**, is research that is not exclusively based on a summary, review, or synthesis of earlier publications on the subject of research. This material is of a primary-source character. The purpose of the original research is to produce new knowledge, rather than to present the existing knowledge in a new form (e.g., summarized or classified). Original research can take a number of forms, depending on the discipline it pertains to. In experimental work, it typically involves direct or indirect observation of the researched subject(s), e.g., in the laboratory or in the field, documents the methodology, results, and conclusions of an experiment or set of experiments, or offers a novel interpretation of previous results. In analytical work,

there are typically some new (for example) mathematical results produced, or a new way of approaching an existing problem. In some subjects which do not typically carry out experimentation or analysis of this kind, the originality is in the particular way existing understanding is changed or re-interpreted based on the outcome of the work of the researcher.

The degree of originality of the research is among major criteria for articles to be published in academic journals and usually established by means of peer review. Graduate students are commonly required to perform original research as part of a dissertation.

Scientific research is a systematic way of gathering data and harnessing curiosity. This research provides scientific information and theories for the explanation of the nature and the properties of the world. It makes practical applications possible. Scientific research is funded by public authorities, by charitable organizations and by private groups, including many companies. Scientific research can be subdivided into different classifications according to their academic and application disciplines. Scientific research is a widely used criterion for judging the standing of an academic institution, but some argue that such is an inaccurate assessment of the institution, because the quality of research does not tell about the quality of teaching (these do not necessarily correlate).

Research in the humanities involves different methods such as for example hermeneutics and semiotics. Humanities scholars usually do not search for the ultimate correct answer to a question, but instead, explore the issues and details that

surround it. Context is always important, and context can be social, historical, political, cultural, or ethnic. An example of research in the humanities is historical research, which is embodied in historical method. Historians use primary sources and other evidence to systematically investigate a topic, and then to write histories in the form of accounts of the past. Other studies aim to merely examine the occurrence of behaviours in societies and communities, without particularly looking for reasons or motivations to explain these. These studies may be qualitative or quantitative, and can use a variety of approaches, such as queer theory or feminist theory.

Artistic research, also seen as 'practice-based research', can take form when creative works are considered both the research and the object of research itself. It is the debatable body of thought which offers an alternative to purely scientific methods in research in its search for knowledge and truth.

Scientific research

Generally, research is understood to follow a certain structural process. Though step order may vary depending on the subject matter and researcher, the following steps are usually part of most formal research, both basic and applied:

- Observations and formation of the topic: Consists of the subject area of one's interest and following that subject area to conduct subject-related research. The subject area should not be randomly chosen since it requires reading a vast amount of literature on the topic to determine the gap in the literature the researcher intends to narrow. A keen interest in the

chosen subject area is advisable. The research will have to be justified by linking its importance to already existing knowledge about the topic.

- Hypothesis: A testable prediction which designates the relationship between two or more variables.
- Conceptual definition: Description of a concept by relating it to other concepts.
- Operational definition: Details in regards to defining the variables and how they will be measured/assessed in the study.
- Gathering of data: Consists of identifying a population and selecting samples, gathering information from or about these samples by using specific research instruments. The instruments used for data collection must be valid and reliable.
- Analysis of data: Involves breaking down the individual pieces of data to draw conclusions about it.
- Data Interpretation: This can be represented through tables, figures, and pictures, and then described in words.
- Test, revising of hypothesis
- Conclusion, reiteration if necessary

A common misconception is that a hypothesis will be proven (see, rather, null hypothesis). Generally, a hypothesis is used to make predictions that can be tested by observing the outcome of an experiment. If the outcome is inconsistent with the hypothesis, then the hypothesis is rejected (see falsifiability). However, if the outcome is consistent with the hypothesis, the experiment is said to support the hypothesis. This careful language is used because researchers recognize

that alternative hypotheses may also be consistent with the observations. In this sense, a hypothesis can never be proven, but rather only supported by surviving rounds of scientific testing and, eventually, becoming widely thought of as true.

A useful hypothesis allows prediction and within the accuracy of observation of the time, the prediction will be verified. As the accuracy of observation improves with time, the hypothesis may no longer provide an accurate prediction. In this case, a new hypothesis will arise to challenge the old, and to the extent that the new hypothesis makes more accurate predictions than the old, the new will supplant it. Researchers can also use a null hypothesis, which states no relationship or difference between the independent or dependent variables.

Historical research

The historical method comprises the techniques and guidelines by which historians use historical sources and other evidence to research and then to write history. There are various history guidelines that are commonly used by historians in their work, under the headings of external criticism, internal criticism, and synthesis. This includes lower criticism and sensual criticism. Though items may vary depending on the subject matter and researcher, the following concepts are part of most formal historical research:

- Identification of origin date
- Evidence of localization
- Recognition of authorship
- Analysis of data
- Identification of integrity

- Attribution of credibility

Artistic research

The controversial trend of artistic teaching becoming more academics-oriented is leading to artistic research being accepted as the primary mode of enquiry in art as in the case of other disciplines.

