Literature Review

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Alant, E., Uys, K., & Tönsing, K. (2009). Communication, language, and literacy learning in children with developmental disabilities. In Treating Childhood Psychopathology and Developmental Disabilities, (pp. 373–399). Springer New York.

How children with disabilities learn about language and how to communicate, particularly with regard to: (1) the impact of specific impairments on information processing and the symbol interpretation, and (2) the role of sociocultural factors on learning; describes several studies in which children who use AAC were perceived by family and teachers as being less capable of participating in activities and less able to relate to stories than other children.

Allan, J., & Raghavan, H. (2002). Using part-of-speech patterns to reduce query ambiguity. In Proceedings of the 25th annual international ACM SIGIR conference on research and development in information retrieval, SIGIR '02, (pp. 307–314). New York, NY, USA: ACM.

Semantic disambiguation of one-word queries using clarification questions, and corresponding answers, based on statistical language modeling of nearby words based on their parts-of-speech.

Baker, B. R. (1986). Using images to generate speech. BYTE, 11(3), 160–168.

Encoding technique called semantic compaction, or Minspeak, in which a sequence of multiple icons, some representing morphemes, maps to a long phrase or utterance.

Ball, L., Beukelman, D., & Pattee, G. (2004). Augmentative and alternative communication acceptance by persons with amyotrophic lateral sclerosis. Augmentative and Alternative Communication, 20, 113–123.

Reviews literature for AAC usage by people with ALS and suggests that approximately 25% of people with ALS reject AAC interventions; presents a case study of 50 people with ALS, in which 96% accepted AAC technology, with 4% rejecting it; describes given reasons for rejection.

Berlo, D. K. (1960). The process of communication: An introduction to theory and practice.

Continuation of work on the Shannon-Weaver and SMCR models of communication to incorporate contextual information, such as shared cultural background or experiences.

Beukelman, D., & Ansel, B. (1995). Research priorities in augmentative and alternative communication. Augmentative and Alternative Communication, 11(2), 131–134.

Examines research priorities in AAC; claims field needs to evaluate the effects of AAC on communication development and create tools or strategies to aid in evaluation; provides a population estimate for potential AAC users of between 0.1% and 1.5%.

Beukelman, D., Jones, R., & Rowan, M. (1989). Frequency of word usage by nondisabled peers in integrated preschool classrooms. Augmentative and Alternative Communication, 5(4), 243–248.

Case study showing that non-AAC users, both children and adults, use a small number of words frequently; encourages the core-fringe organization of AAC vocabulary.

Beukelman, D., & Mirenda, P. (1998). Augmentative and alternative communication: Management of severe communication disorders in children and adults. Baltimore: Paul H. Brookes.

Review of AAC methodologies and systems for various demographics; provides measurements and estimates of aided message construction rates that are less than 20 WPM.

Beukelman, D., & Mirenda, P. (2006). Augmentative and Alternative Communication: Supporting Children and Adults With Complex Communication Needs. Paul H. Brookes Publishing Co.

Review of AAC methodologies and systems for various demographics; shows that icon-based AAC systems are often preferred for face-to-face communication and by users with language or literacy challenges, such as children and second-language learners.

Bickel, S., Haider, P., & Scheffer, T. (2005). Predicting sentences using n-gram language models. In Proceedings of the conference on Human Language Technology and Empirical Methods in Natural Language Processing, HLT '05, (pp. 193–200). Stroudsburg, PA, USA: Association for Computational Linguistics.

Word-based n-gram prediction that uses tab-complete to activate phrasal additions.

Broerse, A. C., & Zwaan, E. J. (1966). The information value of initial letters in the identification of words. Journal of Verbal Learning and Verbal Behavior, 5(5), 441–446.

Letter-based n-gram prediction showing that initial letters of a word have more information content than later letters in the word.

Brumberg, J., Nieto-Castanon, A., Kennedy, P., & Guenther, F. (2010). Brain-computer interfaces for speech communication. Speech Communication, 52(4), 367–379.

Reviews silent-speech AAC; demonstrates 2D cursor-control using BCI-EEG tied to the speech production areas of the brain.

