

Exam Question Collection

(1.1) What is Communication?

“According to etymology, the Latin “communicare” stands for “to unite, unite; divide; to come to an understanding”. Significantly, the supposed sub-verb “municare” does not exist on its own but occurs only in the composite com-municare. By definition, communication takes place between at least two objects or subjects that enter into dialogue with each other. Since nothing in the world exists on its own (matter ultimately causes antimatter) there is always and everywhere at least one counterparty with whom communication takes place.” – Prof. Peter Stucki (2002, Univ. Zürich)

The word is derived from Latin “communicare”; therefore, it means more than only to exchange information or data, it means to unite or to come to an understanding. It takes place between at least two objects or subjects.

(1.2) Political Correctness (People First)

A movement (and organization) which campaigns for people with disabilities to **be a human first** and then be seen as **human with a disability**. This concern also is reflected in a certain choice of terms, where the formulation “**disabled person**” (disability in the foreground by standing first) is replaced by “**person with disability**” (human in the foreground being expressed first / People first).

(1.3) Extended Communication Model

„Sender“ comprises of

IQ = Information source

EC = Encoder

SS = Signal sender

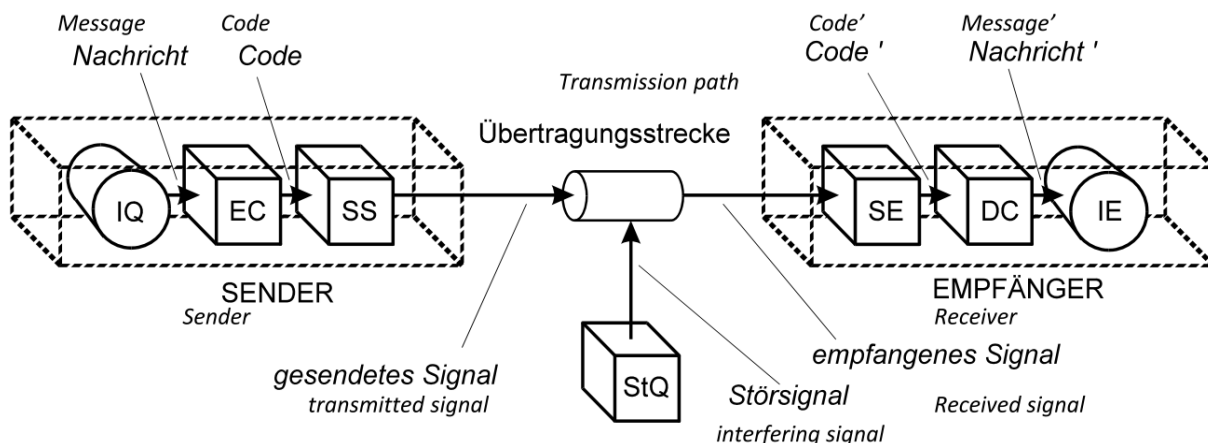
„Receiver“ comprises of

SE = Signal receiver

DE = Decoder

IE = Information receiver

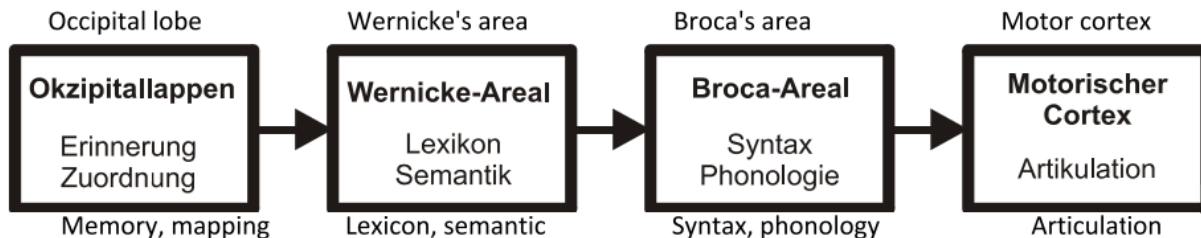
Transmission channel with StQ = noise source



(1.4) Language and Speech

- **Language** (German: Sprache) = **semantic** representation system: Coding of abstract thought patterns into a sequence of characters/symbols
- **Speech** (German: Sprechen) = **phonetic** representation system: Realization in form of sounds/noises

(1.4) Language Articulation Chain



Wernicke's area = "sensoric" language area for lexicon and semantic (meaning of terms)
 Broca's area = "motoric" language area for grammar (syntax and phonology)

(1.4) Generation of Speech

Access to active vocabulary, application of syntactic rules → Message is expressed in a specific "modality" (e.g., phonetic articulation, writing, signing, body language). Therefore: mono-modal, bi-modal, and multi-modal communication.

(1.4) Vowels

Vowels are created by oscillations of the vocal cords. Different vowels do not differ in the base frequency but in the formant frequencies.

(1.4) Consonants

Consonants (voiceless sounds) are noises. Vocal cords do not oscillate. Hearable eddy formations are done by constrictions of the articulatory tract.