One of the characteristics of artistic research is that it must accept subjectivity as opposed to the classical scientific methods. As such, it is similar to the social sciences in using qualitative research and intersubjectivity as tools to apply measurement and critical analysis.

Artistic research has been defined by the School of Dance and Circus (DansochCirkushögskolan, DOCH), Stockholm in the following manner – "Artistic research is to investigate and test with the purpose of gaining knowledge within and for our artistic disciplines. It is based on artistic practices, methods, and criticality. Through presented documentation, the insights gained shall be placed in a context." Artistic research aims to enhance knowledge and understanding with presentation of the arts. A simpler understanding by Julian Klein defines artistic research as any kind of research employing the artistic mode of perception. For a survey of the central problematics of today's artistic research, see GiacoSchiesser.

According to artist HakanTopal, in artistic research, "perhaps more so than other disciplines, intuition is utilized as a method to identify a wide range of new and unexpected productive modalities". Most writers, whether of fiction or non-fiction books, also have to do research to support their creative

work. This may be factual, historical, or background research. Background research could include, for example, geographical or procedural research.

The Society for Artistic Research (SAR) publishes the triannual *Journal for Artistic Research* (*JAR*), an international, online, open access, and peer-reviewedjournal for the identification, publication, and dissemination of artistic research and its methodologies, from all arts disciplines and it runs the *Research Catalogue* (RC), a searchable, documentary database of artistic research, to which anyone can contribute.

Patricia Leavy addresses eight arts-based research (ABR) genres: narrative inquiry, fiction-based research, poetry, music, dance, theatre, film, and visual art.

In 2016, the European League of Institutes of the Arts launched *The Florence Principles' on the Doctorate in the Arts*.

The Florence Principles relating to the Salzburg Principles and the Salzburg Recommendations of the European University Association name seven points of attention to specify the Doctorate / PhD in the Arts compared to a scientific doctorate / PhD. The Florence Principles have been endorsed and are supported also by AEC, CILECT, CUMULUS and SAR.

Steps in conducting research

Research is often conducted using the hourglass model structure of research. The hourglass model starts with a broad spectrum for research, focusing in on the required information through the method of the project (like the neck of the

hourglass), then expands the research in the form of discussion and results. The major steps in conducting research are:

- Identification of research problem
- Literature review
- Specifying the purpose of research
- Determining specific research questions
- Specification of a conceptual framework, sometimes including a set of hypotheses
- Choice of a methodology (for data collection)
- Data collection
- Verifying data
- Analyzing and interpreting the data
- Reporting and evaluating research
- Communicating the research findings and, possibly, recommendations

The steps generally represent the overall process; however, they should be viewed as an ever-changing iterative process rather than a fixed set of steps. Most research begins with a general statement of the problem, or rather, the purpose for engaging in the study. The literature review identifies flaws or holes in previous research which provides justification for the study. Often, a literature review is conducted in a given subject area before a research question is identified. A gap in the current literature, as identified by a researcher, then engenders a research question. The research question may be parallel to the hypothesis. The hypothesis is the supposition to be tested. The researcher(s) collects data to test the hypothesis. The researcher(s) then analyzes and interprets the data via a variety of statistical methods, engaging in what is

known as empirical research. The results of the data analysis in rejecting or failing to reject the null hypothesisare then reported and evaluated. At the end, the researcher may discuss avenues for further research. However, some researchers advocate for the reverse approach: starting with articulating findings and discussion of them, moving "up" to identification of a research problem that emerges in the findings and literature review.

The reverse approach is justified by the transactional nature of the research endeavor where research inquiry, research questions, research method, relevant research literature, and so on are not fully known until the findings have fully emerged and been interpreted.

Rudolph Rummel says, "... no researcher should accept any one or two tests as definitive. It is only when a range of tests are consistent over many kinds of data, researchers, and methods can one have confidence in the results."

Plato in Meno talks about an inherent difficulty, if not a paradox, of doing research that can be paraphrased in the following way, "If you know what you're searching for, why do you search for it?! [i.e., you have already found it] If you don't know what you're searching for, what are you searching for?!"

Research methods

The goal of the research process is to produce new knowledge or deepen understanding of a topic or issue. This process takes three main forms (although, as previously discussed, the boundaries between them may be obscure):

- Exploratory research, which helps to identify and define a problem or question.
- Constructive research, which tests theories and proposes solutions to a problem or question.
- Empirical research, which tests the feasibility of a solution using empirical evidence.

There are two major types of empirical research design: qualitative research and quantitative research.

