PSYC3016 Complete Evidence Tables

Developmental Psychology - All Lectures Combined

Table of Contents

L01: Introduction to Developmental Psychology

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Height Growth Trajectory	*Standard pediatric growth data*	0-18 yr Universal	Longitudinal growth charts measuring height velocity (cm/month) across development	**Two acceleration periods:** 0-3 years shows rapid initial growth, then puberty (11-16 yr) shows secondary growth spurt. Methodology: **Study phenomena during rapid change periods** to capture maximum developmental variance.	Peak velocity: 0-3 yr (~25cm/yr), puberty (~8-10cm/yr); plateau: childhood (~5-6cm/yr)	**Rate of change determines observability.** Studying stable periods yields minimal developmental insight compared to acceleration windows.	**"Study children when they're changing fastest — that's where development shows itself."**
Vocabulary Development Trajectory	*Developmental psycholinguistics research*	1-6 yr Children	Longitudinal measurement of productive vocabulary (words produced) and receptive vocabulary (words understood)	**Vocabulary explosion:** Sharp increases from 18-24 months (50→200+ words), continuing steep acceleration through preschool. **Rate declines** through childhood as base grows larger.	18mo: ~50 words; 24mo: ~200-300 words; 6yr: ~10,000-14,000 words	Demonstrates **non-linear development**: critical period for word learning coincides with brain maturation for language.	**"Between 1.5 and 6, vocabulary grows from dozens to thousands — the steepest learning curve in life."**
Executive Function Development	*Developmental cognitive neuroscience*	4-5 yr Critical window	Tasks measuring planning, inhibition, working memory, cognitive flexibility (e.g., DCCS, Stroop-like tasks)	**Near-linear acceleration** ages 4-5: Executive function (planning, forward thinking, self-regulation) shows **steepest developmental trajectory** between ages 4-5. Massive differences observable in this 12-month window.	Comparing 3yr-olds vs 6yr-olds yields maximum variance; comparing 30yr-olds vs 35yr-olds yields minimal variance	**Methodological implication:** Study EF during 4-5yr window for optimal research design. Prefrontal cortex maturation drives this acceleration.	**"At four they can't plan; at five they can — the sharpest year for thinking ahead."**
CONSOLIDATE: Developmental Trajectories: Height (two peaks: 0-3yr, puberty), Vocabulary (explosion 18-24mo), Executive Function (steepest 4-5yr). KEY PRINCIPLE: Study phenomena during periods of rapid change to maximize observable developmental variance.							
Nature-Nurture Dialectic	*Philosophical foundation (Locke vs Descartes tradition)*	All ages; theoretical framework	Framework for analyzing developmental phenomena: is X innate (nature/rationalism) or learned (nurture/empiricism)?	**False dichotomy:** Modern developmental psychology recognizes **interactionist model**. Question isn't "nature OR nurture" but "how do genetic predispositions and environmental inputs interact dynamically across developmental time?"	Example: Language acquisition — neither pure input nor pure genetics explains rule learning without explicit teaching	**Empiricism (nurture)** = experience shapes blank slate. **Rationalism (nature)** = innate structures constrain development. Reality = both interact.	**"The versus is dead — the question is how nature and nurture dance together."**
Interactionist Model of Intelligence	*Behavioral genetics framework*	All ages	Conceptual model: Nature (hereditary baseline) + Nurture (education, nutrition) → Realized potential	**Genetic potential realized through environmental scaffolding.** IQ heritability (~50-80%) does NOT mean unchangeable — environmental intervention can shift entire distributions.	Japanese height increased 15cm in 3 generations despite stable genetics (nutrition change)	Demonstrates **heritability ≠ immutability**. High heritability indicates mechanism, not determinism.	**"Genes set the range; environment determines where you land within it."**
Interactionist Model of Personality	*Developmental personality research*	Infancy through adulthood	Temperament (inborn) × Environment (parenting, peers) → Personality outcome	**Goodness-of-fit:** Same temperament produces different outcomes depending on environmental match. Shy child in supportive vs critical environment develops differently.	Temperament predispositions stable (~40% heritable) but expression shaped by context	**Gene-environment correlation:** Shy child selects different environments (back of room,	**"Born shy doesn't mean stay shy — it means you'll need different support to flourish."**