(1.4) Disorders on the Boundary between Language and Speech

- Dyslalia (phonemes changed or replaced)
- Echolalia (repetition of heard)
- Bradylalia (slowing of speech)

(2) Augmentative vs. Alternative

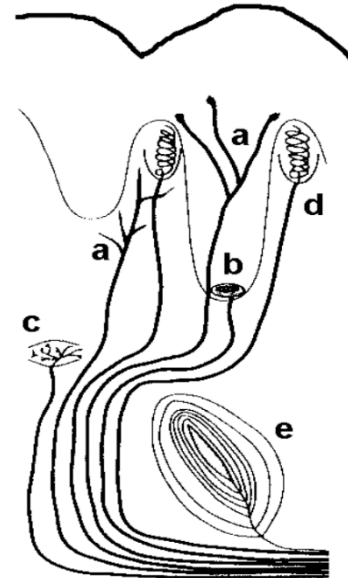
- **Augmentative** (amplified) communication = without change of modality
- **Alternative** (replaced) communication = with change of modality

(3.1) Tactile vs. Haptic

- **Tactile**: using the *tactile sense* (of the skin) alone – "palpable" information
- **Haptic**: addition of *proprioception* (spatial perception and association) of the own body/ the own limbs (and their posture)

(3.1) Tactile Mechanoreceptors

- a: free nerve endings
- b: Merkel corpuscle
- c: Ruffini corpuscle
- d: Meissner corpuscle
- e: Vater-Pacini corpuscle



(3.1) Peculiarities of Tactile Sense

- **Invariance of haptic perception to position change:** Blind persons show higher invariance to positional changes in perception of tactile models than people accustomed to visual perception.
- **Visual occultation** of an object can occur by other object, which is in (between) the line of sight. When exploring something tactually with the hands however, areas are accessible which are hidden from the eye.
- **Visual perspective:** The size of an object seems to depend on its distance. With haptic perception the distance of the observer is at maximum the length of the arm. The perceived size is always experienced in direct contact with the object and therefore constant.
- **Visual shadowing** results from straight running light rays, for which blind persons have no equivalent in haptic perception.

(3.2) Braille Grading

- **Grade 1 Braille:** Every letter is written Partially used in primary school (as entry point into Braille)
- **Grade 2 Braille:** Uses partially letters for representation of words, e.g. “y” stands for “you”, “b” stands for “but”, ... Grade 2 is faster to read than Grade 1 and saves space in books English books nowadays are typically written in Grade 2 Braille. Grade 2 is taught regularly in schools.
- **Grade 3 Braille:** Also uses non-standardized abbreviations, only used in private area.

(3.2) Relief writing

In the beginning in teaching of blind children only **enlarged Latin letters** were used = **relief writing**.

(3.2) Raphigraphy

Replication of the black/normal print letters. With this writing, blind persons could write to their relatives who were not able to read Braille.

(3.2) New York Point Tactile Writing

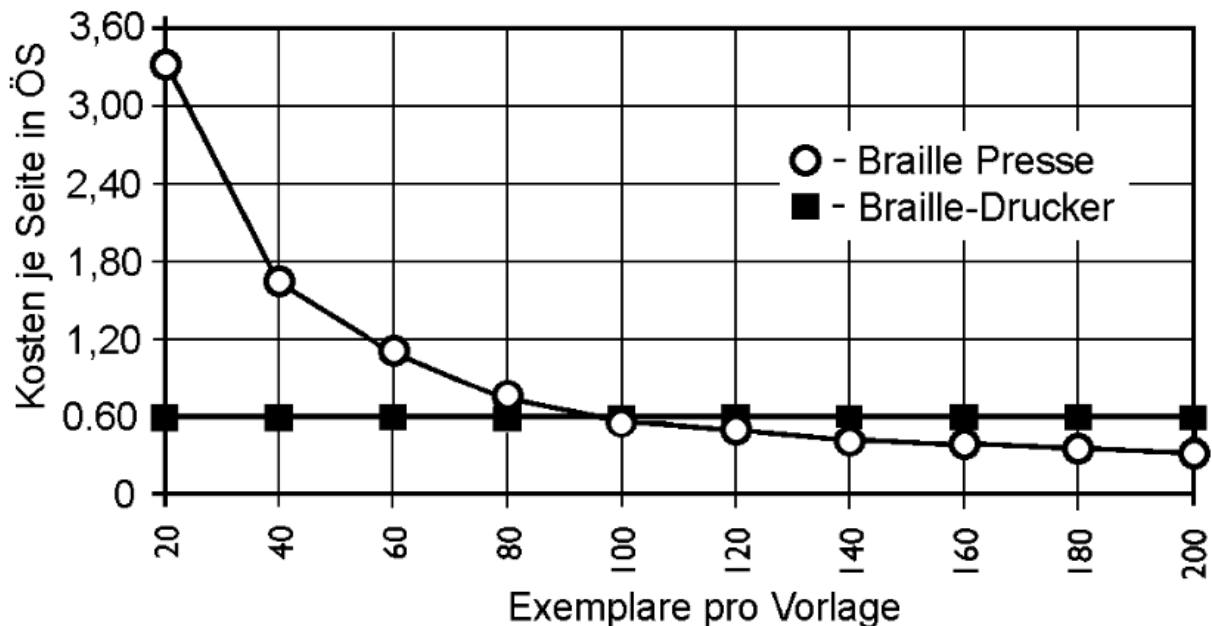
It is a dot writing, which coding considers the frequency of characters and optimizes the needed space.

