Introduction

Infants

• Early Childhood Development
• Issues Relating to Infant Assessment
• Assessment Strategies
• Readiness

Getting Started Messages

• The traditional nature versus nurture debate is simplistic and scientifically obsolete
• Environmental influences clearly affect brain development, beginning well before birth and continuing long into adulthood
• Early intervention programs can improve the odds for vulnerable children, but those that work are rarely simple, inexpensive, or easy to implement

Getting Started Messages

• How young children feel is as important as how they think, and how they are treated is as important as what they are taught, particularly with regard to their readiness to succeed in school
• Healthy early development depends on nurturing and dependable relationships
• Culture influences all aspects of early development through child-rearing beliefs and practices

Getting Started Messages

• There is no scientific evidence that special "stimulation" activities, beyond normal growth-promoting experiences, lead to "advanced" brain development
• Substantial scientific evidence indicates that poor nutrition, infections, neurotoxins, and chronic stress can harm the developing brain
• Significant parental mental health problems, substance abuse, and family violence impose heavy developmental burdens on young children
Getting Started Messages

If we really want to enhance children’s readiness to succeed in school, then we must pay as much attention to their emotional health and social competence as we do to their cognitive abilities and academic skills.

Infants and Children

Early Childhood Development and Beyond

- Stages of Human Growth and Development
- Information Processing System
- Luria’s Theory of Development of Functional Systems
- Geschwind’s Model of Hormonal Influences on Lateralization
- Interaction of Etiologic Factors (i.e., Malnutrition, etc.)

Normal Brain Architecture is Established Through the Development of Highly Integrated Neural Circuits that are Built in a Specific Sequence, Within the Time Constraints of Sensitive Periods

- The good news
  
  The window of opportunity for skill development generally remains open for many years

- The sobering news
  
  Positive adaptation in the face of impaired brain circuits is more difficult and costly than getting it right the first time

Early Childhood Development

<table>
<thead>
<tr>
<th>Stages of Human Growth and Development</th>
<th>Approximate Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal</td>
<td>0 to 280 days</td>
</tr>
<tr>
<td>Ovum (pre-embryonic)</td>
<td>0 to 14 days</td>
</tr>
<tr>
<td>Embryo</td>
<td>14 days to 9 weeks</td>
</tr>
<tr>
<td>Fetus</td>
<td>9 weeks to birth</td>
</tr>
<tr>
<td>Premature infant</td>
<td>27 to 37 weeks</td>
</tr>
<tr>
<td>Birth</td>
<td>Average 280 days</td>
</tr>
<tr>
<td>Neonate</td>
<td>First 4 weeks after birth</td>
</tr>
<tr>
<td>Infancy</td>
<td>First year</td>
</tr>
<tr>
<td>Early Childhood (preschool)</td>
<td>1 to 6 years</td>
</tr>
<tr>
<td>Later Childhood (prepubertal)</td>
<td>6 to 10 years</td>
</tr>
<tr>
<td>Adolescence</td>
<td>Girls, 8 to 18 years</td>
</tr>
<tr>
<td></td>
<td>Boys, 10 to 20 years</td>
</tr>
<tr>
<td>Puberty (average)</td>
<td>Girls, 13 years</td>
</tr>
<tr>
<td></td>
<td>Boys, 15 years</td>
</tr>
</tbody>
</table>

Source: Adams and Victor, 1981

Height and Weight Growth During the First Two Years

Growth in Height and Weight from 2-18 Years
### Social Development

**Attachment**
- an enduring emotional bond uniting one person with another
- manifested in efforts to seek proximity and contact to the attachment figure
- important psychological catalyst for the early emergence of trust in others and understanding of self

**Bonding**
- the emotional process occurring between a parent and offspring that usually begins at the time of birth
- the basis for further emotional affiliation
- influences the child’s physical and psychological development.

