

# ABSTRACTS OF RECENT LITERATURE

by

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Abstracts are drawn primarily from the orthotics, prosthetics, and sensory aids literature. Selections of articles were made from these journals:

*American Journal of Otolaryngology*  
*American Journal of Physical Medicine and  
Rehabilitation*  
*ASHA (American Speech and Hearing Association)  
Assistive Technology*  
*Canadian Journal of Rehabilitation Ear and  
Hearing*  
*Ergonomics*  
*Foot and Ankle*  
*Journal of Biomechanics*  
*Journal of Medical Engineering Technology*  
*Journal of Speech and Hearing Research*  
*Laryngoscope*  
*Paraplegia*  
*Physical Therapy*  
*Physiotherapy*  
*Scandinavian Journal of Rehabilitation Medicine*  
*Visual Impairment and Blindness*

## **PROSTHETICS, ORTHOTICS, AND RELATED TOPICS**

**Acceptable Loads and Locomotor Patterns Selected in Different Carriage Methods.** Nottrodt JW, Manley P, reprinted from *Ergonomics* 32:945-957, 1989.

The purpose of this study was twofold: (1) to assess the reliability of both the psychophysical method in determining maximum acceptable loads (MAL) and the use of selected gait parameters in

describing locomotor patterns; and (2) to describe and compare the locomotor patterns associated with a number of common load carriage strategies involving the hands and arms. A test-retest experimental design was utilized. Ten males performed five tasks comprising four load carriage conditions and one normal walking condition over a 10 m walking distance. The MAL for each carriage task was determined using procedures modified from those described by Snook *et al.* (1970). Preferred walking speed was calculated from the time taken to cover a standardized portion of the walking distance. The other gait parameters/Mstride length, cadence and total and double support periods/Mwere obtained using a footswitch technology as described by Wall *et al.* (1981). The results demonstrated that the procedures used in this study were reliable, in that no significant test-retest differences were found for any of the dependent variables (MAL and gait parameters). No significant differences in MAL were found between the carriage strategies involving two hands, but significantly less mass was chosen in the one-hand carriage condition. Only the two-handed arms-straight carriage condition resulted in significantly different preferred walking speeds. All load carriage conditions except the one-hand carriage condition resulted in significant changes in stride length and/or cadence when compared with normal walking. Only one condition, involving the heaviest MAL, resulting in significantly different total and double support periods when compared with normal walking. There appear to be discrepancies in the literature regarding the effects of load carriage on the various gait parameters. Specific

task characteristics, such as gender, age and occupation, may also be confounding factors. [JEE]

**Accessibility of Urban Facilities to the Disabled: A Summary of Descriptive Survey Results.** Zissermann L, Tumiel J, *Paraplegia* 27:370-371, 1989.

This article describes a 1984 study of the architectural accessibility characteristics of a proportional stratified random sample of facilities in the center of Seattle, WA. The survey area was 10.5 square miles, and included the central business district, the medical center, two parks, and an historical site. The survey team consisted of two faculty members and 24 senior occupational therapy studies in cooperation with the major and the local Independent Living Center. Twenty-five types of facilities likely to be used by the disabled were investigated; 400 buildings were randomly chosen. The final survey tool contained 146 response items on assessment of parking, entrance, and other architectural features plus questions for the facility representative concerning usage by handicapped individuals.

Most entrance doorways, registration desks, corridors, restroom commodes, faucets, and restaurant facilities were accessible. Few facilities had braille markers or flashing lights for the hearing impaired. Few outside doors were power operated. Almost half of the facilities had inaccessible toilets in public restrooms or hotel restrooms. A quarter of the facilities had at least one step to be negotiated before the main entrance was reached, while two-thirds of multilevel restaurants had all levels accessible to the disabled. [JEE]

**An Apparatus and a Method for Determining the Slip Resistance of Shoes and Floors by Simulation of Human Foot Motions.** Gronqvist R, Roine J, Harvinen E, et al., reprinted from *Ergonomics* 32:979-995, 1989.

An apparatus to measure the coefficient of kinetic friction ( $\mu_k$ ) between the shoe sole and the underfoot surface was constructed, and a method including criteria to evaluate the risk of slipping during walking was developed. The apparatus is a prototype stationary step simulator capable of simulating the movements of a human foot and the forces applied to the underfoot surface during an actual

slip, and the drainage capability of the contact surface between the shoe sole and the flooring when different lubricants or contaminants are used.