Bustamante, E., & Spain, R. (2008). Measurement invariance of the nasa TLX. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting, vol. 52, (pp. 1522–1526). SAGE Publications.

Review of the NASA TLX system for measuring mental workload; presents results of a case study with 200 participants showing that TLX lacks scalar invariance; shows that mean TLX scores are not easily compared with invariance measurements; provides an argument for using the shortened "Raw TLX" method, without pairwise comparisons.

Demasco, P., & McCoy, K. (1992). Generating text from compressed input: an intelligent interface for people with severe motor impairments. Communications of the ACM, 35(5), 68–78.

"Sentence compansion" technique, in which users only select content words (semantically salient words) and the system expands the message into its syntactically correct form; this technique relies on the content words being selected in syntactic order (no reordering is performed) and only expands function words; uses hand-coded syntactic rules and semantic labels.

Fang, H., & Zhai, C. (2006). Semantic term matching in axiomatic approaches to information retrieval. In Proceedings of the 29th annual international ACM SIGIR conference on research and development in information retrieval, SIGIR '06, (pp. 115–122). New York, NY, USA: ACM.

Query approach for determining document relevance based on semantic term matching; presents an information-theoretic approach that determines semantically similar terms by looking at pre-judged relevant documents and tagging non-query words that have high mutual information; uses those similar terms, and their similarity distances, to reweight potentially relevant documents during query time.

Fillmore, C. J. (1976). Frame semantics and the nature of language. Annals of the New York Academy of Sciences, 280(Origins and Evolution of Language and Speech), 20–32.

Seminal work on frame semantics, an extension of case grammar, that describes semantic frames as a collection of facts that specify "characteristic features, attributes, and functions of a denotatum, and its characteristic interactions with things necessarily or typically associated with it;" argues that one cannot understand a word without understanding its semantic frames and the associated semantic roles of each frame; relates linguistic semantics to knowledge.

Goel, M., Wobbrock, J., & Patel, S. (2012). GripSense: using built-in sensors to detect hand posture and pressure on commodity mobile phones. In Proceedings of the 25th annual ACM symposium on User interface software and technology, UIST '12, (pp. 545–554). New York, NY, USA: ACM.

Approach for determining which of 4 different hand postures someone is using to hold their mobile phone; requires only the built-in sensors of a standard mobile phone (e.g. accelerometer, inertial sensors, vibration motor, and touchscreen); detects one of 3 different levels of pressure being used on the touchscreen.

Goldberg, D. (1997). Unistrokes for computerized interpretation of handwriting (US Patent #5596656).

Patent of a method for classifying continuous strokes, referred to as "unistrokes," into sets of characters from a predetermined alphabet; allows for multiple characters to be drawn in a single, unbroken stroke; useful for converting handwritten text on a touchscreen into digitized text.

Guenther, F., Brumberg, J., Wright, E., Nieto-Castanon, A., Tourville, J., Panko, M., Law, R., Siebert, S., Bartels, J., Andreasen, D., Ehirim, P., Mao, H., & Kennedy, P. (2009). A wireless Brain-Machine interface for Real-Time speech synthesis. PLoS ONE, 4(12).

Case study of a patient with locked-in syndrome in which a wireless brain-computer interface (BCI) was used to monitor attempts to produce speech; attempted speech was converted into synthesized vowel sounds with a feedback delay of 50 milliseconds.

Hansen, J. P., Lund, H., Aoki, H., & Itoh, K. (2006). Gaze communication systems for people with ALS. In ALS Communication Workshop, Yokohama, Japan, (pp. 35–38).

System description of GazeTalk, a multi-lingual typing system based on eye tracking and dwell-time selection; intended for users with amyotrophic lateral sclerosis (ALS).

Hart, S., & Staveland, L. (1988). Development of NASA-TLX (task load index): Results of empirical and theoretical research. Human mental workload, 1(3), 139–183.

Results of multiple experiments on the effectiveness of NASA's initial TLX system; proposes a multi-dimensional rating scale for six subjective, workload-related factors to quantify total workload.