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Developmental Timeline Integration Synthesis across approaches	*Cross-framework synthesis*	Lifespan	Integration of Kohlberg stages with social domain emergence patterns.	18mo: self-awareness. 30mo: moral-conventional distinction. 3-7yr: pre-conventional reasoning (Stage 1-2). 7-11yr: conventional reasoning emerges. Adolescence: formal operations enable abstract principles. Adulthood: 10-15% reach post-conventional.	Appraisal (30mo) precedes reasoning (adolescence)	Developmental sequence	Moral appraisal emerges years before moral reasoning.
Multiple Parallel Trajectories Complex development	*Theoretical integration*	Lifespan	Synthesis of developmental processes.	Moral development proceeds along multiple parallel trajectories: self-awareness enabling agency, self-conscious emotions providing affective foundation, domain differentiation establishing harm-based categories, reasoning sophistication enabling principled deliberation, behavioral control emerging through executive function.	5 parallel trajectories must integrate	Multifaceted process	Moral development integrates five parallel maturing trajectories.

CONSOLIDATE: INTEGRATION: Moral REASONING (Kohlberg) = what SHOULD be done, rationalist, adolescence+, hypothetical dilemmas. Moral APPRAISAL (Social Domain) = is it RIGHT/WRONG, sentimentalist, 30mo+, harm perception. NEITHER ALONE predicts behavior—reasoning without emotion = empty principles, intuition without reasoning = can't handle complex dilemmas. BOTH needed. Timeline: 18mo self-aware → 30mo appraisal → adolescence reasoning → 10-15% post-conventional adults.

L09: Moral Development II

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Sentimentalist Philosophy	*Hume (1700s)*	Theoretical framework	Philosophical analysis of moral behavior origins	**Moral behavior emerges from emotion/empathy, not pure reasoning.** Feeling > reasoning as moral source. Contrasts with rationalist tradition.	N/A - philosophical framework	Foundation for sentimentalist tradition; challenges Kohlberg's cognitive-developmental approach	**"Hume's sentimentalism: moral behavior emerges from emotion/empathy, not pure reasoning."**
Darwin's Dual-Instinct Model	*Darwin (1871) Descent of Man*	Theoretical - evolutionary	Theoretical model: Social instincts (constant, moderate) vs Appetites (sudden, strong). Dissatisfaction when appetite subsides = guilt/remorse	**Social instincts maintain steady affiliative pressure; appetites spike intensely then fade.** Mismatch between past appetitive behavior and current social instinct dominance creates **dissatisfaction = guilt.**	Model: S = 5 (constant baseline). A(t) = 10×e^(-t/2). At t=0: A > S (transgression). At t=2min: A(2)=3.7 < S=5. Dissatisfaction D = S - A(2) = 1.3 guilt units	Evolutionary basis of moral emotions; explains why transgressions feel bad AFTER appetite satisfied; teaching signal for inhibitory control	**"Darwin: social instincts (constant, moderate) conflict with appetites (sudden, strong) creating guilt/remorse when appetite fades."**

CONSOLIDATE: Theoretical Foundations: Sentimentalist tradition (Hume) privileges emotion over reasoning. Darwin's dual-instinct model explains guilt as dissatisfaction when social instinct returns after appetitive transgression. Contrasts with Kohlberg's rationalist emphasis on cognitive stage progression.