The apparatus consists of a movable artificial foot controlled by a computer with the aid of three hydraulic cylinders. The frictional force ( $F_{gn}$ ), the normal force ( $F_N$ ) and their ratio ( $\nu_k = F_{gn}/F_N$ ) are measured with a two-way force platform when the foot slides along its surface. Two separate gait patterns, heel-slide ( $\nu_{k1}$ ) and sole-slide ( $\nu_{kz}$ ) gait pattern, are used for the evaluations. The method classifies studies shoe, lubricant and underfoot surface combinations into five slip resistance classes according to the measured  $\nu_{k1}$ . The slip resistance assessments are specified with some complementary safety criteria, e.g., the ratio  $\nu_k/\mu_{kz}$ . The reliability of the developed measurement method was assessed in an international comparison test. According to available results discussed in this paper, our method seems to be valid and the slip resistance measurements seem to be repeatable. [JEE]

**An Arm-Powered Racing Bicycle.** Cooper RA, *Assist Technol* 1:71-74, 1989.

An arm-powered bicycle permits paraplegics to propel themselves rapidly. The bicycle described in this article was used in the National Triathlon for the Physically Challenged. The frame is constructed of tubular chromolly steel with brass-welded joints. The bicycle is less than 2 meters long and can be transported in a passenger automobile. It has a bucket-type seat in which the user sits with legs bent and held close to the chest. This position improved balance and allows for more force to be put into propelling the bicycle. The bicycle is low enough so that hands can be placed on the ground for balance when starting and stopping. The user transfers into the bicycle by leaning it against the wheelchair or a stable object or having someone hold it. Unlike other bicycles for paraplegics, this version does not have side wheels. This feature improves turning ability, reduces weight, and eliminates the risk of bouncing from one side wheel to the other. The steering and drive train are interconnected. The user steers with the arms. Brake levers are mounted on the front crossmember of the frame. The bicycle, which has 12 speeds, was raced by an individual with T9-T10 paraplegia who attained speeds in excess of 8.9 meters per second (20 mph), and

maintained an average speed exceeding 6.7 meters per second (15 mph) over the 10-km course. [JEE]

**Basic Principles of Splinting the Hand.** Duncan RM, reprinted from *Phys Ther* 69:1104-1116, 1989.

This article presents the basic principles needed in the fabrication of static and dynamic splints. The principles are defined, and examples are used as illustrations. The biomechanics of dynamic splinting are described, with special attention given to low-profile dynamic splinting. Several low-profile dynamic splints are described, with current indications presented in case studies with supporting documentation for appropriate splinting protocols. [JEE]

**Body-Powered Hand Prosthesis with Low Operating Power for Children.** Kruit J, Cool JC, reprinted from *J Med Eng Tech* 13:129-133, 1989.

For unilateral below-elbow amputated children a new elbow-controlled hand prosthesis has been developed. Since the triceps of young children have insufficient power to activate normal spring-closing hands, a special mechanism with low operating power has been developed for this prosthesis. A stiff spring gives a good gripping force. When the elbow is slightly extended this spring is switched off, and by further extension the hand is opened against a weak spring. So far, six children have used this special prosthesis. Their initial enthusiasm resulted in an improved system, which is now being designed. [JEE]

**Combined Effect of Foot Arch Structure and an Orthotic Device on Stress Fractures.** Simkin A, Leichter I, Giladi M, et al., reprinted from *Foot Ankle* 10:25-29, 1989.

Two hundred and ninety-five male military recruits were studied; none had pes planus or pes cavus. Half were randomly chosen and fitted with military stress orthotics (Langer Biomechanics Group, Deer Park, NY) before a vigorous 14-week training period. The device has a semirigid 3.5-mm polyolefin plastic module extending from the heel to the metatarsal heads. A 45-durometer styrene butadene rubber hind-post at 3 degrees varus was added to the shell. On top of the shell was a thin layer of open cell urethane foam (PPT) laminated

with moisture-resistant expanded vinyl. Thirty soldiers discontinued use of the device because they could not accommodate to it. The final study involved 113 with the device and 152 without it. Before training, lateral x-rays of both feet were taken barefoot while weightbearing. Films were marked with calcaneal angle (between tangent to the inferior surface of the calcaneus and the horizon); forefoot angle (between the horizon and the tangent to both the inferior surface of the medial sesamoid and the inferior surface of the talar head); and height to length ratio (ratio between the height and length of the arch). Height was the distance from the inferior talar head to the platform; length was the distance from posterior calcaneus to the anterior first metatarsal head.

