


PEARSON **deaper**
Understanding Workshop

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Presented by: Professor Barbara Dodd
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ASSESSMENT




Differential diagnosis is THE key concept in determining appropriate intervention for speech impairment

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Diagnostic Evaluation of Articulation and Phonology (DEAP) is multifaceted.

- A diagnostic screen
- An oromotor assessment
- An articulation assessment
- A phonological assessment
 - Single words
 - Connected speech
- An inconsistency assessment



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The Diagnostic Screen

- THE SCREEN SAVES A HUGE AMOUNT OF TIME
- Allows the clinician to determine which direction the assessment of a child should take.
 - The child names 10 pictures.
 - Any sounds not produced correctly are tested for sound stimulability
 - Then, the same 10 pictures are named again.
 - Inconsistency is calculated in percentage terms, between trials 1 and 2.
 - A comparison is made with the expected normative data for:
 - Sounds NOT elicited
 - Error patterns used

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Screening Test Results: Lucy 3;7

Target	IPA	Transcription 1	Transcription 2	Speech Sounds Not Imitated
Watch	wɒtʃ	wɒt	wɒts	
Fishing	fɪʃɪŋ	fɪsɪn	fɪsɪn	ʃ
Gloves	glɒvz	dɒbz	dɒbz	
Spider	spɑɪdə	pɑɪdə	pɑɪdə	
Thank you	fæŋk ju	fæntu	fæntu	ə
Scissors	sɪzəz	sɪzəz	sɪzəz	
Helicopter	helɪkɒptə	hɛtɒtə	hɛlɪtɒtə	
Bridge	bɪdʒ	bɪd	bɪd	r, dʒ
Umbrella	ʌmbrelə	bɛlə	bɛlə	
elephant	ɛləfənt	ɛfənt	ɛfənt	

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On the basis of the findings from the screener, the clinician can choose one or more of the following routes:

- Articulation assessment, checking stimulability.
- Phonological assessment, checking error patterns and comparing PCC to the norms.
- Inconsistency assessment to determine nature and degree of inconsistency.
- Oro-motor assessment is done if child has an articulation difficulty or is inconsistent, to identify dysarthria or CAS.

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Decision Making Schema

Diagnostic Screen Indicators	Action
Age Appropriate	Review/Discharge
Phonetic Errors, Imitation X	Articulation and Oro-motor subtests
Error patterns (not age appropriate)	Phonology Subtest
50%+ Inconsistent	Inconsistency and Oro-motor subtests

Reliability of the Screen

- **Study 1:** All 30 children in a class at a local school assessed on all subtests
- **Study 2:** 30 children on a waiting list for assessment (initial or review) of speech difficulty.
- **Findings:** 10 % false positives **NO false negatives**



The Articulation Assessment

- 30 CVC words – 3 opportunities
- Samples all the English speech sounds in initial and/or final position. It allows for speech sound stimulability of errors in a CV syllable or in isolation.
- The aim is to assess whether a child can produce a perceptually acceptable speech sound.
- 90% criterion used. *If >10% of normative sample in a 6 month age band CAN'T produce a sound, then it is age appropriate NOT to be able to say it.*



Oromotor

- Diadochokinetic task: 'patacake'
- Isolated movements: e.g. tongue elevation
- Sequenced movements: e.g. kiss and cough
- Two trials, second scored out of 3
- Rules for scoring on scoresheet
- Compliance problem
- Reliability



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Types of Articulation Disorder

- Developmental delay (e.g., w/r; f/θ)
- Phonetic disorder (lisp)
- Anatomical anomaly (e.g., cleft palate)
- Dysarthria (e.g., cerebral palsy)
 - *?Childhood Apraxia of Speech?*

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Phonology

- 50 pictures: all consonants in most phonetic contexts, all but one vowel
- Range of syllable shapes and lengths
- 3 'funny' pictures – 14 words from single word list elicited in sentences
- Tables for calculating PCC, PVC, Error Patterns (5 examples), SW-Cont Sp Ratio.