(3.4) Moon Writing

Symbols similar to Latin characters (☞ easier to learn for late blind persons) Are embossed into moist paper.

(3.5) Printing: Braille Press or Braille Printer?

Printing costs depended on the number of copies to be printed. Up until 100 copies the braille printer is more profitable but any amount more than 100 copies then the Braille press becomes more efficient.



(3.6) Production Methods of Tactile Graphics

- Manual
- Deep drawing (German: Tiefziehen)
- Swell paper (Minolta copy) by heat (German: Schwellpapier)
- Graphic dot print
- Auditory supported graphics
- 3D-printing – brings new possibilities, but is not yet widespread in this application area

(3.7) Electromagnetic Braille Display

Each pin is moved up and down by combination of electromagnet and spring. Systems with locking mechanism (bistable e/m Braille display) exist (improvement of power consumption).

- + “relative” simplicity (Note: only “relatively” simple because one Braille row with 80 8-dot cells already needs 640 electro magnets, pins and springs)
- high power consumption (All not to be sensed dots must be forced downwards by the magnets. This leads to warming up and is too energy hungry for mobile use)

(3.7) Piezoelectric Braille Display

2 strips of piezo ceramic glued together, working principle like bimetal. Elongation and shrinkage of each, and thus bending of the two-layer-sandwich, depending on the polarity.

- + energy-saving
- very large/long, multi-line displays are difficult
- low achievable force

(4.1) Types of Symbols

- **Pictographic or iconographic:** creation of (simplified) illustrations of real objects
- **Ideographic:** mostly stylized symbols for a (even abstract) concept
- **Arbitrary:** for terms for which neither pictographic nor ideographic symbols can be found

(4.4) Augmentative and Alternative Communication (AAC) Methods

	Literacy	Length of symbol combination	Number of symbols required	Symbol sequence length	Promotes message automaticity
Single Meaning Pictures	Not required	Short	Large	Short (= 1 symbol)	No
Alphabet-Based Systems	Required	Long	Small	Long	Yes
Semantic Compaction	Not required	Short	Small	relatively short	Yes

(4.4) Communication Boards

Input via pictures or symbols – output via synthetic language. At the same time substitute for the voice Communication via electronic picture / symbol board.

- Static (graphic tablet)
- Dynamic (touch screen)

(4.4) AUTONOM Assistive System

A Technical Assistance System combined with an environmental control system (ECS), where input can be via *head stick + key mask on keyboard* or via *single button + scanning*.

(4.5) Semantic Compaction

*Semantic compaction is the systematic use of **secondary iconicity** to reduce the number of symbols in a **conceptually based selection set** for the representation of **natural language**. – Bruce Baker (1994)*

- Method using pictorial language to formulate sentences.
- Typical: 50 pictorial symbols, sentence formation consisting of a sequence of only 4 symbols
- Icons on the display stay in a fixed location
- Patterns applied to say a word can be used when learning to say new words

(4.5) “Secondary Image Meaning” Explanation

Primary image meaning is the "superficial" image meaning. The picture means exactly the represented object, snowflake means snowflake. **Secondary meaning:** "white", "cold", "winter" etc. Ambiguous symbols not only express the object shown on top. Associated concepts are added: "what do you do with it?", "what belongs to it?", "where does that happen?", "what color, size, shape does that have?"

(4.5) “Based on Concepts” (Conceptually Based) Explanation

Language is based either on **concepts** (e.g., hieroglyphs began in their original form as a collection of images to express certain thoughts and things) or **phonetics** (as the need for communication increased, more and more phonetic elements were added).

"Our" languages are completely phonetics based.

(4.5) “Selection Set” Explanation

Total amount of items available for selection in a system.

Example 1: Morse code: 3 symbols: point, dash and pause. For 26 letters sequences of up to 4 elements.

Example 2: Chinese: several thousand symbols

(4.5) “Natural Language” Explanation

Languages like German, English, French, ÖGB etc.

Natural languages consist of semantic units (lexemes) linked by syntax.

(5.2) Methods for Increasing Communication Rate

- **Abbreviations:** Using abbreviations is technically simple and effective. However, complicated rules and high performance are required. The reconstruction of a text from abbreviations is called abbreviation expansion.
- **Phrase catalogues:** In everyday life, a high degree of recurring phrases occurs. Recurring phrases in an electronic catalog are addressed by shortcuts or symbols (on keys). Problem with large catalogs: Remember the abbreviations or symbols. Increasing time required for navigation and selection! Always limited to previously prepared context.
- **Predictive typing (Text prediction):** If interpersonal communication is done via an alphabet board, the other party will try to guess the rest after the first few letters of a word. Confirmation with "YES", if correct, continue writing if wrong. With the computer: stored vocabulary, suggestions for completing the word (word completion).