Stress fractures, usually unilateral, were diagnosed from X-ray and/or scintigram evidence. Femoral and tibial fractures were more prevalent in those with high calcaneal angle, while metatarsal fractures predominated in flatter feet. All who had multiple fractures had a large calcaneal angle. The orthosis reduced incidence of femoral fractures in high arched feet and the number of metatarsal fractures in low-arched feet. The device did not affect the number of tibial fractures in either high- or low-arched feet. [JEE]

**Comparison of Soft Dressing and Rigid Dressing in the Healing of Amputated Limbs of Rabbits.** Frogameni AD, Booth R, Mumaw LA, et al., reprinted from *Am J Phys Med Rehabil* 68:234-239, 1989.

Thirty white male New Zealand rabbits underwent forelimb amputation below the elbow under sterile operating conditions. Fifteen of the amputation stumps were dressed in a soft, bulky dressing while the remaining 15 rabbits had their stumps immobilized in a rigid plaster dressing. On each of the postoperative days, 3, 6, 9, 12 and 15, three rabbits from each group were killed and the amputated limb disarticulated and fixed in formalin. Then, histological examination of the suture line and subcutaneous tissue was carried out by a pathologist to determine the effects, if any, that the type of immobilization has on wound healing. Based on microscopic evaluation of wound approximation, interstitial edema and presence of granulation tissue, there was no significant difference between the stumps immobi-

lized in a plaster dressing and those dressed with a soft, bulky dressing. [JEE]

**A Computer-Controlled Knee Prosthesis: A Preliminary Report.** Peeraer L, Tilley K, Van der Perre G, *J Med Eng Tech* 13:134-135, 1989.

An experimental system designed to obtain knee flexion during stance and speed-dependent swing phase control is described. The knee mechanism has an electromagnetic brake capable of energy dissipation. Energy requirements for active functions are small compared to the amount of energy dissipated during level walking. Sensors at the knee determine knee angular position and angular speed. Heel and ball sensors detect force. The control unit has two linked 6809 microprocessors. One is a mode recognizer which continuously samples sensory information to determine locomotor mode, gait subphases and velocity as it checks for stumble situations. The second computer is a servo-controller which provides a digital output to the circuit that generates a pulse-width-modulated signal to the brake.

A walking trial with an ischial-bearing orthosis demonstrated that knee flexion can be allowed and limited during stance phase. Future developments will be directed toward implementing an intent recognizer, determining ramp climbing and transitional movements, possibly with electromyographic signals. Control algorithms will be refined and safety precautions will be introduced into the software and hardware. [JEE]

**Correction for Gravity in Isokinetic Dynamometry of Knee Extensors in Below Knee Amputees.** van der Leeuw GHF, Stam HJ, van Nieuwenhuyzen JF, *Scand J Rehabil Med* 21:141-145, 1989.

Eight below-knee amputees were tested on an isokinetic dynamometer with the prosthesis on the amputated side and then on the nonamputated side. The device measures torque produced by a muscle group at a preset angular velocity and range of motion. A torque curve is obtained by measuring isokinetic torque during passive extension with muscles fully relaxed producing a passive torque curve, or gravity correction curve. The testing instrument was specially designed to allow for passive torque measurement.

Contrary to what was expected on the basis of mathematical analysis, the passive torque of the knee extensors was a straight line. Reproducibility of the passive curve was high. Large differences existed between individual subjects. The value of the correlation on the nonamputated side was always higher than at the amputated side, which was caused by the difference in mass below the knee. [JEE]

**Current Advances in the Use of Pressure Splints in the Management of Adult Hemiplegia.** Johnstone M, reprinted from *Physiotherapy* 75:381-384, 1989.

Abnormal muscle tone and loss of sensory interpretation frequently present as major barriers to rehabilitation. A way must be found to hold fully corrective inhibiting positioning while rehabilitation is undertaken. Associated reactions and overflow of tone must be diverted away from anti-gravity tonal patterns into the opposing low tonal patterns while enough limb stability is offered to allow for early weightbearing exercise and dynamic sensory input. Pressure splints supply this need. [JEE]

**Design and Development of a Powered Vehicle for Handicapped People.** Marinissen AH, Oldenkamp I, *J Med Eng Tech* 13:149-155, 1989.