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The Phonological Assessment

- The transcription can then be described in terms of patterns that are:
 - Age appropriate
 - Delayed error patterns
 - Unusual error patterns
 - Standard scores for:
 - o Consonants in error
 - o Vowels in error
 - o Phonemes in error
 - o Single words vs. continuous speech ratio

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Single Word vs. Continuous Speech



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'What's funny about this picture?'



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Single-Word vs. Continuous Speech

Target Word	Realisation	Same	Different
frog	pog	✓	
strawberry	ɔbbi		✓
spider	paɪə	✓	
toothbrush	tutʌt	✓	

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Consistency

- 25 words, 3 trials separated by another activity
- All three identical = 0, otherwise 1, converted to percentage
- Different error forms, not alternation between correct and developmental error.
- 40% criterion (norms indicate < 10%)
- 36%-44% investigate phonological working memory, spontaneous speech

Inconsistency is one symptom of Childhood Apraxia of Speech (CAS) which is rare, over-diagnosed and controversial.

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Differential Diagnosis of CAS and ISD

CAS	ISD
Poor oro-motor skills	Oro-motor skills within normal limits
Poorer in imitation than spontaneous production	Better in imitation than spontaneous production
Dysfluent, short utterance length, prosodic disturbance, slow speech rate	Fluent, normal utterance length, normal affect, normal-rapid speech rate
Best therapy focuses on phonetic gesture (PROMPT, Hayden)	Best therapy: Core vocabulary

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The DEAP Diagnoses:

- articulation disorder (dysarthria)
- articulation disorder (phonetic planning)
- delayed phonological development (extent)
- phonological disorder (use of non-developmental error patterns)
- phonological disorder (inconsistency in the absence of CAS)
- childhood apraxia of speech

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QUESTIONS?

The structure of the DEAP is different from other assessments of speech. Why?...

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...because diagnosis is linked to treatment

Diagnosis	Target and Evidence Based Intervention
Articulation	Speech sounds - Articulation therapy
Delay	Connected speech - Whole language; Error patterns - Phonological contrast
Consistent disorder	Error patterns - Phonological contrast
Inconsistent disorder	Words - Core vocabulary
CAS	Phonetic gesture - PROMPT

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Why is Differential Diagnosis Necessary?



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Children with SSD are a Heterogeneous Group

They differ in terms of:

- Age of acquisition (at birth, developmental emergence, acquired after illness or accident)
- **Severity**
- Causal and maintenance factors
- **Types of errors**
- **Profile of associated abilities**
- **Response to intervention**

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Severity: PCC - Most Common Descriptor

Categories: Mild (>90%), Moderate (>65) Severe (<50)

Problematic because:

- Sample size varies, range of sounds sampled
- Substitutions and omissions treated the same as distortions
- Vowels not included
- Consistency is not evaluated
- Age and gender affect results (e.g., an age appropriate 3 year old would be classified as moderately-severely impaired)

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Other Ways of Classifying Subgroups

- Aetiology (Shriberg and colleagues)
- Psycholinguistic abilities (Stackhouse and Wells, and colleagues)
- Description of linguistic symptomatology (Kamhi)
- Matching articulatory and phonological error types with psycholinguistic abilities and response to intervention (Dodd and colleagues)

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Speech Error Profiles

- 4 groups of children with SSD according to type of speech sound errors made were identified:
- Psycholinguistic experiments compared these 4 groups on range of studies to describe:
 - psycholinguistic abilities (including literacy),
 - risk factors,
 - natural history of disorder,
 - clinical efficacy trials have examined response to different types of therapy for each group.

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The DEAP's Differential Diagnosis of SSD

Studies indicate that children referred with speech disorder fall into the following subgroups:

- Articulation disorder 10%
- Delayed phonological acquisition 60%
- Consistent speech disorder 20%
- Inconsistent speech disorder 10%
- Childhood Apraxia of Speech (CAS) Rare (Crary: .002% of total population; Shriberg: 3-5% of children with a speech. [Morely – 'the children who don't get better in therapy']

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Articulation Disorder

- **Definition:** Production of perceptually inaccurate phones, can co-occur with phonological disorder.
- **Causes:**
 - Mis-learning of phonetic program for sound production e.g. lisp

(NB Organic articulation disorders due to anatomical anomaly e.g. cleft palate, and motor dysarthrias e.g. cerebral palsy require specialist assessment and intervention.)