Researchers choose qualitative or quantitative methods according to the nature of the research topic they want to investigate and the research questions they aim to answer:

- Qualitative research
- This involves understanding human behavior and the reasons that govern such behavior, by asking a broad question, collecting data in the form of words, images, video etc. that is analyzed, and searching for themes. This type of research aims to investigate a question without attempting to quantifiably measure variables or look to potential relationships between variables. It is viewed as more restrictive in testing hypotheses because it can be expensive and time-consuming and typically limited to a single set of research subjects. Qualitative research is often used as a method of exploratory research as a basis for later quantitative research hypotheses. Qualitative research is linked with the philosophical and theoretical stance of social constructionism.

Social media posts are used for qualitative research.

- Quantitative research
- This involves systematic empirical investigation of quantitative properties and phenomena and their relationships, by asking a narrow question and collecting numerical data to analyze it utilizing statistical methods. The quantitative research designs are experimental, correlational, and survey (or descriptive). Statistics derived from quantitative research can be used to establish the existence of associative or causal relationships between variables. Quantitative research is linked with the philosophical and theoretical stance of positivism.

The quantitative data collection methods rely on random sampling and structured data collection instruments that fit diverse experiences into predetermined response categories. These methods produce results that can be summarized, compared, and generalized to larger populations if the data are collected using proper sampling and data collection strategies. Quantitative research is concerned with testing hypotheses derived from theory or being able to estimate the size of a phenomenon of interest.

If the research question is about people, participants may be randomly assigned to different treatments (this is the only way that a quantitative study can be considered a true experiment). If this is not feasible, the researcher may collect data on participant and situational characteristics to statistically control for their influence on the dependent, or outcome, variable. If the intent is to generalize from the research

participants to a larger population, the researcher will employ probability sampling to select participants.

In either qualitative or quantitative research, the researcher(s) may collect primary or secondary data. Primary data is data collected specifically for the research, such as through interviews or questionnaires. Secondary data is data that already exists, such as census data, which can be re-used for the research. It is good ethical research practice to use secondary data wherever possible.

Mixed-method research, i.e. research that includes qualitative and quantitative elements, using both primary and secondary data, is becoming more common. This method has benefits that using one method alone cannot offer. For example, a researcher may choose to conduct a qualitative study and follow it up with a quantitative study to gain additional insights.

Big data has brought big impacts on research methods so that now many researchers do not put much effort into data collection; furthermore, methods to analyze easily available huge amounts of data have also been developed. Types of Research Method 1. Observatory Research Method 2. Correlation Research Method

- Switching topics

There have been indications that during the last decades scientists have switched between scientific topics more frequently.

- Non-empirical research

Non-empirical (theoretical) research is an approach that involves the development of theory as opposed to using observation and experimentation. As such, non-empirical research seeks solutions to problems using existing knowledge as its source. This, however, does not mean that new ideas and innovations cannot be found within the pool of existing and established knowledge. Non-empirical research is not an absolute alternative to empirical research because they may be used together to strengthen a research approach. Neither one is less effective than the other since they have their particular purpose in science. Typically empirical research produces observations that need to be explained; then theoretical research tries to explain them, and in so doing generates empirically testable hypotheses; these hypotheses are then tested empirically, giving more observations that may need further explanation; and so on. See Scientific method.

A simple example of a non-empirical task is the prototyping of a new drug using a differentiated application of existing knowledge; another is the development of a business process in the form of a flow chart and texts where all the ingredients are from established knowledge. Much of cosmological research is theoretical in nature. Mathematics research does not rely on externally available data; rather, it seeks to prove theorems about mathematical objects.

Research ethics

Research ethics is concerned with the moral issues that arise during or as a result of research activities, as well as the ethical conduct of researchers. Historically, the revelation of scandals such as Nazi human experimentation and the

Tuskegee syphilis experiment led to the realisation that clear measures are needed for the ethical governance of research to ensure that people, animals and environments are not unduly harmed in research. The management of research ethics is inconsistent across countries and there is no universally accepted approach to how it should be addressed. Informed consent is a key concept in research ethics.

When making ethical decisions, we may be guided by different things and philosophers commonly distinguish between approaches like deontology, consequentialism, virtue ethics and value (ethics). Regardless of approach, the application of ethical theory to specific controversial topics is known as applied ethics and research ethics can be viewed as a form of applied ethics because ethical theory is applied in real-world research scenarios.

Ethical issues may arise in the design and implementation of research involving human experimentation or animal experimentation. There may also be consequences for the environment, for society or for future generations that need to be considered.

Research ethics is most developed as a concept in medical research, the most notable Code being the 1964 Declaration of Helsinki. Research in other fields such as social sciences, information technology, biotechnology, or engineering may generate different types of ethical concerns to those in medical research.

In countries such as Canada, mandatory research ethics training is required for students, professors and others who work in research.