Hemayati, R., Meng, W., & Yu, C. (2007). Semantic-based grouping of search engine results using WordNet. In Proceedings of the joint 9th Asia-Pacific web and 8th international conference on web-age information management conference on Advances in data and web management, APWeb/WAIM'07, (pp. 678–686). Berlin, Heidelberg: Springer-Verlag.

Approach for grouping semantically similar search engine results, primarily to increase diversity, by using synsets from WordNet; synsets are combined into super-synsets; current approach only works for single-term queries.

Higginbotham, J., Bisantz, A., Sunm, M., Adams, K., & Yik, F. (2009). The effect of context priming and task type on augmentative communication performance. Augmentative and Alternative Communication, 25(1), 19–31.

Case study in which an AAC device was, or was not, primed with task-specific vocabularies and tested on non-AAC users; contextual priming had a small but significant effect on keystroke savings; higher level measurements of communication rate, task performance, and user perceptions suggested keystroke savings that were not seen in experiments; keystroke-based measurements may not be predictive of task-level performance.

Higginbotham, J., Shane, H., Russell, S., & Caves, K. (2007). Access to AAC: Present, past, and future. Augmentative and Alternative Communication, 23(3), 243–257.

Survey of AAC system types, design factors, and emerging technologies and approaches; reviews several studies to provide communication rate estimates of 3 - 7 WPM for scanning systems and 5 - 10 WPM for eye-tracking systems.

How, Y., & Kan, M. (2005). Optimizing predictive text entry for short message service on mobile phones. In Human Computer Interfaces International (HCII 05).

Remapping of letters to the 9-button telephone keypad that is optimized for language patterns from a corpus of text messages; optimization by genetic algorithms was based partly on an operation-level model (OLM) of required time to perform certain physical movements on the keypad.

Järvelin, A., Järvelin, A., & Järvelin, K. (2007). s-grams: Defining generalized n-grams for information retrieval. Information Processing & Management, 43(4), 1005–1019.

Enhanced definitions for using s-grams, where the "s" stands for "skip," as a generalization of n-grams in which a number of characters (for letter-based s-grams) or words (for word-based n-grams) are skipped to form the gram; n-grams can be considered s-grams with a skip value of zero, thus requiring adjacency; presents an enhancement to Jaccard distance that is more sensitive to gram counts.

Jinks, A., & Sinteff, B. (1994). Consumer response to AAC devices: Acquisition, training, use, and satisfaction. Augmentative and Alternative Communication, 10(3), 184–190.

Case study that surveyed former patients of an AAC rehabilitation center; there were 76 respondents between 3 and 79 years of age; 71% of respondents received devices and 81% of those devices were taxpayer-funded; 53% of respondents with cerebral palsy (CP) continued using their AAC devices.

Kane, S. K., Church, B. L., Althoff, K., & McCall, D. (2012). What we talk about: designing a context-aware communication tool for people with aphasia. In Proceedings of the 14th international ACM SIGACCESS conference on Computers and accessibility, ASSETS '12, (pp. 49-56). New York, NY, USA: ACM.

Context-aware, adaptive AAC system for people with aphasia; context includes location (via GPS and 802.11), user (via front camera), and conversation partner (via rear camera).

Karberis, G., & Kouroupetroglou, G. (2002). Transforming spontaneous telegraphic language to Well-Formed greek sentences for alternative and augmentative communication. In Proceedings of the Second Hellenic Conference on AI: Methods and Applications of Artificial Intelligence, SETN '02, (pp. 155–166). London, UK, UK: Springer-Verlag.

Telegraphic-to-Full Sentence (TtFS) module that converts telegraphic input (compressed, incomplete, grammatically and syntactically ill-formed) into full sentences that are grammatically and syntactically correct; designed for the Greek language; uses hand-coded information for each word in the lexicon; assumes that all content words are provided and basic order is correct for active voice Greek (subject then object).

Kiss, T., & Strunk, J. (2006). Unsupervised multilingual sentence boundary detection. Computational Linguistics, 32(4), 485–525.

Punkt sentence boundary detection (SBD), a language-independent and unsupervised approach using only criteria that are independent of context; especially relies on detection of abbreviations; defines abbreviations as tight collocations of truncated words with internal or final periods.