(5.3) Keystroke Saving Rate (KSR)

KSR is the ratio between the number of keystrokes saved and the number of total characters in the phrase.

$$KSR[\%] = 100 \cdot \left(k_{\text{sav}} = \frac{n_{\text{st}} - n_{\text{p}}}{n_{\text{st}}} = 1 - \frac{n_{\text{p}}}{n_{\text{st}}} \right)$$

k_{sav} = savings factor

n_{st} = number of stops with conventional input

n_p = number of stops with predictive input (letters + selection)

(5.3) Text Prediction Calculation

k = writing speed in stops/sec

B = number of letters in text

W = number of words (= number of spaces + number of paragraphs)

$A = B + W$ = number of strokes to produce the text

Total time for conventional input:

$$T_k[s] = \frac{B + W}{k} = \frac{A}{k}$$

t_s = time to make the right decision (change view from keyboard to screen and back + search suggestion list)

Total time for text input with prediction:

$$T_p[s] = \frac{n_p}{k} + n_p \cdot t_s = \frac{(1 - k_{sav}) \cdot A}{k} + (1 - k_{sav}) \cdot A \cdot t_s$$

(5.3) Increase Efficiency of Predictive Typing

- Prefer long words
- Do not re-propose rejected words
- Optimization of the length of the suggestion list
- Adapted or adaptive vocabulary with appropriate size
- Consideration of the relative frequencies (word frequencies, "frequency")
- Considering the topicality of a word ("recency")
- Separate treatment of word stem and ending (especially good for heavily inflected languages)
- Inclusion of grammatical and syntactic rules in the vocabulary (each entry has corresponding grammatical markings)

(5.3) EMU Predictive Typing

- Prediction of compound words
- Generating arbitrarily composed words "from scratch"
- Consideration of preceding parts of speech
- Two words of one kind do not usually follow each other directly
- Suggestions matching the text also with free movement of the cursor
- Available in many languages: German, English, French, Italian, Dutch, Swedish, Spanish, Turkish
- Dictionary extensible with own texts
- Feedback possible through sound and voice output

(5.3) Predictive Adaptive Lexicon (PAL)

Early prediction systems still had handcrafted dictionaries PAL System was able to update frequency of words and to add new words ("recency") while writing.

(6) Lip Reading

Recognition of spoken sounds only from the lips (viseme) and the mouth position.

Phoneme: The smallest meaningful sounding segment of a language.

Viseme: Smallest segment distinguishable at the lip image. (Some phonemes can lead to the same viseme, like /b/ and /p/; in some cases, the same phoneme can lead to different visemes depending on the preceding phoneme, like the /f/ phoneme in the German "Ofen" and "Hafen"; throat-formed phonemes are "invisible", like the whole German word "Rache")

(6) Visual Communication for Deaf (or Speech Impaired) People

- Lip reading
- Finger alphabet
- Sign Language (SL)
- Cued speech: Support of lip reading through visually presented phonemes
- Manually Coded Language (MCL) / LBG (visual words)
- Notetaking, subtitling

(7) Communication with Deafblind People

Communication with deafblind people is particularly difficult. Only sense of touch usable for communication purposes. Depending on which of the two sensory deficits occurred first, the affected person, usually already before the onset of deafblindness, had either learned and practiced the handling of Braille or with gestures (or finger alphabet). This usually determines which of these two forms of communication will continue to be used.

- **Print on Palm (POP)**: Easiest way to communicate – write capital letters in the palm of your hand.
- **Lorm Alphabet (Lormen)**: Developed communication method for letter-wise text transmission to a deaf-blind person by touching the palm and the fingers.
- **Finger Braille**: (from Japan) 6 fingers (3 on each hand) are used as a "Braille keyboard".

(7.2) Tadoma Tactile Speaking

Tactile equivalent to visual lip-reading. Fingers used to acquire tactile information: Position of the jawbone Vibrations on the larynx. Communication in real time possible, but usually slower, years of training needed.

(8.2) Resonators

Articulatory system: vocal cords, palate, tongue, teeth, lips.

Cavity resonators: larynx, throat, mouth (tongue, jaw, lips)

(8.2) Methods of Amplification of Voice

- Speech amplifier + esophagus voice
- Electronic larynx
 - Extrinsic (vibrations for phonation are generated outside the body and coupled into the pharynx)
 - Transcervical resonator (Artificial Larynx)
 - **Intraoral resonator** (Cooper-Rand)
 - **Interoral resonator** (UltraVoice)
 - Intrinsic (Tracheo-Esophageal-Puncture: adjustable valve between trachea and esophagus)

(8.3) Altered Auditory Feedback (AAF)

AAF can be realized as a hearing aid behind the ear or installed in a telephone.

Delayed Auditory Feedback (DAF) delays the perception of one's voice by 50 to 250 ms. Stuttering can improve by 75%.

Frequency-Altered Feedback (FAF) pitch of the perception of your own voice shifted by about 1/2 octave. Stuttering improved up to 80%.

(10.2) Two Important Groups of Hearing Aids

- **Behind The Ear (BTE)** are easier to be adjusted, offer more features, more battery power (lifetime) and fit also severe hearing impairments.
- **In The Ear (ITE)** are generally smaller and more “invisible” but fit only mild to moderate hearing impairments.