### Social Interaction

**Full-Term Newborn**
- has organized states
- attends selectively
- behaves in interpretable ways
- systematic responses to parents
- acts in temporarily predictable ways
- learns from, adapts to parent’s behavior

**Parent**
- helps regulate states
- provides necessary stimuli
- searches for communicative intent
- wants to influence newborn and feel effective
- adjusts to newborn’s temporal rhythms
- acts repetitively and predictably

### Shifting Focus of Assessment: Infants and Toddlers

- **Observation**
  - Gross and fine motor functions
  - Language and communication
  - Social behavior
  - Bonding
- **Concerns:**
  - Delayed development (e.g. MR)
  - Abnormal development (e.g. PDD)
  - Poor bonding (e.g. neglect, abuse)
### Shifting Focus of Assessment: Preschoolers
- Observation, personal interview
  - Observe milestones
  - Assess what child talks and thinks about (e.g. through play)
  - Parent-child relations
- Concerns:
  - Delayed development (e.g. MR), Abnormal development (e.g. PDD), Poor bonding (e.g. neglect, abuse)
  - Speech-language delays
  - Hyperactivity
  - Aggressive/defiant behaviors
  - Excessive anxiety
  - Toilet training

### Shifting Focus of Assessment: School-age Child
- Observation, interviews, reports from school
  - How does child function in family?
  - How does child function in school? (behavior and academics)
- Concerns:
  - Learning problems
  - Externalizing conditions (ADHD, ODD)
  - Separation anxiety
  - Tourette’s syndrome

### Information Processing System

<table>
<thead>
<tr>
<th>Environmental Event</th>
<th>Sensory Register</th>
<th>Working Memory</th>
<th>Central Processor</th>
<th>Permanent Memory</th>
<th>Response System</th>
</tr>
</thead>
</table>

### Luria’s Theory of the Development of Functional Systems

<table>
<thead>
<tr>
<th>Functional System</th>
<th>Brain Region</th>
<th>Age of Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>arousal</td>
<td>reticular system</td>
<td>birth - 12mos</td>
</tr>
<tr>
<td>primary motor</td>
<td>motor cortex</td>
<td>birth - 12mos</td>
</tr>
<tr>
<td>primary sensory</td>
<td>visual and auditory cortex</td>
<td>birth - 12mos</td>
</tr>
<tr>
<td>secondary sensory and motor</td>
<td>visual and auditory cortex and surrounding areas</td>
<td>birth - 5yrs</td>
</tr>
<tr>
<td>tertiary sensory input</td>
<td>parietal</td>
<td>5 - 8 years</td>
</tr>
<tr>
<td>tertiary output - planning</td>
<td>prefrontal</td>
<td>12 - 24 years</td>
</tr>
</tbody>
</table>

### Geschwind’s Model of Hormonal Influence on Lateralization

- Testosterone
  - Learning Disorders
    - Autism
    - Dyslexia
    - Left Handedness
  - Anomalous Dominance
  - Immune Disorders
    - Myasthenia
    - AIDS
  - Neural Crest Disorders
    - Greying
    - Harelip

### Interaction of Etiologic Factors

*Figure 19-3: Developmental disability resulted from the interaction of etiologic factors occurring during a time period of development involving essential neurotransmitters (Thompson and Ogilvie, 1979).*
Interaction of Etiologic Factors

Malnutrition

Nutritional deficiency → CNS alterations → Cognitive ability → Behavior

High risk of infectious disorders
Alterations in the quality and quantity of maternal care
Environmental stimulation
Motivation
Emotional reactivity
Motoric ability
Sensory ability

Social and economic status

Malnutrition and School Performance

Issues Relating to Infant and Child Assessment

Multidisciplinary Assessment
• Integrate findings across disciplines
• Development viewed in a social-environmental context
• Focus on a more "holistic" approach to the child

Family Involvement
• How development affects family functioning
• How family functioning affects development

Reliability
• Variability of infant and, to some degree, child behavior makes obtaining a reliable estimate of ability difficult.
• Results are compromised by limited behavioral and verbal repertoire, variable states of arousal, and rapid emotional, cognitive and physical development.
• Affected by expertise and experience of the examiner.
Issues Relating to Infant and Child Assessment

Test Limitations
- Qualitatively and psychometrically limited
- Norm-referenced tests derived on normal infants but used on challenged infants
- High dependence on motor behaviors increases risk of invalid assessment on physically challenged infants and underestimation of cognitive abilities in other children
- Reliability of parental reports may be questionable

Stability and Continuity in Development
- Assumption of "continuous" or "linear" development
- Stability and continuity are key in studying and working with high-risk children