Koester, H., & Levine, S. (1996). Effect of a word prediction feature on user performance. Augmentative and Alternative Communication, 12(3), 155–168.

Case study of 14 people who regularly use AAC, including mouth-stick systems, and the effects of word prediction on their typing speed for a "copy phrase" task; demonstrated that the increased cognitive and perceptual costs for using prediction can overwhelm keystroke gains; number of keystrokes was reduced, but keystroke time increased.

Koester, H., & Levine, S. (1997). Keystroke-level models for user performance with word prediction. Augmentative and Alternative Communication, 13(4).

Examines the estimated/theoretical and empirical performance improvements of different keystroke savings models; presents four primary factors in correlating actual and estimated performance improvements from word prediction: average number of searches per character, keystroke savings, keypress time, and prediction-list search time.

Kristensson, P. O., & Vertanen, K. (2012). The potential of dwell-free eye-typing for fast assistive gaze communication. In Proceedings of the Symposium on Eye Tracking Research and Applications, ETRA '12, (pp. 241–244). New York, NY, USA: ACM.

Application of continuous motion typing (e.g. Swype, ShapeWriter, T9 Trace) for letter-based systems using eye-tracking; shows improvement of 20 WPM for dwell-time eye-typing to over 40 WPM for dwell-free eye-typing; uses a theoretically perfect recognizer to give upper bound estimates.

Kristensson, P. O., & Zhai, S. (2004). SHARK2: a large vocabulary shorthand writing system for pen-based computers. In Proceedings of the 17th annual ACM symposium on User interface software and technology, UIST '04, (pp. 43–52). New York, NY, USA: ACM.

Shorthand Aided Rapid Keyboarding (SHARK), that uses sokgraphs (shorthand defined on a keyboard as a graph) to recognize movement patterns on any letter-based keyboard from a precalculated mapping of patterns to words; tested vocabulary of roughly 20,000 sokgraphs; uses both shape and location to define the patterns.

Kushler, C., & Marsden, R. (2008). System and method for continuous stroke word-based text input (US Patent #7453439).

Patent of a continuous motion typing system for letter-based keyboards that uses a dictionary approach with gestural thresholds (e.g. path angles) to perform lexical disambiguation on a superset of letters.

Lesher, G., Moulton, B., & Higginbotham, J. (1998). Techniques for augmenting scanning communication. Augmentative and Alternative Communication, 14(2), 81–101.

Comparison of 14 different switch-based scanning techniques for AAC, including both letter and word prediction; the best character and word-based prediction techniques each provided about 40% switch savings.

Lesher, G., & Rinkus, G. (2002). Domain-Specific word prediction for augmentative communication. In Proceedings of the RESNA 2002 Annual Conference.

Method of deriving word prediction models from domain-specific corpora; case study of using telephone transcripts from the Switchboard Corpus to generate models for 20 different topic domains; shows benefit of using domain-specific models; mentions idea of dynamically switching between statistical models, but does not present an approach.

Lesher, G., & Sanelli, C. (2000). A Web-Based system for autonomous text corpus generation. In Proceedings of ISAAC.

Automatic generation of large corpora by crawling the World Wide Web (WWW) and automatically tagging text blocks with information about genre, style, or education level.

Li, J., & Hirst, G. (2005). Semantic knowledge in word completion. In Proceedings of the 7th international ACM SIGACCESS conference on Computers and accessibility, Assets '05, (pp. 121–128). New York, NY, USA: ACM.

Approach to word prediction that merges n-gram probabilities with semantic knowledge based on pointwise mutual information, with a Lesk-like filter, of co-occurring words in the British National Corpus (BNC); shows prediction improvement as a keystroke savings of 14% for completion of nouns.

Light, J., Beukelman, D., & Reichle, J. (2003). Communicative competence for individuals who use AAC: From research to effective practice. Paul H. Brookes Publishing Co.

Book about AAC research, systems, and therapeutic practices; surveys studies and demographic information showing that many people with motor-speech impairments also have upper limb impairments that prevent the use of sign language or standard QWERTY keyboards.