(12) Replacement for Hearing and Seeing

- **Mechanical Braille communication devices:** Person A writes in Braille; person B reads the written Braille form the single cell (mechanical) Braille display directly from device
- **Electronic Braille communication devices:** "DIALOGOS", Electronic typewriter + Braille keyboard with vibrating buttons
- **The Tactuator:** A mechanical replica of the TADOMA method, which is used successfully (albeit with a lot of training) by deafblind people to read spoken language via the sense of touch in real time from the face of the person speaking (sensing of vibrations (tactile) and movements (haptic) of three bars).
- **Proposed device using finger alphabet, text, and braille:** Deafblind person uses data glove for finger alphabet and reads from a braille display; non-disabled person uses keyboard and LCD display
- **Tactile Morse code:** Easy to implement is the use of vibro-tactile transmitted Morse code.

(13.1) Standards Concerning Telephone Sound Amplifiers

ETSI (European Telecommunication Standards Institute) ETS 300 488 (1994):

Predominantly for use by a hearing-impaired person: Settings should be maintained after the end of the conversation.

In mixed use: Automatic return to normal gain after end of call. Gain of 20 dB and attenuation of 15 dB should not be exceeded.

(13.1) Standards Concerning Electrical Coupling

ETSI ETS 300 679 (1994):

Bandwidth should be 315 Hz to 4 000 Hz. If necessary, a frequency band limitation to be provided. The signal should be taken from the connection to the telephone receiver (handset). It must not be possible to feed a signal into the telephone system. Load of the output assumed to be 2 k Ω . The output must be electrically isolated.

(13.1) Hearing Impairments Interferences and Countermeasures

Interference: Disruption due to external use Disruption by self-use

Possible countermeasures: Shielding of the hearing aid by metallic conductive lining of the housing. Shorting the interspersed frequencies with blocking capacitors. Avoidance of “antennas in the hearing aid”. Increasing the distance to the source of interference.

(13.2) Mediation / Exchange Services

Voice Carryover (VCO) – In one direction, the voice (the audio signal) is transmitted directly to the remote station (for people who cannot hear but can speak)

Hearing Carryover (HCO) – the voice is transmitted directly from remote station to local station (for people who cannot speak but can hear)

(13.3) Augmentative and Alternative Telecommunication for Deafblindness

Electronic Braille communication: For deaf-blind people who are proficient in Braille (usually if the blindness occurred early and before the hearing impairment). Telecommunication via a computer equipped with a Braille display (Braille line).

Telecommunications with mechanical hand (DEXTER): For deaf-blind people using tactile hand alphabets (usually when deafness has occurred early and before visual impairment). Mechanical replica of a hand (finger alphabet), control via interface of a text telephone.

(13.4) VRS vs. VRI

Video Relay Service (VRS): Is used to place phone calls between Deaf and hearing persons (who are in different locations).

Video Remote Interpreting (VRI): The hearing and Deaf persons are in the same room, the Sign Language (SL) interpreter is at a remote site.

(13.4) Apps for Blind People

- Be My Eyes
- Seeing AI
- Blindsquare
- RotoBraille

(14.1) Digital Audio-Based Information System (DAISY)

DAISY is a worldwide audiobook standard for navigable, accessible multimedia documents. Powerful hierarchical navigation features (jumping from heading to heading in the text and navigate page, paragraph, and sentence by sentence). Interactivity, recording of speech, text (and images) possible. Variable playback speed at the same pitch, variable pitch at the same speed.

(14.2) Audio-Description

Objective: To make TV programs (or even cinema performances and theatrical performances) accessible to blind viewers.

Method: In dialog pauses a concise but accurate scene description is made by a spoken commentary.

Apps: GRETA, STARKS

(15) Ambient Assisted Living (AAL)

- *Target user group*: older people
- *Aim*: Supplement / support in everyday life through technology to stay active longer. Communication between people and their environment. (Smart home, e-home)

(15) Ambient Assisted Living (AAL) Sensors

- **Non-invasive sensors**: switches/contacts on doors, windows, movement detectors
- **Invasive sensors**: cameras, microphones, and person localization markings

(15) Interaction Variants

- **Explicit interaction**: deliberate control of system by hand gesture, GUI, touchscreen, and ASR
- **Implicit interaction**: controls assistance system by behaviors that don't need attention focus of the user (entering a room or sitting on a chair)

(15) Emergency Call Systems

- **First generation**: wired ringer system
- **Second generation**: transmission of emergency call via telephone, triggering alarm.
- **Future (AAL)**: triggered by sensors, monitoring activity and behavior.

(15) Service Robot Types

- Vacuum cleaner robot (functional robot without social behavior)
- Pet / tamagotchi (therapeutic robot, Paro-seal)
- Communication fixed/mobile robot (telepresence robot)
- Universal robots that do "work" (hobbit, Care-o-bot)

(16) Important Principles of AAL Ethics

- Home that does everything itself destroys existing skills and makes people lazy.
- All concerned must be made aware of what is happening with collected data.