Etiological Classification of Disorders

Prenatal Causes
- Chromosomal Disorders
- Syndrome Disorders
- Inborn Errors of Metabolism
- Developmental Disorders of Brain Function
- Environmental Influences

Perinatal Causes
- Intrauterine Disorders
- Intrauterine Exposures
- Neonatal Disorders

The Vulnerable Fetus

- Teratogens: chemical or environmental agents which cause damage to the embryo or fetus.
  - Viruses:
    - Rubella: most serious if exposed between 4-8 weeks; later prenatal exposure seldom life-threatening (congenital deafness common)
    - HIV: 20-50% may pass on virus prenatally or during delivery

- Alcohol:
  - Fetal Alcohol Syndrome (FAS): slow growth, facial abnormalities, hyperactivity, intellect impaired
  - Fetal alcohol effects: some symptoms

- Nicotine:
  - Increased chances of premature birth
  - Low birth weight
  - Higher risk of infant mortality (SIDS)
The Problem

- “The recent proliferation of small-scale methamphetamine production labs has brought with it large-scale dangers to the public. What was once done in large-scale warehouses by experienced persons is now done in heavily populated areas by untrained persons using substandard equipment. The danger this poses to innocent children is the most troubling aspect of this problem.”
  - John Davis, deputy district attorney, CA.

The Problem

- One study in Riverside County, CA:
  - 85% of children removed from labs tested positive for crank.
  - Found children or evidence of children at nearly 50% of the labs they raided.
  - From 1998 to 1999, number of children present in labs increased 30%.

The Problem

- J. Graham, 2004
  - “Children are paying an enormous toll as a meth epidemic sweeps through rural Illinois and much of the Midwest. Frightened, neglected kids are living in homes with parents who think only of their next high. Abused and abandoned children are pouring into the child welfare system.”

Drug abuse and pregnancy

- Most common complications:
  53 women who used meth thru out pregnancy:
  - Maternal HTN
  - Maternal tachycardia
  - Maternal proteinuria
  - Prematurity
  - Premature labor
  - Placental hemorrhages
Drug ingestions: anecdotal reports of fetal anomalies

- Prenatal exposure results in an increase in birth defects.
  - CNS defects
  - Heart defects
  - Kidney malformation
  - Skeletal abnormalities
  - Intestinal anomalies
  - Cleft lip/palate.

Drug ingestion: Prenatal

- Meth passes through the placenta to the fetus, this can cause:
  - Elevated fetal BP.
  - Increased fetal HR.
  - Fetal cardiac arrhythmias.
- Birth outcomes improve if mother stops using for last 1-3 months of pregnancy.

Neonatal Signs and Symptoms of Intrauterine Meth Exposure

- Abnormal reflexes
  - Hypertonia.
- Sleeping problems
  - Not waking to feed for the first few weeks after birth.
  - Lassitude.
- After the above:
  - More like cocaine babies:
    - Agitation.
    - Shriil cry.
    - Poor feeding.

Neonatal Signs and Symptoms of Intrauterine Meth Exposure

- Dysphoria.
  - Difficulty habituating or self-regulating, particularly under stress.
    - I.e. noisy and chaotic environments.
- Decreased head circumference.
- Increased risk of:
  - HIV, viral hepatitis.
  - SIDS.
  - CVA's.


- Early interventions for drug-exposed infants:
  - Nutrition
  - Psychomotor assessment/monitoring development.
  - Vision and hearing assessment.
  - Speech and language assessment.
  - Emotional development and assessment.
  - Play therapy.
  - Early educational needs assessment.
  - Physical therapy.
  - Immunizations.
  - Appropriate referrals.

Children and Meth Ingestion

- Children who ingest methamphetamine are MISERABLE!
  - Can't sit still, repetitive behaviors for hours on end.
  - Crying and moaning.
  - Agitated.
  - Increased heart rates (180-200 beats per minute).
  - Increased blood pressure.
  - Seizures.
  - Vomiting.
  - Ataxia.
  - Roving eye movements.
Children and Meth Ingestion

- Length of symptoms 8 to 24 hours.
- Because of the short half life, the sooner you get a urine test the more likely you are to discover the drug.