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Violence Inhibition Mechanism (VIM) Theory	*Blair (2005)*	Theoretical model; psychopathy groups	Proposed mechanism: **Distress cues → withdrawal response → negative reinforcement.** Non-verbal distress communications (sad faces, tears) activate withdrawal, terminating aggression	**VIM creates negative reinforcement loop** where actions causing distress become progressively less likely. **Teaches moral behavior through emotional conditioning** rather than explicit reasoning.	If distress intensity (80%) > threshold (60%) → withdrawal activated. ΔR = -0.2 per episode. 10 episodes: cumulative = -2.0 units. Aggression probability drops from 0.5 to 0.5×e^(-2.0) ≈ 0.068	Sentimentalist mechanism linking empathy to moral behavior; operates automatically as inhibitory system triggered by distress cues	**"Blair's VIM: distress cues trigger automatic withdrawal, creating negative reinforcement that teaches moral behavior through emotion, not reasoning."**
VIM Psychopathy Studies: Emotion Recognition	*Blair (2005)*	Children with psychopathic tendencies vs typically developing controls	Emotion recognition task: identify happy, angry, fearful, sad faces. Compare accuracy across psychopathy groups	**Selective impairment in fear/sadness recognition.** No differences for other emotions (happiness, anger). Demonstrates **specific deficit in processing distress cues** prevents VIM activation.	**Mean recognition errors:** High psychopathic tendency = 4.73 for fear/sadness. Typically developing = 2.20 for fear/sadness. **2.14× more errors.** No group differences for other emotions	Supports VIM theory: selective distress-cue processing deficit impairs moral development by preventing emotional conditioning mechanism	**"Blair's VIM: psychopathic children show impaired fear/sadness recognition (4.73 vs 2.20 errors) but normal recognition of other emotions."**
VIM Psychopathy Studies: Moral-Conventional Distinction	*Blair (2005)*	High vs low psychopathic spectrum disorder (PSD) children	Rate seriousness of moral (harm-based) vs conventional (rule-based) transgressions. Compute difference scores	**High PSD children show smaller moral-conventional distinction.** Rate moral violations as only slightly more serious than conventional violations, unlike controls with large gap.	**Seriousness difference:** High PSD = 1.23 gap between moral and conventional. Low PSD = 1.84 gap. **33% smaller distinction** in high PSD group	Impaired VIM → reduced sensitivity to harm-based (moral) violations → smaller M/C distinction; links emotion processing to moral cognition	**"Blair VIM: high psychopathy children show smaller moral-conventional gap (1.23 vs 1.84) due to impaired distress-cue processing."**
VIM Psychopathy Studies: Predictive Power	*Blair (2005)*	Children grouped by moral-conventional distinction performance	Compare PSD scores between children who pass vs fail moral-conventional distinction task	**M/C distinction "failers" score significantly higher on PSD measures,** particularly on motivation and impulsivity facets. **Demonstrates link between moral cognition deficit and psychopathic traits.**	**PSD scores:** M/C failers = 21.95. M/C passers = 18.39. **Difference = 3.56 points.** Strongest on motivation/impulsivity subscales	Validates VIM theory: inability to distinguish moral from conventional predicts psychopathic traits, supporting emotion-morality link	**"Blair VIM predictive: children failing moral-conventional distinction score higher on psychopathy (21.95 vs 18.39), especially motivation/impulsivity."**

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Prevention Models Comparison Summary	*Hierarchy of approaches*	System-wide analysis	Compare 4 prevention models: developmental, situational, social, criminal justice. Assess cost, ROI, timescale, evidence quality, political feasibility	**Developmental prevention:** best ROI ($7 per $1), best evidence, generational timescale (10+ years), politically difficult (long wait). **Situational prevention:** environmental design (vehicle immobilizers, bank security), good ROI for specific crimes, immediate effect, politically feasible. **Social prevention:** community cohesion (after-school programs), moderate long-term ROI, eroding post-COVID (police note fraying social fabric). **Criminal justice:** worst ROI, most expensive ($1 million/year), poorest outcomes (50% recidivism), politically attractive (visible response). **Inverse relationship: best evidence approaches least politically attractive, worst evidence approaches most politically attractive.**	**Developmental:** $7/$1 ROI, 10+ year timeline, best evidence. **Situational:** good ROI specific crimes, immediate. **Social:** moderate ROI, eroding post-COVID. **Criminal justice:** worst ROI, most expensive, 50% recidivism, politically attractive. **Evidence-politics inverse relationship**	System invests disproportionately in least effective (criminal justice) vs most effective (developmental); political timescales (election cycles 3-4 years) mismatch with prevention timescales (generational 10+ years); requires political courage to invest in prevention without immediate visible results; comprehensive reform reallocating from back-end to front-end	**"Prevention models: Developmental best ($7/$1, 10+yr), Situational good (specific crimes, immediate), Social moderate (eroding post-COVID), Criminal Justice worst ($1M/50% recidivism, politically attractive) - evidence-politics inverse."**

CONSOLIDATE: Prevention Models Hierarchy: (1) Criminal Justice WORST (most expensive $1M/year, poorest outcomes 50% recidivism, back-end post-offense, poor ROI, politically attractive). (2) Developmental BEST ($7 per $1 ROI Heckman 2006, early childhood 1000 days, Perry Preschool 44% lower arrests, generational 10+ year timescale, politically difficult). (3) Diversion 70% never reoffend (15-min caution > $1M detention). Inverse: best evidence = least political appeal, worst evidence = most political appeal. System reform requires reallocation from expensive ineffective back-end to cost-effective evidence-based front-end.