Lin, C., & Hovy, E. (2003). Automatic evaluation of summaries using n-gram co-occurrence statistics. In Proceedings of the 2003 Conference of the North American Chapter of the Association for Computational Linguistics on Human Language Technology - Volume 1, NAACL '03, (pp. 71–78). Stroudsburg, PA, USA: Association for Computational Linguistics.

Comparison of human evaluation and n-gram co-occurrence for determining how similar machine-produced texts are to human-produced texts for automatic summarization and translation tasks; shows that n-gram co-occurrence is a useful metric that could save on human evaluation efforts.

Lindsay, G., Dockrell, J., Desforges, M., Law, J., & Peacey, N. (2010). Meeting the needs of children and young people with speech, language and communication difficulties. International Journal of Language & Communication Disorders, 45(4), 448–460.

Six case studies consisting of interviews with program managers, teachers, and specialists in speech, language, and communication therapy centers across England; showed a lack of consistency in services and approaches; 7% of children entering school had significant speech and language difficulties; 1% of children had severe and complex communication needs.

Lv, Y., & Zhai, C. (2009). Positional language models for information retrieval. In Proceedings of the 32nd international ACM SIGIR conference on Research and development in information retrieval, SIGIR '09, (pp. 299–306). New York, NY, USA: ACM.

Combination of query-term proximity measurements and passage retrieval into a positioning language model (PLM); breaks documents into "soft" passages based on term clustering and density for each word position; presents 4 proximity-based density functions to estimate PLMs, with the Gaussian density kernel and Dirchlet smoothing performing the best.

Mackenzie, I. S., & Felzer, T. (2010). SAK: Scanning ambiguous keyboard for efficient one-key text entry. ACM Transactions on Computer-Human Interaction, 17(3).

A one-key scanning technique that uses an ambiguous, letter-based keyboard followed by word selection; letter-selection step scans over an alphabet split into 3 keys plus a space; word-selection step uses word prediction based on frequency; used able-bodied participants.

MacKenzie, I. S., & Soukoreff, R. W. (2002). Text entry for mobile computing: Models and methods, theory and practice. Human-computer Interaction, 17 , 147-198.

Survey of mobile, letter-based text entry techniques and combinations of Fitts' law with language models; identifies primary optimization techniques as language prediction and movement minimization; shows that corpora often do not represent user language.

MacKenzie, I. S., & Soukoreff, R. W. (2003). Phrase sets for evaluating text entry techniques. In CHI '03 Extended Abstracts on Human Factors in Computing Systems, CHI EA '03, (pp. 754-755). New York, NY, USA: ACM.

Collection of 500 phrases for use in testing letter-based text entry systems; ecologically validated to represent letter and word frequencies in English.

MacWhinney, B. (2000). The CHILDES Project: Tools for Analyzing Talk. Lawrence Erlbaum.

Book describing the CHILDES project, which collects conversational interactions from children, their caregivers and siblings, as well as bilingual children, second-language learners, and children with various types of language disabilities.

MacWhinney, B. (2007). The TalkBank project. creating and digitizing language corpora: Volume 1, synchronic databases.

Chapter of a book describing the TalkBank project, which collects corpora of first language acquisition, second language acquisition, conversation analysis, classroom discourse, and aphasic language; CHILDES is a sub-project of TalkBank.

Marvin, C., Beukelman, D., & Bilyeu, D. (1994). Vocabulary-use patterns in preschool children: Effects of context and time sampling. Augmentative and Alternative Communication, 10(4), 224–236.

Case study of vocabulary usage by 10 non-disabled, preschool-aged children; similar vocabulary was used at home and at school; reviews vocabulary designs of AAC systems; suggests core vocabulary is 20% of total and structure (function) words are 2% of total.

Matas, J., Mathy-Laikko, P., Beukelman, D., & Legresley, K. (1985). Identifying the nonspeaking population: a demographic study. Augmentative and Alternative Communication, 1(1), 17–31.

Two studies in Washington state to determine the size, characteristics, and intervention needs of school-age nonspeaking students; estimated 3 - 5 potential AAC users per 1,000 students.

Matiasek, J., & Baroni, M. (2003). Exploiting long distance collocational relations in predictive typing. In Proceedings of the 2003 EACL Workshop on Language Modeling for Text Entry Methods, TextEntry '03, (pp. 1–8). Stroudsburg, PA, USA: Association for Computational Linguistics.