Mis-learned motor program for phone production

- e.g. lisps, w/r, /k/
- **Associated Abilities in Deficit:** None yet identified
- **Deficit in Speech Processing:** Output processing – phonetic motor program
→ perceptually unacceptable phone.
- **Best Intervention:** Focus on motoric production of individual speech sound(s) in isolation, nonsense syllables, single syllable words, carrier phrases and sentences e.g. Van Riper.



Gierut (1998)

- **Articulation impairments** reflect motoric production of speech sounds -hence **phonetic** in nature.
- **Phonological impairments** reflect problems at the level of phonological representation and are therefore **phonemic** in nature.



Delayed Phonology

- **Definition:** All speech errors typical of a child of a younger chronological age.
- **Possible Causes:**
 - Language learning environment
 - Intermittent hearing loss, otitis media (Fox)
 - Slower maturation, general mild delay
- **Associated Abilities in Deficit:** Non-word spelling, number of phonologically plausible spelling errors.
 - Often have associated articulation disorder. Slower development of rule derivation – phonology and rule learning in general.

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Delayed Phonology

- **Tasks showing NO statistical difference from controls:** phonological awareness, input processing, oro-motor skills.
- **Deficit in Speech Processing:** Not yet known.
- **Typical characterisation:** Low-end of the normal range.
- **Best Intervention:**
 - (i) Whole language groups: general language stimulation (Marion Blank)
 - (ii) Phonological contrast therapy (focus on delayed error patterns (Metaphon, Gierut, Weiner).

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Consistent Phonological Disorder

- **Definition:** At least one error pattern that is atypical of usual phonological acquisition (e.g., backing, favorite sound, initial consonant deletion, vowel errors). Most children also have some delayed patterns, a few have co-occurring articulation disorder.
- **Possible cause:** Genetic 45% report family history of CD compared to 20% of controls; the only risk factor identified.
- **Associated Abilities in Deficit:** Phonological awareness, literacy, rule derivation, cognitive flexibility.
- **Tasks showing NO statistical difference from controls:** auditory input processing, oro-motor skills, poor on some lip-reading tasks

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Consistent Disorder: Deficit in Speech Processing

- Cognitive-linguistic deficit: impaired ability to derive phonological constraints (e.g., learn the correct rules governing phonology).
- **Best Intervention:**
Phonological contrast therapy (focus on disordered error patterns: Metaphon, Gierut, Weiner).
e.g. minimal or maximal pairs, multiple comparisons

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Inconsistent Speech Disorder

- **Definition:** Inconsistent production of the same lexical items in the same phonetic context.
- **Possible Cause:** Unknown, but possible specific birth injury (case history data, differences in populations, adult aphasia similarities)
- **Associated Abilities in Deficit:** Spelling, learning new words, learning new fine motor programs e.g. NWR
- **Tasks showing NO statistical difference from controls:** phonological awareness (except syllable counting), reading, rule derivation and flexibility, input processing, oro-motor skills.

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Inconsistent Speech Disorder

- **Deficit in Speech Processing:** **phonological assembly** translating internal mental representation of words into a phonological plan (choice of phonemes and their sequence) for output.
- **Best Intervention:** Core vocabulary therapy - focus on teaching children how to plan the constituents of **whole words**.

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What is the evidence that these groups are real?

- The subgroups differ in terms of their:
 - Associated ability profiles
 - Risk factors
 - Natural history (delayed spontaneously improve)
 - Response to therapy
- The subgroups exist in all languages tested so far: including Cantonese, Mandarin, Punjabi, Arabic, Maltese, German, Italian.
- Bilinguals have the same subtype of disorder in both languages.