Nowadays, research ethics is commonly distinguished from matters of research integrity that includes issues such as scientific misconduct (e.g. fraud, fabrication of data or plagiarism).

Problems in research

Meta-research

Meta-research is the study of research through the use of research methods. Also known as "research on research", it aims to reduce waste and increase the quality of research in all fields.

Meta-research concerns itself with the detection of bias, methodological flaws, and other errors and inefficiencies. Among the finding of meta-research is a low rates of reproducibility across a large number of fields. This widespread difficulty in reproducing research has been termed the "replication crisis."

Methods of research

In many disciplines, Western methods of conducting research are predominant. Researchers are overwhelmingly taught Western methods of data collection and study. The increasing participation of indigenous peoples as researchers has brought increased attention to the scientific lacuna in culturally-sensitive methods of data collection. Western methods of data collection may not be the most accurate or relevant for research on non-Western societies. For example, "Hua Oranga" was created as a criterion for psychological evaluation in Māori

populations, and is based on dimensions of mental health important to the Māori people – "tahawairua (the spiritual dimension), tahahinengaro (the mental dimension), tahatinana (the physical dimension), and taha whanau (the family dimension)".

Bias

Research is often biased in the languages that are preferred (linguicism) and the geographic locations where research occurs. Periphery scholars face the challenges of exclusion and linguicism in research and academic publication.

As the great majority of mainstream academic journals are written in English, multilingual periphery scholars often must translate their work to be accepted to elite Western-dominated journals. Multilingual scholars' influences from their native communicative styles can be assumed to be incompetence instead of difference.

For comparative politics, Western countries are over-represented in single-country studies, with heavy emphasis on Western Europe, Canada, Australia, and New Zealand. Since 2000, Latin American countries have become more popular in single-country studies. In contrast, countries in Oceania and the Caribbean are the focus of very few studies. Patterns of geographic bias also show a relationship with linguicism: countries whose official languages are French or Arabic are far less likely to be the focus of single-country studies than countries with different official languages. Within Africa, English-speaking countries are more represented than other countries.

Generalizability

Generalization is the process of more broadly applying the valid results of one study. Studies with a narrow scope can result in a lack of generalizability, meaning that the results may not be applicable to other populations or regions. In comparative politics, this can result from using a single-country study, rather than a study design that uses data from multiple countries. Despite the issue of generalizability, single-country studies have risen in prevalence since the late 2000s.

Publication peer review

Peer review is a form of self-regulation by qualified members of a profession within the relevant field. Peer review methods are employed to maintain standards of quality, improve performance, and provide credibility. In academia, scholarly peer reviewis often used to determine an academic paper's suitability for publication. Usually, the peer review process involves experts in the same field who are consulted by editors to give a review of the scholarly works produced by a colleague of theirs from an unbiased and impartial point of view, and this is usually done free of charge. The tradition of peer reviews being done for free has however brought many pitfalls which are also indicative of why most peer reviewers decline many invitations to review. It was observed that publications from periphery countries rarely rise to the same elite status as those of North America and Europe, because limitations on the availability of resources including high-quality paper and sophisticated image-rendering software and printing tools render these publications less able to satisfy standards currently carrying formal or informal authority in the

publishing industry. These limitations in turn result in the under-representation of scholars from periphery nations among the set of publications holding prestige status relative to the quantity and quality of those scholars' research efforts, and this under-representation in turn results in disproportionately reduced acceptance of the results of their efforts as contributions to the body of knowledge available worldwide.

Influence of the open-access movement

The open access movement assumes that all information generally deemed useful should be free and belongs to a "public domain", that of "humanity". This idea gained prevalence as a result of Western colonial history and ignores alternative conceptions of knowledge circulation. For instance, most indigenous communities consider that access to certain information proper to the group should be determined by relationships.

There is alleged to be a double standard in the Western knowledge system. On the one hand, "digital right management" used to restrict access to personal information on social networking platforms is celebrated as a protection of privacy, while simultaneously when similar functions are used by cultural groups (i.e. indigenous communities) this is denounced as "access control" and reprehended as censorship.

Reseach teams

Indications that fresh (new) teams are associated with more original and more multidisciplinary scientific studies has been found by An Zeng et al.

Future perspectives

Even though Western dominance seems to be prominent in research, some scholars, such as Simon Marginson, argue for "the need [for] a plural university world". Marginson argues that the East Asian Confucian model could take over the Western model.

This could be due to changes in funding for research both in the East and the West. Focussed on emphasizing educational achievement, East Asian cultures, mainly in China and South Korea, have encouraged the increase of funding for research expansion. In contrast, in the Western academic world, notably in the United Kingdom as well as in some state governments in the United States, funding cuts for university research have occurred, which some say may lead to the future decline of Western dominance in research.