A development project begun in 1986 is now in the construction stage of a mock-up for a gasoline-powered car to be used by persons with disabilities. The design is based on responses from disabled people who use commercial small vehicles. Their disabilities ranged from impairment of one or both legs, polio, multiple sclerosis, and visual, cardiac, respiratory, arm, or back problems. The new vehicle is propelled by a 50-cc gasoline engine mounted at the rear. Front and aft leaf springs provide suspension. Subjects who tested the vehicle preferred an aft sliding door by a slight margin over the hinge door for easing transfer from a wheelchair. The mock-up has a front-mounted engine. Exterior styling is in progress, particularly with regard to the rear contour. A prototype is being constructed for user trials to establish the quality of the chassis construction and the suspension system. [JEE]

**A Digital Video Fluoroscopic Technique for Spine Kinematics.** Breen A, Allen R, Morris A, reprinted from *J Med Eng Tech* 13:109-113, 1989.

The kinematic behavior of the vertebral segments under the influence of spinal injury and other mechanical problems is difficult to quantify in patients. This paper describes the use of a calibration model and human subjects to investigate the accuracy of a method for determining lumbar intervertebral rotations using images digitized from an image intensifier. The main influences were found to be observer error in marking coordinates, scaling of the image presented by the computer's monitor, distortion caused by out-of-plane images and loss of image quality as a result of scattered radiation from the soft tissues. The technique may be valuable in the light of its efficiency and low X-ray exposure to patients. [JEE]

**Electric Versus Pneumatic Power in Hand Prostheses for Children.** Plettenburg DH, reprinted from *J Med Eng Tech* 13:124-128, 1989.

Most externally powered hand prostheses for children with a unilateral congenial below-elbow amputation are myoelectrically controlled. All of them are electrically powered. Despite the success of fitting children with this kind of prostheses, there are some disadvantages; prosthetic weight is high, operating speed is low, the system is vulnerable and its size prohibits fitting it to patients with a long fore-arm stump. It will be shown that pneumatic power can overcome most of these disadvantages. [JEE]

**Hybrid-Powered Wheelchair: A Combination of Arm Force and Electrical Power for Propelling a Wheelchair.** Cremers GB, reprinted from *J Med Eng Tech* 13:142-148, 1989.

Many of the handicapped who could use a hand-driven wheelchair do not have sufficient arm force, arm movement and/or endurance for proper propulsion. Furthermore, there are users of electric wheelchairs who still have some arm functions and strength. In some cases a hand-driven chair, which can be propelled with reduced arm power, could be a better solution. By means of simulation, a study has been carried out to investigate the possibility of propelling a wheelchair by means of hybrid powering. Hybrid powering can be defined as a combination of arm force and electrical power. Using this hybrid principle, the necessary arm force can be decreased. [JEE]

**An Intelligent End-Effector for a Rehabilitation Robot.** Gosine RG, Harwin WS, Furby LJ, et al., reprinted from *J Med Eng Tech* 13:37-43, 1989.

A UMI TRX robot, modified with limited end-effector sensors and a restricted but effective vision system, is currently used in a developmental education setting for severely physically disabled children. The low physical and cognitive abilities of the children involved in the project require a semi-autonomous robot with environmental sensing capability to operate in a task oriented mode. A variety of low-cost sensors including proximity, distance, force and slip sensors, have been investigated for integration in end-effectors for the RTX robot. The sensors employed on a modified end-effector are detailed and experimental results are presented. A design for an end-effector with integrated sensors is discussed. The integration of the sensor information into a high-level, task-oriented programming language is detailed and examples of high-level control sequences using sensor inputs are presented. Finally, the development of intelligent gripping strategies based on sensor information is discussed. [JEE]

**A Low-Cost FES Exercise Bicycle for Training Paraplegics at Home.** Mulder AJ, Hermens HJ, Janssen F, et al., reprinted from *J Med Eng Tech* 13:90-92, 1989.