Collocation-based word prediction using mutual information within a fixed window size of 50 words; only used pairs of semantically related words (300,000 pairs); hand-tuned and fixed weighting for frequencies of unigrams, bigrams, and collocations.

McCoy, K., Pennington, C., & Badman, A. (1998). Compansion: From research prototype to practical integration. Natural Language Engineering, 4(01), 73–95.

Continuation of work on "Compansion" technique that expands telegraphic input by adding function words and conjugation to an in-order stream of content words based on hand-coded rules; presents plans for practical implementation of an intelligent parser/generator (IPG).

Mehl, M., Vazire, S., Ramírez-Esparza, N., Slatcher, R., & Pennebaker, J. (2007). Are women really more talkative than men? Science, 317(5834), 82.

Longitudinal study of 400 college students in the U.S. and Mexico that sampled their speech using electronically activated recording (EAR) devices; showed that, on average, both men and women speak about 16,000 words per day, of which 32% (about 5,000) were unique words.

Muller, K. R., & Blankertz, B. (2006). Toward noninvasive brain-computer interfaces. Signal Processing Magazine, IEEE, 23(5).

Hex-o-Spell BCI system for letter-based typing that uses surface-level EEG and 2-signal motor imagery; typing rate was 2 - 8 characters per minute and called "world-class spelling speed" for a BCI system on untrained users.

Nielsen, J., & Molich, R. (1990). Heuristic evaluation of user interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '90, (pp. 249–256). New York, NY, USA: ACM.

Efficiency and accuracy of heuristic evaluation of user interfaces using Molich and Nielsen's "9 Heuristics;" shows that 3 - 5 people is the optimal group size for heuristic evaluations.

Nikolova, S., Tremaine, M., & Cook, P. (2010). Click on bake to get cookies: guiding word-finding with semantic associations. In Proceedings of the 12th international ACM SIGACCESS conference on Computers and accessibility, ASSETS '10, (pp. 155–162). New York, NY, USA: ACM.

Visual Vocabulary for Aphasia (ViVA), a semantically organized vocabulary network based on Lingraphica's vocabulary structure, intended for AAC systems used by people with aphasia.

Patel, R., Pilato, S., & Roy, D. (2004). Beyond linear syntax: An Image-Oriented communication aid. Journal of Assistive Technology Outcomes and Benefits, (1), 57–66.

IconCHAT, an icon-based AAC system that uses case grammar to allow for verb-first, non-linear message construction.

Porter, M. F. (1997). Readings in information retrieval. chap. An algorithm for suffix stripping, (pp. 313–316). San Francisco, CA, USA: Morgan Kaufmann Publishers Inc.

Porter stemming algorithm that uses suffix-stripping techniques to approximate lemmatization for the English language.

Rashid, D., & Smith, N. (2008). Relative keyboard input system. In Proceedings of the 13th international conference on Intelligent user interfaces, IUI '08, (pp. 397–400). New York, NY, USA: ACM.

Letter-based input system that uses a blank touch-screen and touch-typing; single word input sequences are disambiguated by the relative positioning of touch locations and a dictionary.

Roark, B., Villiers, J. D., Gibbons, C., & Oken, M. F. (2010). Scanning methods and language modeling for binary switch typing. In Proceedings of the NAACL HLT 2010 Workshop on Speech and Language Processing for Assistive Technologies, SLPAT '10, (pp. 28–36). Stroudsburg, PA, USA: Association for Computational Linguistics.

Comparison of row-column scanning, Huffman scanning, and RSVP for letter-based AAC; shows that language modelling is a big factor in accuracy and speed of Huffman approach; RSVP was slower than row-column scanning with the same language model.

Roy, B. C., Frank, M. C., & Roy, D. (2012). Relating activity contexts to early word learning in dense longitudinal data. In Proceedings of the 34th Annual Meeting of the Cognitive Science Society.

Results from the Human Speechome corpus showing that a child's word acquisition and usage is contextually related to location and activity.