- Benefits of AAL must be easy to convey and understand.
- AAL technology must be conveyed convincingly and carefully.
- AAL technology must be reliable and sustainable.

(16) Informed Consent Conditions

- Subject had an interview to understand the objective, risk, and inconveniences.
- Subject has been informed consent to taking part in trial.
- Subject may withdraw from trial at any time.

Possibly Relevant Old AT1 Exam Questions

(1.2) What is proposed by the “People First” language/principle? Give 2 examples!

Examples:

- ~~The disabled (people)~~ → people with disabilities / differently abled people
- ~~The mentally disabled (people)~~ → people with learning difficulties
- ~~Enchained to wheelchair~~ → using a wheelchair
- ~~Suffering from disability~~ → living with disability
- ~~Disabled friendly~~ → accessible / barrier free
- ~~Mongolism~~ → Down Syndrome → Trisomy 21
- ~~Inmate~~ → inhabitant / resident
- ~~Invalid~~
- ~~Nursing case / case for a care home~~
- ~~Deaf dumb/numb~~

(1.4) How and where are vowels / consonants created when speaking (difference)

(1.4/8.2) Which body parts are involved in voice formation (phonation)? (at least 3)

- Respiratory system (lungs & airways)
- Larynx (with vocal cords)
- Articulatory system (pharynx, oral cavity, nasal cavity)
- Hearing (for feedback)

(1.3) Signal vs. Message in Communication

Message is the information you want to convey, signal is how you convey the message (e.g., sound for speaking to someone).

(1.1) When two people communicate, what are (some) purposes of this action?

- Sharing thoughts, sentiments, information, ideas, knowledge, insights, experiences, needs, ...
- Understanding
- Negotiation
- Emerging of new knowledge, new positions, theories, ...
- Need for social interaction

(-) Which principal methods can be tried to overcome a communication handicap of a communication partner?

Depends on the handicap: find first what the issues are; be mindful & patient. As the non-disabled person: adapt to the disabled communication partner's speed/mode of communication.

(10.2) Which possibilities exist to support hearing with hearing aids?

Behind the ear (BTE), in the ear (ITE), in the canal (ITC), completely in the canal (CTC), contralateral routing of signal (CROS), bone anchored hearing aid (BAHA), implanted hearing aid

(-) Name replacements for manual writing.

Typing; speech; speech to text; sign language; Lormen; magnified overhead projection; symbols/images.

(4.5) List advantages of Semantic Compaction in AAC (Augmentative and Alternative Communication)?

- Method using pictorial language to formulate sentences
- Only a small number of icons to be learned (40 – 80)
- Icons on the display stay in a fixed location
- Patterns applied to say a word can be used when learning to say new words

(13.4) List examples of smart phone apps dedicated to blind users or to deaf users and briefly outline the principles the apps are based on.

- *Blind users:*
 - “Be My Eyes” – contact a seeing person and ask them to describe whatever you’re showing them
 - text-to-speech
 - “DAISY” – worldwide audiobook standard for navigable, accessible multimedia documents
- *Deaf users:*
 - “GRETA” – audio description or subtitles at smart device
 - “STARKS” – headset showing subtitles on small transparent headset screen instead of phone
 - “DEC 112” – contact emergency numbers via text message
 - speech to text

(13) Cell phones, smartphones and tablets have opened many new opportunities for people with disabilities. Select 3 types of disability and give an example of a particular functionality of a modern device or app and explain how it helps in the telecommunications field.

- *Visually impaired people:* “Be My Eyes” app, text-to-speech

- *People with hearing impairment*: telephone hearing amplifier, telecoil, ...
- *Deaf users*: text telephone (or nowadays just text messaging, video chats, ...)
- *Deafblind users*: electronic Braille communication, DEXTER
- *People with language/speech disabilities*: text to speech

(5.2) Which simple measures can increase the communication rate when using “scanning” (communication with single switches and characters on an on-screen keyboard) – except “predictive typing”? Give short descriptions.

- Optimize the arrangement of characters: Sort by character frequency or probability of occurrence
- Use abbreviations (leave out redundant letters)
- Use phrase catalogs (create a catalog of frequently recurring phrases)
- Continuous adaption of scan time using current average position of selection time within scan time, using error rate, or when target is often missed.

(3.1) Difference between tactile and haptic

(3.3) Describe and/or sketch the dot (Braille) script (system, characters, dimensions)

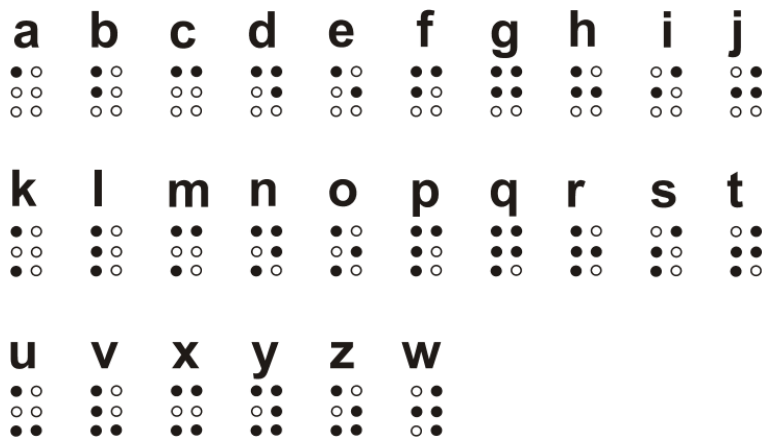
System: Since 1998 (Reform of the German Blindenschrift) there are 3 fundamental coding systems in German Braille: Basisschrift (letters, leading character indicating capital letters or numbers, punctuation), Vollschrift (single characters for most frequent character combinations) and Kurzschrift (shorting of sound groups, syllables, and words). Many more coding systems have been created for special tasks.