The success of FES exercise programmes for training paraplegic muscles at home depends highly upon the availability of reliable, easy-to-use and inexpensive training equipment. For endurance training, FES bicycle exercisers are well accepted. However, they are not suited for home use due to the high expense of commercially available equipment. This paper describes the development of a FES exercise bicycle for use at home. It consists of a standard bicycle ergometer with minimum modifications. The exerciser can be used by the patient sitting in the wheelchair, and may be used with any two-channel muscle stimulator. [JEE]

**The Monoselector: A New Actuator for an Environmental Control System.** Leliveld WH, reprinted from *J Med Eng Tech* 13:44-47, 1989.

Within the Division of Medical Electrical Engineering of the Eindhoven University of Technology, a portable microprocessor-controlled actuator for an

environmental control system has been developed. It allows severely physically disabled persons to remotely control up to 16 different electrical appliances using only a single switch. The actuator, the 'Monoselector,' actuates the Busch Timac X-10 remote control system. The complete system is very easy to install, transportable, flexible, easy to use and has extensive control possibilities. Since its introduction at the Hannover Trade Fair in 1987 the Monoselector has been commercially available. [JEE]

**Performance Assessment of the Terry Fox Jogging Prosthesis for Above-Knee Amputees.** DiAngelo DJ, Winter DA, Ghista DN, et al., *J Biomech* 22:543-548, 1989.

The Terry Fox jogging prosthesis was developed at Codoke Hospital. It has a large compression spring in the shank which attenuates the peak of impact force. Energy is released at push-off to aid in propelling the runner forward and upward. The prosthesis has an open-end suction socket, four-bar linkage knee unit with pneumatic swing control, a Griessinger multi-axis foot, and a telescoping shank which works in parallel with a coil spring. A two-way air damper in the shank reduces impact force and prevents the coil spring from collapsing completely. The shank allows the residual hip to lower in a way similar to that of a nonamputee jogger who flexes the knee. Hip lowering controls pelvic rotation and eliminates vaulting over the prosthesis.

A 21-year-old man with right above-knee amputation was tested using the Terry Fox jogging prosthesis in a gait laboratory. His data were compared with that of nonamputee joggers.

The test showed that the intact leg compensated for the prosthesis by generating 90 percent of the total energy generated by both legs. The amputee still vaulted over the prosthesis in the toe-off position. Ground reaction forces peaking at 4.3 times body weight, almost double that for a nonamputee jogger, were recorded at early stance when the amputee could not flex the prosthetic knee. The spring absorbed 60 percent of peak vertical loads, but did not provide a forward thrust at toe-off. Perhaps a heavier spring would be active over the entire range of loads and would eliminate need for an air damper. Swing time of the prosthesis

exceeded that of the sound limb because the prosthesis was hyperextended at the end of swing phase and ready for weight-acceptance. The swing phase mechanism did not control the prosthesis during the increased knee angular velocities associated with jogging. [JEE]

**Propulsion Technique in Hand Rim Wheelchair Ambulation.** van der Woude LHV, Veeger HEJ, Rozendal RH, reprinted from *J Med Eng Tech* 13:136-141, 1989.

Six male subjects took part in a pilot study on a stationary wheelchair ergometer. They propelled the ergometer at a speed of 0.55, 0.83, 1.11 and 1.39 m/s. The speed increased every three minutes. Inertia and friction force were adjusted proportional to body weight. Every third minute 750 samples of the torque and velocity signals were digitized at a sampling rate of 100 Hz. From the signals mean external power output ( $P_{\text{mean}}$ ), peak power ( $P_{\text{peak}}$ ), mean torque ( $M_{\text{mean}}$ ) and peak torque ( $M_{\text{peak}}$ ), work/cycle, 'time-to-peak' (TTP), cycle duration (CT), push time (PT) and recovery time (RT) were determined in relation to mean velocity (speed).

For the mean velocity range studied, analysis of variance ( $P < 0.05$ ) revealed significant increments in  $P_{\text{peak}}$ ,  $M_{\text{peak}}$ ,  $P_{\text{mean}}$ ,  $M_{\text{mean}}$  and work/cycle with increasing mean velocity, whereas CT and PT showed a significant decrease. TTP showed a decrease with speed which, however, was not statistically significant. The RT showed no significant variation as well. Our previous research into propulsion techniques mainly focused on movement frequency and timing and was conducted during wheelchair ambulation on a motor driven treadmill. Despite considerable inter-individual variation in terms of movement pattern, current and previous studies showed similar trends in the timing pattern (cycle, push, recovery duration) with respect to speed. Theoretical considerations regarding variations in peak torque and work/cycle with respect to velocity are supported by the current results. Both torque and work/cycle are important technique parameters and of relevance in speed regulation. The data also suggest that wheelchair ambulation can be validly simulated and studied with the special purpose wheelchair ergometer. Between-subject variation suggests the effect of wheeling experience and needs further research. [JEE]

**The Use of Information Technology in Rehabilitation: An Overview of Possibilities and New Directions in Applications.** Soede M, *J Med Eng Tech* 13:5-9, 1989.