Schler, J., Koppel, M., Argamon, S., & Pennebaker, J. (2006). Effects of age and gender on blogging. In Proceedings of 2006 AAAI Spring Symposium on Computational Approaches for Analyzing Weblogs.

Analysis of 700,000 posts by 20,000 bloggers over a month shows that there are differences in writing style and content between males, females, and writers of different ages; age and gender can be predicted given writing samples; creation of the freely available Blog Authorship Corpus.

Schramm, W. (1954). How communication works. the process and effects of mass communication. *Urbana: University of Illinois Press*.

Continuation of work on the Shannon-Weaver model of communication to incorporate full reciprocity (i.e. feedback) via effects and interaction; reformulation as SMCR (Source-Message-Channel-Receiver).

Shannon, C. E. (1948). A mathematical theory of communication. Bell System Technical Journal, 27, 379–423.

Seminal work on information theory; models information with a logarithmic measure, usually binary digits (bits); models communication with 5 components: an information source, a transmitter, a channel, a receiver, and a destination.

Shannon, C. E., & Weaver, W. (1949). The mathematical theory of communication. University of Illinois Press, 19(7), 1.

Formalization, clarification, and repackaging of work on information and communication theory; asserts definitions for formal problems of communication.

Suen, C. (1979). n-Gram statistics for natural language understanding and text processing. Pattern Analysis and Machine Intelligence, IEEE Transactions on, PAMI-1(2), 164–172.

Representative work on letter-based n-grams in natural language processing; analyzes a corpus of 1 million words and presents frequency statistics.

Todman, J. (2000). Rate and quality of conversations using a text-storage AAC system: Single-case training study. Augmentative and Alternative Communication, (pp. 164–179).

TALK system that incorporates multiple AAC features, such as labels that hide shuffled selections (e.g. "Hi," "Hello," "Hi there"), subsequent moves based on turns, holistic phrases, advance planning based on conversational progress, and feedback utterances (e.g. "uh-huh"); results of a single-user case study showed communication rates of 30 WPM.

Todman, J., Alm, N., & Elder, L. (1994). Computer-aided conversation: A prototype system for nonspeaking people with physical disabilities. Applied Psycholinguistics, 15(01), 45–73.

Simulated results of using an utterance-based AAC system that follows predicted sequences of speech acts; given a specific topic, conversations progressed quickly and were recoverable.

Trinh, H., Waller, A., Vertanen, K., Kristensson, P. A., & Hanson, V. (2012). iSCAN: a phoneme-based predictive communication aid for nonspeaking individuals. In

Proceedings of the 14th international ACM SIGACCESS conference on Computers and accessibility, ASSETS '12, (pp. 57–64). New York, NY, USA: ACM.

Predictive AAC system based on 42 phonemes (17 vowels and 25 consonants); uses mixture model with 6-gram phonemes and 3-gram words; tested on 16 able-bodied participants and 1 cerebral palsied participant.

Trnka, K., & McCoy, K. (2007). Corpus studies in word prediction. In Proceedings of the 9th international ACM SIGACCESS conference on Computers and accessibility, Assets '07, (pp. 195–202). New York, NY, USA: ACM.

Survey of corpus studies for AAC; shows that no large, authentic AAC corpora exist; shows that approximations, such as with out-of-domain data, are useful even with advanced language modeling techniques, such as topic modeling.

Trnka, K., Yarrington, D., McCoy, K., & Pennington, C. (2006). Topic modeling in fringe word prediction for AAC. In Proceedings of the 11th international conference on Intelligent user interfaces, IUI '06, (pp. 276–278). New York, NY, USA: ACM.

Comparison of two topic-modelling algorithms for letter-based prediction, using trigrams, of fringe words for AAC.

Tzoukermann, E., Klavans, J., & Jacquemin, C. (1997). Effective use of natural language processing techniques for automatic conflation of multi-word terms: the role of derivational morphology, part of speech tagging, and shallow parsing. SIGIR Forum, 31(SI), 148–155.

Description of system that uses NLP techniques, especially derivational morphology and phrasal relations, to determine semantically related terms for information retrieval.

Udwin, O., & Yule, W. (1990). Augmentative communication systems taught to cerebral palsied children - a longitudinal study:I. the acquisition of signs and symbols, and syntactic aspects of their use over time. British Journal of Disorders of Communication, 25(3), 295–309.