Other Dangers to Children

- "Binge" and "crash" pattern of usage = poor parenting skills
  - Poor supervision to complete abandonment.
  - Erratic behavior, unpredictable, paranoid, violent.
  - Sexual abuse of children.
  - Decreased appetite for food means decreased effort to feed the children.
  - Use of illicit drugs (like benzodiazepines) to sedate the children.

Fetal Alcohol Syndrome

What is FASD?

Fetal Alcohol Spectrum Disorders
  - Actual physical damage to the brain
  - Irreversible
  - Can lead to secondary mental health disabilities due to life long frustration
Fetal Alcohol Spectrum Disorders
• Not a diagnostic term
• Umbrella term
• Includes all alcohol related medical diagnoses
• Encompasses FAS and FAE as well

FASD Related Terms
- Fetal Alcohol Syndrome
  • Brain Damage
  • Growth Deficiencies
  • Facial Features
  • Maternal alcohol consumption

FAE- Fetal Alcohol Effects
• Hidden disability
• Less visible, NOT less severe
• Greater risk for development of secondary mental health characteristics

FAE- Fetal Alcohol Effects

It can affect their ability to:

Learning Issues
Remember there is actual physical damage to the brain
• Learning difficulties
• Language processing difficulties
• Poor short term memory
• Difficulty recalling stored information
• Difficulty with abstract concepts
• Time
• Money

Physical Issues
• Physical disabilities as a result of prenatal exposure to alcohol
• Coordination difficulties
• May need to focus on one modality at a time (PE can be challenging)
• May have a greater need for physical activity

It can affect their ability to:

Follow directions due to language difficulty
• They may be able to hear
• They may be able to repeat directions
• They may NOT be able to understand directions
• They may NOT be able to follow more than one or two directions at a time

Learn as a result of brain damage
• Mental retardation
• Alcohol exposure is the single highest cause of mental retardation
• However: Most people with prenatal exposure are NOT retarded
• Learning disabilities
• Language processing difficulties
• Learning differences
Get along with others due to sensory damage

Effects of Prenatal Exposure to Alcohol

- Alcohol affects brain development
  - Learning Problems
  - Mental Retardation
  - Learning Disabilities
  - Language Processing Problems
- Alcohol affects social-emotional development
  - Social/Behavioral Problems
  - Immaturity
- Alcohol affects physical development
  - Physical Problems
  - Vision and Hearing Disabilities
  - Organ Defects
Behavioral Issues

- Impulsivity
- Immaturity
- Difficulty with cause and effect
  - Requires memory processing
  - Requires concept of time

Social Issues

- Difficulty comprehending social situations
  - Personal space
  - Language processing difficulties
  - Higher expressive language than receptive
- Hyper or hypo sensitive
- Impulsive
- Friendly

Emotional Issues

- Students with FASD may be at a very different functioning level emotionally, intellectually, behaviorally, physically...
- They may be affected by environment and situations to a greater degree
  - Under the best circumstances students with FASD must use greater effort to 'maintain'
  - Under stressful situations they may 'overload' and shut down

Secondary Characteristics- or what we want to avoid: (develop over time from chronic poor "fit" with home, school, work, community environment)

- Fatigue, frustration
- Anxiety, fearfulness
- Rigidity, resistance
- Appear to not care, show no facial expressions, shutdown
- Poor self concept, feelings of failure and low self esteem
- Isolation- fewer and fewer friends
- Aggressive Behavior- Rage
- Truancy, trouble with the law, running away
- Addiction
- Depression, self- destruction, suicide
- Mental illness

Etiological Classification of Disorders

Postnatal Causes

- Head Injuries
- Infections
- Demyelinating Disorders
- Seizure Disorders
- Toxic-Metabolic Disorders
- Malnutrition
- Environmental Deprivation
- Hypoconnection Syndrome (Disturbance of Neuronal Connectivity)

Assessment Strategies

- Screening Approach
- Traditional Approach
- Conceptual Approach
Assessment Strategies

Screening Tests
- Apgar Test:
  - Appearance (color)
  - Pulse (heart rate)
  - Grimace (irritability)
  - Activity (muscle tone)
  - Respiratory Effort
- Bayley Infant Neurodevelopmental Screener (BINS)
- Denver Developmental Screening Test

Assessment Strategies

Traditional Approach
- Intellectual/Cognitive
- Achievement/Basic Skills
- Language Impairment/Aphasia
- Sensorimotor
- Memory
- Nonverbal Cognition
- Personality/Psychopathology
- Behavioral Assessment