Information technology is the mechanical processing of information with computers. Applications can be classified according to user: (a) research and development workers, (b) therapists, or, (c) handicapped persons. Computers are used to assess cognitive, linguistic, and motor abilities, and can be used in training. Specialized software and expert-system shells, emphasize that the limitation in use of information technology is the level of expert knowledge itself. Although good programs for specific skills exist, there is a severe lack of a general model to link these programs. Computers enhance communication and show the client good possibilities for professional and leisure-time use. Most systems use normal texts but size and resolution of symbols or pictures are insufficient. Voice output is becoming a more accepted medium, but requires better quality for lower prices. The problem of restricted entry-speed is unsolved. Telebanking, teleshopping, and telework can substitute for mobility to a limited extent. Telecommunication stimulates the desire to make contact; thus, it enhances mobility. Alarm systems have simple technology, but problems involving safety and reliability requirements are complex. Computers offer employment possibilities. Manipulators for personal use can aid telephoning and reading books. Robotic manipulators require computer power to control them and complex conversion techniques must control the large number of degrees of freedom possessed by manipulators. Wheelchair control can be achieved with head motion, voice, or small finger force. Advanced prostheses use sensors for feedback of force and position. Miniaturization and low-power consumption, large memory capacity, and fast operation are needed for functional electrical stimulation.

Common application problems are: adapted interfacing; dedicated versus consumer technology; and artificial intelligence, in which computers are programmed to do the same task as intelligent people do by simulating human thinking. [JEE]

**Workspace for Disabled People.** Nowak E, reprinted from *Ergonomics* 32:1077-1088, 1989.

The paper aims at determining the workspace for disabled young people. The investigation embraced a group of young people with motor dysfunction of lower extremities. Seventeen measurements were taken of 32 boys and 45 girls aged 15-18. There are significant differences in functional dimensions of the arm between the healthy and the disabled populations. The differences clearly indicate that there is a need for different shaping of space in which people of limited motor efficiency must function. A method based on Das and Grady's concept was used in determining workspace. This method was modified by the author. The method allows determination of workspace by means of several simple anthropometric measurements. Workspace for young people investigated was determined for the sitting position in transverse and sagittal planes. The results of the investigation constitute data for design and estimation of workplaces for disabled young people with motor dysfunction of lower extremities. The results can also be used to determine functional space in classrooms, school workshops, educational and rehabilitation centers. [JEE]

## SENSORY AIDS AND REHABILITATION

**Acoustic and Physiological Reaction Times of Stutterers and Nonstutterers.** Peterms HFM, Hulstijn W, Starkweather CW, *J Speech Hear Res* 32:668-680, 1989.

The results of subjecting 20 stutterers and 20 matched controls to a variety of experiments showed that the reaction times of both groups were increased by longer utterances, but the result was proportionally greater for stutterers. Pressure to respond quickly produced longer reaction times in both groups, but, again, more emphatically among the stutterers. These findings suggest "stutterers may have difficulty in the motor programming of speech behaviors." [JDS]

**Braille—Implications for Living.** Stephens O, *J Visual Impairm Blindn* 83:288-289, 1989.

The position of the American Council of the Blind emphasizes the primacy of braille as "the only

medium of literacy available to blind persons." Its teaching to blind children is vital, but it is also of value to persons blinded in adulthood. The trend toward its deemphasis should be reversed. [JDS]

**Cerebellopontine Angle Epidermoid in a Noise-Exposed Patient.** Miller MH, Coker NJ, *Ear Hear* 10:262-265, 1989.

In the course of a hearing-conservation program, a person with a cerebellopontine-angle epidermoid was identified. The case models the referral-treatment consequences of a hearing-conservation program, despite its primary function of prevention of noise-induced hearing loss. [JDS]

**Coalition for Information Access for Print Handicapped Readers (CIAPHR).** Huebner KM, Kelly J, Davis B, *J Visual Impairm Blindn* 83:303-305, 1989.