L14: Classic Theories of Cognitive Development

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Jacqueline Anticipation (Grape Juice vs Soup)	*Piaget diary studies*	9 mo Piaget's daughter Jacqueline	Naturalistic observation: present spoon with grape juice vs soup; record anticipatory responses (mouth open vs refuse)	Stage 4: **Coordination of schemes.** Infant anticipates outcome based on visible cue (spoon) → demonstrates **means-ends separation**: spoon = means, juice/soup = end. Not just reflex.	Consistent differentiated response: juice → accept; soup → reject	**Evidence for intentionality without symbols.** Physical action schemes coordinate to predict outcomes.	**"At 9 months, the spoon tells the future — grape juice yes, soup no."**
Lucienne Matchbox Problem (Mental Representation)	*Piaget diary studies*	18 mo Piaget's daughter Lucienne	Hide chain in matchbox with small opening; child must retrieve it. Observe strategies: physical trial-error vs pause-then-solve.	Stage 6: **Mental combinations.** Lucienne pauses, opens/closes her MOUTH (physical analogue), then solves problem → **internalized representation** of "opening." **Semiotic function** emerges: mental trial-and-error replaces physical.	Pause duration before solution; mouth-opening gesture = symbolic stand-in	**Transition from action to thought.** Physical exploration → mental simulation. **Symbol created** through action schemes.	**"Matchbox opens when mouth opens — body becomes the first symbol system."**
Stuck Carriage Problem (Problem-Solving Insight)	*Piaget diary studies*	18 mo Lucienne	Lucienne tries to pull carriage through doorway; it's stuck. Observe whether trial-error or sudden insight.	Stage 6 **insight:** After initial failure, Lucienne **pauses, looks, then adjusts angle** and succeeds → shows **mental representation** of spatial problem rather than blind perseveration. Evidence for **tertiary→mental transition**.	Single-trial learning after pause (not gradual shaping)	Demonstrates **representational thought**: child "sees" the solution mentally before acting. **End of sensorimotor period.**	**"Stuck carriage, clear mind — one look solves what hands couldn't."**
Six Sensorimotor Stages Framework	*Piaget (1936) Origins of Intelligence*	0-24 mo Universal sequence	Longitudinal observation of own children + clinical method with other infants; code behaviors into hierarchical stages	Stage 1 (0-1mo): Reflex modification Stage 2 (1-4mo): Primary circular (body-centered) Stage 3 (4-8mo): Secondary circular (object-focused) Stage 4 (8-12mo): Coordination of schemes Stage 5 (12-18mo): Tertiary circular (experimentation) Stage 6 (18-24mo): Mental combinations → **SYMBOLIC THOUGHT**	Universal age ranges (±2mo individual variation); **logically necessary sequence** (can't skip stages)	**Constructivism:** Each stage builds on prior; sensorimotor action schemes gradually internalize into mental operations. **No innate symbols.** CONSOLIDATE: Memorize: 1-Reflex, 2-Primary (body), 3-Secondary (object), 4-Coordination (means-ends), 5-Tertiary (experiment), 6-Mental (symbols)	**"Six steps from reflex to thought: body builds mind, 0 to 24 months."**
Object Permanence Emergence	*Piaget (1954) Construction of Reality*	8-12 mo Stage 4	A-not-B task: hide object at location A (infant retrieves); then visibly move to B. Measure search location.	Stage 4 error: Infants search at A despite seeing object move to B → object permanence still **action-bound**, not fully representational. Stage 6: Search correctly at B → object exists independent of action.	**A-not-B error**: ~80-90% at 8-10mo; ~10-20% by 12mo	Shows gradual construction of **mental representation**. Object concept tied to motor schemes → decontextualized representation.	**"Eight months: 'out of sight, out of mind'; two years: object has a life of its own."**
Zone of Proximal Development (ZPD)	*Vygotsky (1978) Mind in Society*	All ages; focus on 2-7 yr	Compare child's solo performance vs performance with adult/peer assistance on same task	**ZPD = gap** between what child can do alone vs with help. Development occurs **through social interaction** in this zone. Learning **leads development** (opposite of Piaget: development enables learning).	Solo score vs assisted score; size of gap predicts learning potential	**Sociocultural transmission:** Adult provides cultural tools (language, strategies) that child internalizes. Scaffolding bridges **ZPD**.	**"The gap between 'I can't' and 'I can' is filled by a teacher."**