Neo-colonial approaches

Neo-colonial research or science, frequently described as helicopter research, parachute science or research, or safari study, is when researchers from wealthier countries go to a developing country, collect information, travel back to their country, analyze the data and samples, and publish the results with no or little involvement of local researchers. A 2003 study by the Hungarian academy of sciences found that 70% of articles in a random sample of publications about least-developed countries did not include a local research co-author.

The result of this kind of research is that local colleagues might be used to provide logistics but are not engaged for their

expertise or given credit for their participation in the research. Scientific publications resulting from parachute science may only contribute to the career of the scientists from rich countries, but not contribute development of local science capacity (such as funded research centers) or the careers of local scientists.

This is a form of "colonial" science that has reverberations of 19th century scientific practices of treating non-Western participants as "others" in order to advance colonialism—and critics call for the end of these practices in order to decolonize knowledge.

- This kind of research approach reduces the quality of research because international researchers may not ask the right questions or draw connections to local issues. The result of this approach is that local communities are unable to leverage the research to their own advantage. Ultimately, especially for fields dealing with global issues like conservation biology which rely on local communities to implement solutions, neo-colonial science prevents institutionalization of the findings in local communities in order to address issues being studied by scientists.

Professionalisation

In several national and private academic systems, the professionalisation of research has resulted in formal job titles.

In Russia

In present-day Russia, the former Soviet Union and in some post-Soviet states the term *researcher* (Russian: Научныйсотрудник, *nauchnysotrudnik*) is both a generic term for a person who carried out scientific research, as well as a job position within the frameworks of the USSR Academy of Sciences, Soviet universities, and in other research-oriented establishments.

The following ranks are known:

- Junior Researcher (Junior Research Associate)
- Researcher (Research Associate)
- Senior Researcher (Senior Research Associate)
- Leading Researcher (Leading Research Associate)
- Chief Researcher (Chief Research Associate)

Publishing

Academic publishing is a system that is necessary for academic scholars to peer review the work and make it available for a wider audience. The system varies widely by field and is also always changing, if often slowly. Most academic work is published in journal article or book form. There is also a large body of research that exists in either a thesis or dissertation form. These forms of research can be found in databases explicitly for theses and dissertations. In publishing, STM publishing is an abbreviation for academic publications in science, technology, and medicine. Most established academic fields have their own scientific journals and other outlets for publication, though many academic journals are somewhat

interdisciplinary, and publish work from several distinct fields or subfields. The kinds of publications that are accepted as contributions of knowledge or research vary greatly between fields, from the print to the electronic format. A study suggests that researchers should not give great consideration to findings that are not replicated frequently. It has also been suggested that all published studies should be subjected to some measure for assessing the validity or reliability of its procedures to prevent the publication of unproven findings. Business models are different in the electronic environment. Since about the early 1990s, licensing of electronic resources, particularly journals, has been very common. Presently, a major trend, particularly with respect to scholarly journals, is open access. There are two main forms of open access: open access publishing, in which the articles or the whole journal is freely available from the time of publication, and self-archiving, where the author makes a copy of their own work freely available on the web.

Research funding

Most funding for scientific research comes from three major sources: corporateresearch and development departments; private foundations, for example, the Bill and Melinda Gates Foundation; and government research councils such as the National Institutes of Health in the USA and the Medical Research Council in the UK. These are managed primarily through universities and in some cases through military contractors. Many senior researchers (such as group leaders) spend a significant amount of their time applying for grants for research funds. These grants are necessary not only for

researchers to carry out their research but also as a source of merit. The Social Psychology Network provides a comprehensive list of U.S. Government and private foundation funding sources.

Academic writing

Academic writing or **scholarly writing** is nonfiction produced as part of academic work, including reports on empirical fieldwork or research in facilities for the natural sciences or social sciences, monographs in which scholars analyze culture, propose new theories, or develop interpretations from archives, as well as undergraduate versions of all of these.

Though the tone, style, content, and organization of academic writing vary across genres and across publication methods, nearly all academic writing shares a relatively formal prose register, frequent reference to other academic work, and the use of fairly stable rhetorical moves to define the scope of the project, situate it in the relevant research, and to advance a new contribution.

Academic style

Academic writing often features a prose register that is conventionally characterized by "evidence...that the writer(s) have been persistent, open-minded, and disciplined in study"; that prioritizes "reason over emotion or sensual perception"; and that imagines a reader who is "coolly rational, reading for information, and intending to formulate a reasoned response." The particular stylistic means of achieving these conventions

can differ considerably by academic discipline. These differences help explain the distinctive sounds of, for example, writing in history versus engineering or physics versus philosophy. One attempt to account for these differences in writing is known as the theory of "discourse communities".

Biber and Gray suggested that there are significant differences with regards to complexity in academic writing in humanities versus science, with humanities writing often focused on structural elaboration, and sciences, on structural compression.