CIAPHR brings together agencies serving blind people in order to establish and maintain a centralized source of information about materials in special formats for blind and visually impaired persons. It has set guidelines for those interested in joining the network. [JDS]

**Computer-Designed Cognitive-Perceptual Training of Closed Head Injury Patients after Spontaneous Recovery. Study 2: Non-Speeded Tasks.** Ethier M, Baribeau JMC, Braun CMJ, *Can J Rehabil* 3(1):7-16, 1989.

Following 6 months of cognitive-perceptual training, 19 men and three women who had severe closed-head injuries practiced for ten sessions under either massed (continuous repetitions) or spaced (twice each week) conditions using 25 computerized exercises. Improvements occurred on 32 of 34 measures, with spaced practice having a slight advantage over massed, and the greatest amount found in auditory, memory, attention, visuospatial, and problem-solving tasks. Of six predictors of improvement, only presence of coma after initial injury was significant. [JDS]

**Early Rehabilitation in Trauma Centers: Have Speech-Language Pathology Services Progressed?** Schwartz R, *ASHA* 31(8):91-94, 1989.

Results of two surveys of trauma centers in the U.S. show that only 69 percent have speech and language services in acute settings, as opposed to 74 percent in occupational therapy and 87 percent in physical therapy settings. Additional topics covered in the surveys were diagnosis, coma stimulation, augmentative communication, and follow-up speech pathology. [JDS]

**The Importance of Consonant-Vowel Intensity Ratio in the Intelligibility of Voiceless Consonants.** Freyman RL, Nerbonne GP, *J Speech Hear Res* 32:524-535, 1989.

Testing 50 normally-hearing adults, the authors found variations in C-V ratio accounted for much of the variation in intelligibility of some voiceless consonants. Results varied by speaker and C-V pairs, leading authors to speculate that audibility of consonants must be accounted for in the analysis of speech-recognition data. "When stimuli are calibrated according to vowel intensity, the only importance of C-V ratio appears to be that it determines absolute consonant level, and therefore affects consonant audibility." [JDS]

**Investigation of Tinnitus Induced by Sound and Its Relationship to Ongoing Tinnitus.** George RN, Kemp S, *J Speech Hear Res* 32:366-372, 1989.

Temporary tinnitus induced by a monaural sound was unrelated to level, bandwidth, or center frequency of the stimulating input. In a second experiment with 53 people, the investigators found individual differences in tinnitus produced that were related to ongoing tinnitus, suggesting that some ongoing tinnitus may result from the same auditory process causing the induced tinnitus. [JDS]

**Issues Related to Literacy of Legally Blind Learners.** Rex EJ, *J Visual Impairm Blindn* 83:306-313, 1989.

Employers as well as educators are concerned with literacy when it is broadly defined as the ability to relate in print to language, mathematics, and computer use. The author addresses teacher preparation and related issues of concern to education and rehabilitation of blind persons. [JDS]



**Lip Movement in Apraxia of Speech.** Roben DA, Bean C, Folkins JW, *J Speech Hear Res* 32:512-523, 1989.

The lip movements of five neurologically impaired patients with speech apraxia showed differences in timing and velocity between movement onset of the two lips when accurate and inaccurate utterances were compared. The authors conclude that "some apraxic speakers do not have a defect in the ability to produce high movement velocities." [JDS]

**Literacy: The Key to Opportunity.** Schroeder F, *J Visual Impairm Blindn* 83:290-293, 1989.

Braille, as seen from the standpoint of the National Federation of the Blind, is an essential tool for the independent functioning of blind persons. Present criteria for deciding between it and large print are imprecise, and attitudes toward braille are often negative. "When we, as blind people, seek to change the conception of blindness held by professionals and by society-at-large, we meet resistance founded in the belief that it is the professional who knows what is best for the blind person." [JDS]

**Loss of Residual Hearing after Cochlear Implantation.** Boggess WJ, Baker JE, Balkany TJ, *Laryngoscope* 99:1002-1005, 1989.