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
		intervention from infancy	support, health/nutrition). Dosage: Full-day, year-round, from infancy through school entry. Cost: $15k+/child/year (high-intensity)	children. **However: Low feasibility for scaling** (extremely expensive, requires multi-year commitment, specialized staff)	employment, health; **Cost-benefit: positive but expensive ($15k+/child/year × multiple years)**	but low scalability due to cost/complexity	
Competence vs Performance Distinction: Central Diagnostic Framework	*Theoretical framework synthesis*	Developmental failures across domains	When children fail tasks, diagnose whether lacking knowledge (competence deficit) OR possessing knowledge but lacking executive resources (performance limitation). Signature patterns: Can state rules but can't execute (performance); simplified tasks reveal knowledge (performance); reducing load improves performance (capacity issue)	**DCCS:** **3yo state rule correctly (competence intact)** but **perseverate (performance failure)**. **False Belief:** Competence in infancy (violation-of-expectation) but explicit task failure until 5yo (requires inhibiting own perspective). **Conservation:** Not logic failure but inability to inhibit perceptual salience. **Analogies:** Relational competence present but WM limits prevent demonstration unless familiar content	**DCCS: 100% verbal knowledge (competence) but 0% behavioral execution (performance)**; False belief: infant competence vs 4-5y explicit success; Pattern: competence earlier than performance across domains	FRAMEWORK Both factors matter: EF improvements unlock latent competencies AND conceptual development occurs—continuous capacity×knowledge growth, not discrete stages	"Competence vs performance: DCCS 3yo state rule (competence ✓) but perseverate (performance ✕)—false belief competence in infancy, explicit success at 5yo—EF unlocks latent knowledge"
Knowledge × Capacity Bidirectional Interaction Across Development	*Developmental synthesis*	Childhood through older adulthood	Bidirectional interaction: (1) High EF → enables knowledge acquisition (childhood school readiness), (2) Rich knowledge → reduces EF demands via chunking (adult expertise). Evidence: Go experts (15 pieces→1 pattern, 4× effective WM), Goswami analogies (familiar content within 3yo capacity), elderly decline only in novel tasks	**EF enables knowledge acquisition** (childhood): Need EF to sit still, follow rules, sustain attention → build knowledge base. **Knowledge reduces EF load** (adulthood): **Expertise chunks information (Go: 15→1 pattern)** → compensates for declining capacity. Resolution: 3yo solve familiar analogies (bread:slice) but fail novel—familiar content chunked within capacity (C≈1). **Need childhood EF to build compensatory knowledge base for later life**	**Childhood: EF predicts academic achievement** (school readiness depends on minimal EF); **Adulthood: Go experts no WM decline on familiar positions, significant decline on novel tasks**; Demonstrates bidirectional causation	KNOWLEDGE×CAPACITY Bidirectional: EF enables knowledge acquisition → knowledge compensates for EF decline—why older adults don't become like 4-year-olds	"Knowledge × Capacity bidirectional: childhood EF enables knowledge acquisition (school readiness) → adult expertise chunks info (Go 15→1 pattern) → compensates for EF decline (familiar tasks intact)"
Lifespan Trajectory: Both Low → Both Optimal → Knowledge Compensates	*Lifespan EF development synthesis*	Early childhood (2-5) through older adulthood (60+)	Integration across lifespan: Early childhood (both EF + knowledge low → helpless), Middle childhood (EF enables knowledge building), Young adulthood (both optimal ~25y), Older adulthood (EF declines BUT knowledge compensates). Compare fluid vs crystallized intelligence trajectories	**Early childhood:** Both low (helpless without scaffolding, tantrums, impulsivity). **Middle childhood:** EF enables knowledge acquisition (school readiness). **Young adulthood:** Both systems optimal (**~25y peak**). **Older adulthood:** EF declines **BUT knowledge compensates** (familiar tasks intact, decline only in novel). Example: Grandfather discusses 20th-century politics intelligently BUT struggles with new phone interface	**EF peak: ~25y**; Then gradual decline BUT crystallized intelligence continues rising; Net function maintained in familiar domains; Decline apparent only in novel tasks requiring fluid reasoning	LIFESPAN Why older adults ≠ 4-year-olds: knowledge compensates for EF decline—but requires childhood EF to build that knowledge base	"Lifespan: early childhood (both low, helpless) → young adult (both optimal, ~25y peak) → older adult (EF declines BUT knowledge compensates—familiar tasks intact, novel tasks decline)"