Characters:

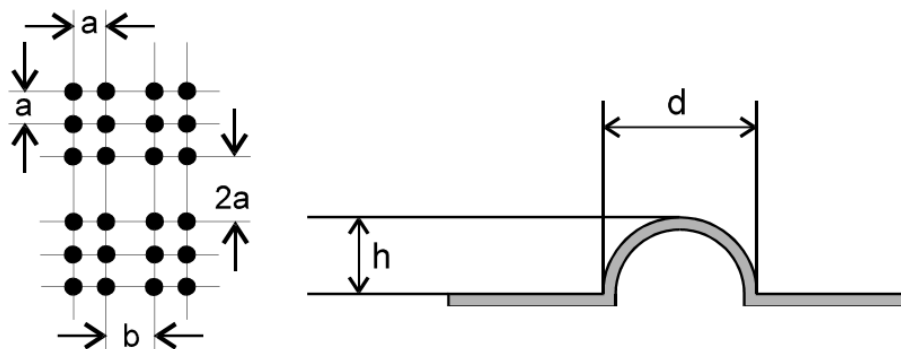
2 rows with 3 (or, extended for computer use, 4) dots each (= 6-point or 8-point Braille).

1	• •	4	1	• • •	4
2	• •	5	2	• • •	5
3	• •	6	3	• • •	6
			7	• • •	8

Allows for encoding of 64 (= 2^6 , extended 256 = 2^8) characters (including space). Encoding of first 10 letters, repeating with added dots in 3rd row, W added later.



Dimensions: Fits size and sensitivity of finger pulp. $a = 2.5$ mm, $b = 3.5$ mm, $d = 1.5$ mm, $h = 0.4$ - 0.8 mm.



(3.7) Describe the operating principle of an electromagnetic Braille display and an advantage and a disadvantage.

(3.7) Describe the operating principle of a piezo-electric Braille display and an advantage and a disadvantage.

(3.3) Describe two ways (devices, procedures etc.) to put Braille on paper.

- Braille can be written dot-by-dot with **slate and stylus** *in mirror* and *from behind* onto the document.
- **Braille typewriter** is operated using 3 fingers of each hand, all buttons needed for a cell are *pressed simultaneously*.

(3.3) Writing Braille with slate & stylus and using a Braille typewriter (e.g., Perkins Brailier) are two methods of putting Braille on paper. Describe important differences.

- Stylus and slate are written *in mirror* and *from behind* onto the document, *dot-by-dot*. It is not possible to read the written text while writing. But it's still in use due to its simplicity.

- Braille is operated using 3 fingers of each hand, pressing all needed buttons for a single character at the same time. It is faster than stylus and slate, and the text can be read during writing without removing the paper.

(3.9) What is the function of a screen reader and for which users?

A screen reader is special software that “reads” the content of the screen and conveys the information that is usually displayed on the screen using non-visual output devices. The content of the screen can be delivered via speech synthesis (= speech output) and/or via a Braille display. It is therefore usable for visually disabled or blind people.

(3.3 / 3.4) List advantages each of dot (Braille) script and relief (Moon) script

- *Braille*: Braille can be read AND written by blind people (Moon must be embossed into wet paper), can be read fast (dots are easier to recognize and distinguish compared to relief shapes/lines)
- *Moon*: Symbols similar to Latin characters → easier to learn for late blind persons (only ~10% of blind or severely vision impaired people can read Braille)

(3.3) Name different common dot (Braille) script codings for German and describe the essential differences (no details needed).

- Base: letters, leading character indicating capital letters or numbers, punctuation
- Full: single characters for most frequent character combinations
- Shorthand: shorting of sound groups, syllables, and words
- Stenography: even more shorting, individual systems, no unnecessary characters

(3.3) What are main reasons why Braille is now used by fewer blind persons?

- **Due to upcoming new alternatives to Braille:**
 - Speech synthesis and screen readers make texts available in audible form
 - Texts and books are available on the Internet (can partly replace the expensive production of Braille books)
 - Hardware required is mainstream
 - many apps available
- **Due to disadvantages of Braille:**
 - Learning and teaching is tedious
 - Braille texts are voluminous

(14.1) (Vinyl) records were previously used as media for audiobooks (or “talking books”). What more modern media are there today? What are the advantages?

Digital audio books: CDs, MP3 players, SD memory card devices, software for PCs, Apps for smart phones, ...

with DAISY standards:

- + Powerful hierarchical navigation features
- + Interactivity, recording of speech, text (and images) possible
- + Up to 40 hours of speech on a CD
- + Manage bookmarks, set markers
- + Variable playback speed at the same pitch, variable pitch at the same speed

(7.1) What is the Lormen or Lorm-Alphabet used for? Describe the method.