Year-long observation of conversational behavior by 40 cerebral-palsied children with language impairments showed that 80% of utterances could be labelled using just 4 categories; sign and symbol AAC systems being used were severely restrictive.

Van Balkom, H., & Welle Donker-Gimbrere, M. (1996). A psycholinguistic approach to graphic language use. Augmentative and alternative communication: European Perspectives, (pp. 153–170).

Examination of language production behaviors in users of graphical AAC systems shows shorter and less complete narratives, single-word utterances, and shorter average sentences.

Van Den Bosch, A. (2006). Scalable classification-based word prediction and confusible correction. Traitement Automatique des Langues, 46(2), 39–63.

Application of a IGTree, a decision-tree algorithm for multi-label classification, to word prediction suggests that prediction accuracy increases at a log-linear rate with more training data; discarding low-frequency words from training data (i.e. the long tail) does not improve results; left-context-only prediction is not as good as left-and-right-context prediction.

Van Den Bosch, A., & Berck, P. (2009). Memory-based machine translation and language modeling. In The Prague Bulletin of Mathematical Linguistics.

Memory-based machine translation (MBMT) that maps all possible trigram translations in a source language to trigrams in a target language; full sentence translation exploits overlaps.

Vertanen, K., & Kristensson, P. O. (2011). The imagination of crowds: Conversational AAC language modeling using crowdsourcing and large data sources. In Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP), (pp. 700–711). ACL.

Creation of a fake AAC corpus by crowdsourcing non-AAC users and asking what they would say if they were AAC users; seed corpus (6,000 utterances) amplified by searching Twitter, Usenet, and other corpora for utterances with low word-error rate (WER) and low cross-entropy per word.

Walsh, T. (2010). Utterance-based systems: organization and design of AAC interfaces. In Proceedings of the 12th international ACM SIGACCESS conference on Computers and accessibility, ASSETS '10, (pp. 327–328). New York, NY, USA: ACM.

Guided, full-utterance AAC system that uses activity contexts and limited word substitution with optional keyboard input and button relabelling.

Wandmacher, T., & Antoine, J. (2006). Training language models without appropriate language resources: Experiments with an AAC system for disabled people. In Proceedings of LREC.

Comparison of three techniques to reduce the dependence of statistical language models on their training resources: cache model that augments probabilities of last N inserted words, a user dictionary, and interpolation between a base model and a dynamic user model; the dynamic user model worked best (trigrams with a linear interpolation and EM-like weighting).

Westerman, S. J., & Cribbin, T. (2000). Mapping semantic information in virtual space: dimensions, variance and individual differences. International Journal of Human-Computer Studies, 53(5), 765–787.

Comparison of 2D and 3D organization of semantic information for manual search; suggests that the amount of additional semantic content in 3D representation is unlikely to be worth the additional cognitive demands of a third dimension.

Wolpaw, J. (2007). Brain-computer interfaces (BCIs) for communication and control. In Proceedings of the 9th international ACM SIGACCESS conference on Computers and accessibility, Assets '07, (pp. 1–2). New York, NY, USA: ACM.

Surface-level EEG, P300 BCI system being distributed for testing in user homes.

Wolpaw, J., Birbaumer, N., McFarland, D., Pfurtscheller, G., & Vaughan, T. (2002). Brain-computer interfaces for communication and control. Clinical Neurophysiology, 113(6), 767–791.

Survey of BCI systems for communication and control operations; current systems have maximum information transfer rates of 10 - 25 bits per minute.

Zhang, X., & MacKenzie, S. (2007). Evaluating eye tracking with ISO 9241 - part 9. In Proceedings of the 12th international conference on Human-computer interaction: intelligent multimodal interaction environments, HCI'07, (pp. 779–788). Berlin, Heidelberg: Springer-Verlag.

First evaluation of eye-tracking techniques using the evaluation standard in ISO 9241-9; comparison of three techniques: long dwell-time, short dwell-time, and keypress during fixation; keypress during fixation was best with throughput of 3.8 bits of information per second compared to 4.7 bits for a standard computer mouse.