Criticism

Academic style, particularly in humanities, has been often criticized for being too full of jargon and hard to understand by the general public.

Discourse community

The **community of inquiry**, abbreviated as **CoI**, is a concept first introduced by early pragmatist philosophers C.S.Peirce and John Dewey, concerning the nature of knowledge formation and the process of scientific inquiry. The community of inquiry is broadly defined as any group of individuals involved in a process of empirical or conceptual inquiry into problematic situations. This concept was novel in its emphasis on the social quality and contingency of knowledge formation in the sciences, contrary to the Cartesian model of science, which assumes a fixed, unchanging reality that is objectively knowable by rational observers. The community of inquiry emphasizes that knowledge is necessarily embedded within a

social context and, thus, requires intersubjective agreement among those involved in the process of inquiry for legitimacy.

A useful metaphor

The Buddhist parable of "The Blind Men and an Elephant " offers a colorful way to make sense of the notion of the community of inquiry. The tale finds many blind men fumbling about an elephant, each trying to discover what it is they are touching. They are fixated in disagreement. One finds the elephant's leg and believes it a tree.

Another finds its trunk and believes it a rope. Yet another finds its side and believes it a wall. The insight is that we are all trapped inside our limited experience and cannot know the truth. If the blind men only cooperated, forming a community whose goal is inquiry into the strange multifaceted object, they may begin to overcome the problematic situation and discover the true nature of the object of their respective opinions. By sharing their experiences in a democratic and participatory manner they could arrive at a more comprehensive truth than their impoverished perspectives allow, isolated from each other.

They would show each other why one found the elephant to be like a rope and the other a tree. They would go further, using other ways to collect evidence (e.g., smell the animal, listen to its sounds). Together they would try to reconcile their conflicting conclusions. The blind men would never see the elephant, but they would no longer be trapped in their own limited perspectives. In short, they would be more likely to resolve the problematic situation, that object is no object at

all, it is an elephant. But resolution is never final; even their consensus could be in error. All findings are provisional and subject to revision. This is the scientific quality of the community of inquiry.

Applications

While Peirce originally intended the concept of the community of inquiry as a way to model the natural sciences, the concept has been borrowed, adapted, and applied in many different fields. This article touches on the contributions in the fields of education and public administration.

Education

According to Matthew Lipman, C.S. Peirce originally restricted the concept to the community of scientists. John Dewey broadened the scope of the concept, applying it to the educational setting (Lipman, 2003, pp. 20–21). Borrowing from Dewey, Lipman systematically applies the concept to the educational setting. He argues that a classroom is a type of community of inquiry, which leads to "questioning, reasoning, connecting, deliberating, challenging, and developing problem-solving techniques." Students and teachers involved in inquiry form a community of inquiry under certain circumstances. Therefore, a holistic understanding of a community of students and teachers engaged in authentic inquiry is the working definition of the key term 'community of inquiry'. There is a gestalt dimension to the concept that is underlined by Lipman. He points to "....the profound educational implications of fusing together, as Peirce had, the two independently powerful

notions of inquiry and community into the single transformative concept of community of inquiry" (2003, p. 84).

Lipman's paradigms

Lipman defined community of inquiry as a rigorous, democratic and reflective form of discussion built up over time with the same group of learners. Lipman also provides a useful set of antonymic statements that contrasts the standard educational paradigm with the reflective educational paradigm in which communities of inquiry can occur.

The standard paradigm poses the following:

- education as knowledge transmission
- knowledge as unambiguous, unequivocal and un-mysterious,
- knowledge is divided into non-overlapping disciplines
- teachers as authoritative sources of knowledge.

The reflective paradigm, in contrast, poses the following:

- education is the outcome of participation in a teacher-guided community of inquiry
- teachers stir students to think about the world when teachers reveal knowledge to be ambiguous, equivocal, and mysterious,
- knowledge disciplines are overlapping and therefore problematic,
- teachers are ready to concede fallibility,
- students are expected to be reflective and increasingly reasonable and judicious

- the educational process is not information acquisition but a grasp of relationships among disciplines (2003, pp 18–19).

A community of inquiry can be seen to exist to the degree that it avoids the qualities of this standard paradigm and shows the qualities of this reflective paradigm.

Online learning

Lipman's and Dewey's ideas were expanded and applied to online learning contexts in a Canadian project that originated in 1996 at the University of Alberta. The project was led by Randy Garrison, Terry Anderson and Walter Archer. The purpose of the study was to provide conceptual order and a tool for the use of Computer-mediated communication in supporting an educational experience.