Lormen is a communication method for letter-wise text transmission to a deaf-blind person by touching the palm and the fingers.

(A3.4/C4.2?) Mark the important elements conveying meaning for visual communication (X).

	Visemes	Phonemes	Characters	Words
Lip Reading	X			
Finger Alphabet			X	
Cued Speech		X		
Manually Coded Language				X

(5.3) Which (undesirable) effects does the use of text prediction often imply (e.g., regarding additional effort related to time and cognition)? Name and describe briefly.

- Writing with word prediction also takes time for ...
 - the change of view from the keyboard to the screen and back.
 - searching the suggestion list (the more suggestions the longer)
- Also, it is necessary to read suggestion lists and at same time to not forget what should actually be said. This can be problematic for some users with disability (increased cognitive load).
- Word prediction systems have problems with morphology, as morphological variations of the same word can cover the whole screen.

(5.3) What is “Keystroke Saving Rate”?

(15) What is “Active / Ambient Assisted Living”?

(15) How is “AAL” motivated by the Demographic Change?

People are getting older, less young people “coming after”. AAL allowing older people to stay in their „usual” surroundings for longer or needing less assistance.

Previous Exams

S1: 19-17

U2: 16,5-14,5

B3: 14-12

G4: 11,5-10

N5: 9,5-0

Blue text is part of the question, black text is predefined text for each answer on the instruction sheet, green text is a suggestion for an answer.

17.06.2021

1. What is proposed by the “People First” language/principle? Give 2 examples! (2 Pt.)

Proposed: People with disabilities to be a human first and then be seen as human with a disability.

Example 1: mental disability → people with learning difficulties

Example 2: the disabled → person with disability

2. When two people communicate, what are (some) purposes of this action? (2 Pt.)

a) sharing information, ideas, needs, experiences ...

b) negotiation

c) social interaction

d) emerging of new knowledge, theories, ... (understanding)

3. Name different common dot (Braille) script codings for German and describe the essential differences (no details needed) (2 Pt.)

Base: letters, leading character indicating capital letters or numbers, punctuation

Full: single characters for most frequent character combinations

Shorthand: shorting of sound groups, syllables, and words

Stenography: even more shorting, individual systems, no unnecessary characters

4. List 2 examples of smart phone apps dedicated to blind users or to deaf users and briefly outline the principles the apps are based on. (1 Pt.)

Blind users: “Be My Eyes” – contact a seeing person and ask them to describe whatever you are showing them

Deaf users: “GRETA” – audio description or subtitles at one’s smart devices

5. Writing Braille with slate & stylus and using a Braille typewriter (e.g. Perkins Brailier) are two methods of putting Braille on paper. Describe important differences. (1 Pt.)

Advantages slate & stylus: Writing with slate and stylus is a practical tool available in different sizes for taking quick notes and can be carried along easily. Still in use due to its simplicity.

Advantages typewriter: It is faster than stylus and slate, and the text can be read during writing without removing the paper.

6. Mark the important elements conveying meaning for visual communication (X). (2 Pt.)

	Visemes	Phonemes	Characters	Words
Lip reading	X			
Finger alphabet			X	
Cued Speech		X		
Manually Coded Language/LBG				X

7. Which body parts are involved in voice formation (phonation)? (2 Pt.)

- a) Respiratory system (lungs and airways)
- b) Larynx (with vocal cords)
- c) Articulatory system (pharynx, oral cavity, nasal cavity)
- d) Hearing (feedback of own voice)

8. What are main reasons why Braille is now used by fewer blind persons? (1 Pt.)

Due to upcoming alternatives (speech synthesis, screen readers, apps, ...)

Due to disadvantages of Braille (tedious to learn and teach, texts are voluminous)

9. Which (undesirable) effects does the use of text prediction often imply (e.g. with regard to additional effort related to time and cognition)? Name and describe briefly. (1 Pt.)

It takes time to change the view from keyboard to screen and back, and to search the suggestion list. And it is necessary to read suggestion list while not forgetting what to write.

10. List 2 advantages of Semantic Compaction in AAC? (1 Pt.)

Only a small number of icons to be learned.

Patterns applied to say a word can be used when learning to say new words.

11. How is "AAL" motivated by the Demographic Change? (1 Pt.)

People are getting older, less young people "coming after". AAL allowing older people to stay in their „usual“ surroundings for longer or needing less assistance.

12. Which principal methods can be tried to overcome a communication handicap of a communication partner? (1 Pt.)

Depends on the handicap: find first what the issues are; be mindful & patient. Adapt to the disabled communication partner's speed/mode of communication.

13. Which two simple measures can increase the communication rate when using "scanning" (communication with single switches and characters on an on-screen keyboard) – except "predictive typing"? Give short descriptions. (2 Pt.)

- a) Optimizing the arrangement of characters: sort by character frequency or probability.
- b) Use abbreviations or phrase catalogs (catalog of frequently recurring phrases).