Assessment of 40 consecutive persons 2 to 24 months following cochlear implant revealed that, of 12 who had some residual hearing initially, thresholds were raised significantly at all frequencies except 4000 Hz in the implanted ear and not significantly in the other ear. The 25 mm electrode array was implanted in each of these cases. [JDS]

**Multisensory Narrative Tracking by a Profoundly Deaf Subject Using an Electrocutaneous Vocoder and a Vibrotactile Aid.** Lynch MP, Eiler RE, Ollers DK, Urbano RC, Pero PJ, *J Speech Hear Res* 32:331-338, 1989.

After 41 hours of training in tactual word recognition, a congenitally profoundly deaf adult tracked a narrative under three conditions: lipreading with aided hearing (LH), lipreading and tactual vocoder (LV), and lipreading, tactual vocoder, and aided hearing (LVH). Her LVH tracking was superior to LH and LV. When a Tactaid II replaced the

vocoder, she achieved a similar result: combining information from the three sources resulted in the highest scores. When the Tacticon 1600 and the Tactaid II were compared, her performance favored the Tactaid. [JDS]

**Placebo Effect in Surgery for Meniere's Disease: Nine-Year Follow-Up.** Bretlau P, Thomsen J, Tos M, Johnsen NJ, *Am J Otol* 10:259-261, 1989.

Of the original 30 patients with Meniere's syndrome, 23 were retested nine years after either placebo surgery (mastoidectomy, N=12) or endolymphatic-shunt surgery (N=11). The two groups were essentially the same: one of the shunt patients and none of the placebo patients had recurrent vertigo; no systematic differences emerged between the two groups with respect to hearing; and eight in the shunt and seven in the placebo group claimed that the surgery aided them. The investigators evaluated eight patients in each group as having a good result, and one shunt and no placebo patients as having a poor outcome. [JDS]

**Potential Impact of Magnetic Resonance Imaging on the Field of Communication Disorders.** Frumkin NL, Potchen EJ, Aniskiewicz AS, Moore JB, Cooke PA, *ASHA* 31(8):95-99, 1989.

Noting the effect already being felt on brain anatomy and physiology, the authors predict that the near future will greatly advance our understanding of the relation between cortical functioning and communication. [JDS]

**A Preliminary Analysis of the Ameliorative Effects of Time-Out from Speaking on Stuttering.** James JE, Ricciardelli LA, Rogers P, Hunter CE, *J Speech Hear Res* 32:604-610, 1989.

Frequency of stuttering was significantly reduced by taking time out from speaking. These results support the amelioration to be expected from response-contingent stimulation. [JDS]

**Probing Brain Function with Acoustic Stimuli.** Musiek FE, *ASHA* 31(8):100-105, 1989.

Recent advances in neuroanatomy and physiology facilitate research on the central auditory nervous

system. It has led to concepts like transsynaptic degeneration in order to explain some types of hearing impairment. Identifying the effects on incoming auditory stimuli of different cell types in the cochlear nucleus helps account for aspects of auditory management at the receptor level. The author does not believe that new radiologic techniques, like MRI, will alleviate the necessity for neuroaudiologic testing. [JDS]

**Spasmodic Dysphonia, Whether and Where: Results of Seven Years of Research.** Finitzo T, Freeman F, *J Speech Hear Res* 32:541-555, 1989.

Is spasmodic dysphonia a neurologic disorder? If it is, what is its central nervous system locus? The authors answer yes to the first question, and they believe half of the cases are due to isolated, multifocal, cortical lesions that are usually in the perisylvian region, medial frontal cortex, and right posterior temporal-parietal area. [JDS]

**Speaking Clearly for the Hard of Hearing III: An Attempt to Determine the Contribution of Speak-**

**ing Rate to Differences in Intelligibility between Clear and Conversational Speech.** Picheny MA, Durlach NI, Braida LD, *J Speech Hear Res* 32:600-603, 1989.

Testing five hearing-impaired persons with processed speech materials showed that "it is not possible to improve the intelligibility of conversational speech by a uniform adjustment of durations in speech. Rather, such adjustment was found to deteriorate intelligibility, and by an amount that cannot be accounted for merely on the basis of processing artifacts." [JDS]

**A Voice Accumulator—Validation and Application.** Ohlsson AC, Brink O, Lofqvist A, *J Speech Hear Res* 32:451-457, 1989.

Using microprocessors that accumulate voice fundamental frequency within 60 to 600 Hz and a contact microphone worn on the front of the neck, the authors have built a device for measuring fundamental frequency and phonation time over long periods of time. Evidence of the validity of the equipment is presented. [JDS]