Central to the work is a model of community inquiry that constitutes three elements essential to an educational transaction - cognitive presence, social presence, and teaching presence. Indicators (key words/phrases) for each of the three elements emerged from the analysis of computer conferencing transcripts. The indicators described represent a template or tool for researchers to analyze written transcripts as well as a heuristic guide to educators for the optimal use of computer conferencing as a medium to facilitate an educational transaction. This research suggested that computer conferencing has considerable potential to create a community of inquiry for educational purposes. This project led to production of many scholarly papers, a book and replication of the Community of Inquiry model by distance education

researchers globally. The Community of Inquiry model is also used to conceptually guide study research and practice in other forms of mediated, blended and classroom education.

Public administration

Patricia M. Shields has applied the community of Inquiry concept to the field of public administration. The community of inquiry is not defined by geographic location, rather a common desire by its members to resolve a problematic situation using a scientific attitude to assess evidence and guide action. The community is also defined by participatory democracy. "The parameters of the problematic situation and approaches to resolution are shaped by the interaction of the community and the facts". The democratic community may consider ideals/values such as equality, freedom, effectiveness, justice as it considers goals. There are three key ideas – "problematic situation, scientific attitude, and participatory democracy". Shields depiction is similar to Lipman's in that she refines the term inquiry by focusing on the problematic situations and scientific attitude (both concepts developed by Dewey in his book *Logic: The Theory of Inquiry*. Community is refined as participatory democracy. The two definitions are essentially the same. Shields draws heavily on John Dewey's insights into democracy and inquiry to refine the concept and apply it to public administration.

A discourse community is essentially a group of people that shares mutual interests and beliefs. "It establishes limits and regularities...who may speak, what may be spoken, and how it is to be said; in addition [rules] prescribe what is true and false, what is reasonable and what foolish, and what is meant

and what not." The concept of a discourse community is vital to academic writers across nearly all disciplines, for the academic writer's purpose is to influence how their community understands its field of study: whether by maintaining, adding to, revising, or contesting what that community regards as "known" or "true." Academic writers have strong incentives to follow conventions established by their community in order for their attempts to influence this community to be legible.

Discourse community constraints

Constraints are the discourse community's written and unwritten conventions about what a writer can say and how he or she can say it. They define what is an acceptable argument. Each discourse community expects to see a writer construct his or her argument using their conventional style of language and vocabulary, and they expect a writer to use the established intertext within the discourse community as the building blocks for his or her argument.

Writing for a discourse community

In order for a writer to become familiar with some of the constraints of the discourse community they are writing for. Across most discourses communities, writers will:

- Identify the novelty of their position
- Make a claim, or thesis
- Acknowledge prior work and situate their claim in a disciplinary context
- Offer warrants for one's view based on community-specific arguments and procedures

Each of theses above are constructed differently depending on the discourse community the writer is in. For example, the way a claim is made in a high school paper would look very different from the way a claim is made in a college composition class. It is important for the academic writer to familiarize himself or herself with the conventions of the discourse community by reading and analyzing other works, so that the writer is best able to communicate his or her ideas.

Novel argument

Within discourse communities, academic writers build on top of the ideas established by previous writers.

Good academic writers know the importance of researching previous work from within the discourse community and using this work to build their own claims. By taking these ideas and expanding upon them or applying them in a new way, a writer is able to make their novel argument.

Intertextuality

Intertextuality is the combining of past writings into original, new pieces of text. Usually attributed to Julia Kristeva, the concept of intertextuality is helpful for understanding that all texts are necessarily related to prior texts through a network of explicit or implicit links, allusions, repetitions, acknowledged or unacknowledged inspiration, and direct quotations. Writers (often unwittingly) make use of what has previously been written and thus some degree of borrowing is inevitable. One of the most salient features of academic writing irrespective of discipline is its unusually explicit conventions for marking

intertextuality through citation and bibliography. Conventions for these markings (e.g., MLA, APA, IEEE, Chicago, etc.) vary by discourse community.

Summarizing and integrating other texts in academic writing is often metaphorically described as "entering the conversation," as described by Kenneth Burke:

"Imagine that you enter a parlor. You come late. When you arrive, others have long preceded you, and they are engaged in a heated discussion, a discussion too heated for them to pause and tell you exactly what it is about. In fact the discussion had already begun long before any of them got there, so that no one present is qualified to retrace for you all the steps that had gone before.

You listen for a while, until you decide that you have caught the tenor of the argument; then you put in your oar. Someone answers; you answer him; another comes to your defense; another aligns himself against you, to either the embarrassment or gratification of your opponent, depending on the quality of your ally's assistance. However, the discussion is interminable. The hour grows late, you must depart, with the discussion still vigorously in progress."

Key elements

There are a number of areas of importance in all academic and scholarly writing. While some areas, such as the use of appropriate references and the avoidance of plagiarism, are not open to challenge, other elements, such as the appropriate style, are contested.