Assessment Strategies

Conceptual Approach
- Component Processes
  - Attentional Processes
  - Perceptual Processes
  - Memory/Learning Processes
  - Organizing Processes
  - Reasoning/Problem-Solving Processes
- Component Systems
  - Working Memory
  - Knowledge Base
  - Executive System

Component Processes

Attentional Processes
1. Is the child adequately alert/aroused?
2. Can the child maintain attention long enough to accomplish age appropriate tasks? If not, what factors appear to improve attention span?
3. Can the child attend to selected stimuli and disregard stimuli not relevant to the task? If the ability to selectively attend is not age appropriate, what are the effects on selective attention of distractions, individual work, and group work?

Component Processes

Perceptual Processes
Care must be taken to distinguish visual-perceptual problems from visual acuity problems, limited ocular range of motion, and cognitive problems such as impaired attention, organization, or executive functions

Component Processes

Attentional Processes
4. Can the child shift attentional focus adequately for effective classroom or social functioning?
5. Can the child divide attention adequately for effective academic and social functioning
Component Processes

Perceptual Processes

1. Does the child focus on selected objects?
2. Does the child visually track objects/people?
3. Can the child identify and discriminate among objects and features of objects?

Learning versus Memory

"Learning is the process of acquiring new information, while memory refers to the persistence of learning in a state that can be revealed at a later time"  
Squire, 1987

Process of Learning and Memory

Why Assess Learning and Memory?

- Difficulty with learning and memory are relatively common in children with Learning Disabilities and Neurologic Disorders
- Memory tests help explain how an individual learns
- Memory tests help reveal relative cognitive strengths and weaknesses that may not be readily apparent to the individual or clinician
- Help develop appropriate recommendations regarding remedial inventions in the classroom
- Help identify compensatory strategies

Practical Interpretation of Memory Test Scores

- What is the individual’s ability to learn and retain new material?
- Are there differences in the individual’s ability to learn and retain auditory versus visual information?
- How quickly or slowly does the individual learn?
- How well is newly-learned information stored after a delayed interval?
- Does the individual benefit from hints, cues, or choices in remembering material?

Component Processes

Memory/Learning Processes

1. Is there a “memory problem” to be explored?
Component Processes
Memory/Learning Processes

2. Since encoding, storage, and retrieval are all tested by testing for retrieval of information, it is not possible to obtain a clear and quantified picture of the relative contributions of each of these aspects of memory to memory problems. However, significant disparities among free, cued, and recognition memory do give insight into this issue.

Component Processes
Memory/Learning Processes

a. Immediate versus delayed recognition memory (visual)
b. Immediate versus delayed recognition memory (auditory)
c. Free versus cued recall
d. Does performance improve with cues?
e. How is the ability to access stored lexical items?

Component Processes
Memory/Learning Processes

3. Attention versus memory: Is the observed memory problem specific to memory processes or is it a result of weak attention?

4. Comprehension versus memory processes: Is the observed memory problem specific to memory or is it a result of weak comprehension?

Component Processes
Memory/Learning Processes

5. Executive system versus memory processes: Is the observed memory problem specific to memory processes or is it (in part) a failure of the executive system (e.g., to deliberately pay special attention to material that has to be remembered or to initiate and maintain an organized search of memory)?

Component Processes
Memory/Learning Processes

6. Characteristics of the information to be remembered: Is it substantially easier for the child to remember one type of information than another? Compare the child’s ability to remember
   - recent episodes in own life
   - factual information that has nothing to do with own life
   - procedures to accomplish a task or rules of a game
   - routes and locations in the building
   - new faces
   - new names

7. Aspects of presentation of the information: Does the child’s ability to remember vary with the way the information is presented?
   - Input and Output channels
   - Processing Time
   - Task Orientation
   - Incentive to Remember
   - Repetition and Spacing
   - Feedback
Component Processes
Memory/Learning Processes

8. Does the child spontaneously use strategies to learn/remember?

9. Effects of memory strategies: Does performance improve when the child is instructed to use specific strategies? Which strategies are most effective?
   - With structured instructions/Without structure
   - Elaboration
   - Organization
   - Mnemonics
   - Retrieval Strategies

Component Processes
Organizing Processes

It is necessary to eliminate the confounding effects of other cognitive processes/systems; e.g., in probing organizing processes, avoid straining attentional, perceptual, comprehension, memory, and “executive” skills.