- Style
- Contrary to stereotype, published academic research is not particularly syntactically complex; it is instead a fairly low-involvement register characterized by the modification of nominal elements through hedging and refining elaborations, often presented as sequences of objects of prepositions.
- Appropriate references
- Generally speaking, the range and organization of references illustrate the author's awareness of the current state of knowledge in the field (including major current disagreements or controversies); typically the expectation is that these references will be formatted in the relevant disciplinary citation system.
- Bibliography
- Typically this lists those articles read as background, and will include the sources of individual citations.
- Plagiarism
- Plagiarism, the "wrongful appropriation of another author's language, thoughts, ideas, or expressions", and the representation of them as one's own original work is consideredacademic dishonesty, and can lead to severe consequences.

Academic genres

- Scholarly monograph, in many types and varieties
- Chapter in an edited volume

- Book Review
- Conference paper
- Dissertation; usually between 6,000 and 20,000 words in length
- Essay; usually short, between 1,500 and 6,000 words in length
- Explication; usually a short factual note explaining some part of a particular work; e.g. its terminology, dialect, allusions or coded references
- Research Article
- Review Essay; a thematic review of several relevant monographs or trends across numerous research articles
- Technical report
- Thesis; completed over a number of years, often in excess of 20,000 words in length
- Translation

For students

- Research Paper; longer essay involving library research, 3000 to 6000 words in length
- Book report
- Exam questions and Essay titles; the formulation of these
- Instructional pamphlet, or hand-out, or reading list; usually meant for students
- Presentations; usually short, often illustrated

Summaries of knowledge

- Annotatedbibliography

- Annotated catalogue, often of an individual or group's papers and/or library
- Creating a simplified graphical representation of knowledge; e.g. a map, or refining a display generated from a database. There will often be a 'key' or written work incorporated with the final work
- Creating a timeline or chronological plan. There will often be a 'key' or written work incorporated with the final work
- Devising a classification scheme; e.g. for animals, or newly arisen sub-cultures, or a radically new style of design
- Encyclopedia entry
- Journalarticle (e.g. *History Today*); usually presenting a digest of recent research
- Literature review; a summary and careful comparison of previous academic work published on a specific topic
- Site description and plan (e.g. in archeology)

Collating the work of others

- Anthology; collection, collation, ordering and editing of the work of others
- Catalogue raisonné; the definitive collection of the work of a single artist, in book form
- Collected works; often referred to as the 'critical edition'. The definitive collection of the work of a single writer or poet, in book form, carefully purged of publishers errors and later forgeries, etc.
- Monograph or exhibition catalog; usually containing exemplary works, and a scholarly essay. Sometime

contains new work by a creative writer, responding to the work
- Transcribing, selecting and ordering oral testimony (e.g. oral history recordings)

Research and planning

- Experimental plan
- Laboratory report
- Raw data collection plan
- Research proposal, including research questions
- Structured notes

Disseminating knowledge outside the academy

- Call for papers
- Documentaryfilm script or TV script or radio script
- Obituary
- Opinion; an academic may sometimes be asked to give an expert written opinion, for use in a legal case before a court of law
- Newspaper opinion article
- Public speech or lecture
- Review of a book, film, exhibition, event, etc.
- Think-tankpamphlet, position paper, or briefing paper

Technical or administrative forms

- Brief; short summary, often instructions for a commissioned work

- Peer review report
- Proposal for research or for a book
- White paper; detailed technical specifications and/or performance report

Personal forms

These are acceptable to some academic disciplines, e.g. Cultural studies, Fine art, Feminist studies, Queer theory, Literary studies.

- Artist's book or Chapbook
- Autobiography
- Belles-lettres; stylish or aesthetic writing on serious subjects, often with reference to one's personal experience
- Commonplace book
- Diary or Weblog
- Memoire; usually a short work, giving one's own memories of a famous person or event
- Notebooks

Newer forms

- Collaborative writing, especially using the internet
- Hypertext, often incorporating new media and multimedia forms within the text
- Performative writing (see also: belles-lettres)

Format

A commonly recognized format for presenting original research in the social and applied sciences is known as IMRD, an initialism that refers to the usual ordering of subsections:

- *Introduction* (Overview of relevant research and objective of current study)
- *Method* (Assumptions, questions, procedures described in replicable or at least reproducible detail)
- *Results* (Presentation of findings; often includes visual displays of quantitative data charts, plots)

and

- *Discussion* (Analysis, Implications, Suggested Next Steps)

Standalone methods sections are atypical in presenting research in the humanities; other common formats in the applied and social sciences are IMRAD (which offers an "Analysis" section separate from the implications presented in the "Discussion" section) and IRDM (found in some engineering subdisciplines, which features Methods at the end of the document).

Other common sections in academic documents are:

- Abstract
- Acknowledgments
- Indices

- Bibliography
- List of references
- Appendix/Addendum, any addition to a document