Component Processes
Organizing Processes

1. Can the child analyze objects into their component parts? concepts into their component features? tasks into their component steps?

2. Can the child compare features, identify similarities/differences, and classify/categorize/associate?

Component Processes
Reasoning/Problem-Solving Processes

It is necessary to rule out the confounding effects of attentional problems, perceptual problems, comprehension problems, memory problems, and executive control problems.
Component Processes

Reasoning/Problem-Solving Processes

1. **Inductive reasoning.** Can the child make appropriate generalizations, given a set of instances? see single principles in a set of instances? see the rule that guides a progression or a grouping of things?

2. **Causal reasoning.** Can the child infer causes from effects? predict effects from causes?

3. **Deductive reasoning.** Can the child draw logical conclusions on the basis of formal logical relations signaled by terms such as “all,” “some,” “if-then,” “and,” “or,” “not”?

4. **Analogic reasoning.** Can the child detect indirect relationships among words, ideas, and events?

5. **Divergent thinking.** Can the child suggest varied solutions to problems? varied interpretations of events or actions?

6. **Problem-solving/decision making.** Can the child integrate concepts 1 - 5 to accurately, logically, and efficiently solve problems and/or make decisions?

Component Systems

Working Memory

1. What is the child’s immediate memory span for unrelated items (e.g., digits, unrelated words, visual symbols)? Compare this with memory span for related items (e.g., semantically related words, sentences).

2. Does the child frequently need directions repeated?

Knowledge Base

1. What is the child’s level of language knowledge and organization?
   • Use receptive picture vocabulary test
   • Use tests of word definitions, multiple definitions, synonyms, antonyms
   • Use specific probes of organizational ability

2. What is the child’s level of general knowledge?

3. What is the child’s level of academic achievement.

4. What is the child’s level of knowledge of acquired social and nonsocial skills, rules, and procedures (e.g., how to ride a bike, use a calculator, play a game, interact with adults)?
Arithmetic in Written Form

Component Systems

Executive System

1. **Awareness of strengths and weaknesses**: Is the child’s awareness of own strengths and weaknesses age-appropriate?
   - Use self-report questionnaires
   - Open-ended questions/questionnaires
   - Inventories

Component Systems

Executive System

2. **Goals**: Does the child understand and engage in goal-directed activity?
   - Does the child accept and work toward short-term goals?
   - Does the child accept and work toward intermediate goals?
   - Does the child accept and work toward long-term goals?
   - Compare goal-directedness with and without incentives.
   - Compare with abilities.

Component Systems

Executive System

3. **Planning**: Does the child give evidence that he or she actively creates plans to achieve own goals?
   - Use tests that requires simple, intermediate, and complex planning tasks.
   - Use tests that reflect verbal and nonverbal planning, organization, and self-structuring.

Component Systems

Executive System

4. **Self-initiating**: Does the child evidence age-appropriate initiation of activities and of cognitive processes?

Component Systems

Executive System

5. **Self-inhibiting**: Does the child demonstrate age-appropriate ability to inhibit behavior, thoughts, and emotions that are inappropriate or nonfunctional?
   - Perseveration? When? What modality?
   - Perseverative motor behavior?
   - Inflexibility in conversation?
   - Socially appropriate versus socially inappropriate behavior?
Component Systems

Executive System

6. Self-monitoring: Does the child demonstrate age-appropriate ability to monitor (attend to) own behavior? monitor own orientation to the tasks? monitor the adequacy of own knowledge to accomplish a task? monitor own remembering?
   • Does the child request information, repetition, or slowing of rate when needed?
   • Does the child recognize the need for more information?

7. Self-evaluating: Does the child show age-appropriate ability to evaluate own performance?

8. Ability to change set: Does the child demonstrate age-appropriate ability to consider alternative hypotheses/courses of action?

9. Strategic behavior: Does the child demonstrate age-appropriate ability to use strategies?
   • Spontaneous use of strategies?
   • Can the child verbalize their strategies?
   • Does the child recognize strategies?
   • Do they profit from strategy suggestions?

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