L22: Language Development I

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Eimas et al. (1971): Categorical Perception of VOT in Newborns	*Eimas et al. (1971)*	**2-day-old infants**	High-amplitude sucking paradigm. Voice onset time (VOT) continuum: 0ms, 20ms, 40ms, 60ms. English categorical boundary: 20-40ms (/d/ vs /t/). Habituate to 20ms, test discrimination across boundary (20ms→40ms) vs within-category (0ms→20ms)	**Newborns show categorical perception**: **Excellent discrimination 20ms vs 40ms (across /d/-/t/ boundary)** BUT **poor discrimination 0ms vs 20ms (both /d/, within-category)**, despite equal 20ms physical acoustic distance. **Categorical boundaries at adult-like locations for BOTH native and non-native contrasts** before perceptual narrowing	**Across-boundary: significant dishabituation (increased sucking)**; **Within-category: no dishabituation**; P(discriminate | across-boundary) >> P(discriminate | within-category) despite equal Δ VOT = 20ms	CATEGORICAL PERCEPTION Present from birth—NOT learned. Perceptual narrowing later tunes WHICH boundaries maintained (native) vs lost (non-native)	"Eimas et al. 1971: 2-day-olds discriminate 20ms vs 40ms VOT (across /d/-/t/ boundary) excellently but 0ms vs 20ms (within /d/) poorly—categorical perception from birth"
Vouloumanos & Werker (2004): Newborn Preference for Speech	*Vouloumanos & Werker (2004)*	**Newborns (0-2 days old)**	Preferential sucking paradigm: Play speech sounds vs acoustically complex non-speech sounds matched for complexity. Measure sucking rate as index of interest/preference	**Newborns suck faster for speech vs non-speech**. **Innate preference for speech signals**. Also recognize native language prosody (rhythm, intonation patterns) heard in utero (preferentially attend to mother's language vs other languages)	**Significantly higher sucking rate for speech stimuli**; Native language prosody preference present at birth (from prenatal exposure to muffled speech heard through womb)	INNATE BIASES Speech-specific processing biases present from birth—NOT general auditory processing. Foundation for language-specific tuning	"Vouloumanos & Werker 2004: newborns suck faster for speech than complex non-speech—innate speech preference + recognize native prosody from womb exposure"

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
		(non-literal emerges)	Irony: Child fails test, teacher says "Great job!" (means opposite of literal). (3) Sarcasm: Similar to irony but with mocking tone. Present scenarios, ask what speaker really means	meaning diverges from literal sentence meaning. Requires **metarepresentational theory of mind**: Represent not just speaker's mental state but speaker's INTENTION to communicate belief different from surface meaning (second-order mental states)	Adult-like pragmatic mastery continues into late childhood/adolescence; Correlates with theory of mind development	literal words. Second-order mental states (I think you intend me to believe X, not literal Y)	
ASD Profile: Pragmatic Deficits with Intact Structural Language	*Clinical dissociation: ASD pragmatic impairments*	Children/adults with Autism Spectrum Disorder	Assess language across four levels: (1) Phonology (sound structure), (2) Morphology/Syntax (word structure, grammar), (3) Semantics (word meanings, lexicon), (4) Pragmatics (language use, social appropriateness). ASD individuals often show: Strong phonology (no articulation problems), large vocabulary (semantics intact), complex grammatical sentences (syntax intact), BUT pragmatic deficits (miss sarcasm, struggle with conversational turn-taking, provide too much/little information for listener's knowledge state, fail to adjust register to context)	**ASD: pragmatic deficits NOT due to lack of linguistic knowledge** (lexicon, grammar intact) but to **social-cognitive deficits** in representing communicative intentions. **Demonstrates dissociability: Can have structural language competence without pragmatic competence**. Interventions focus on teaching mental state reasoning and contextual appropriateness rules (NOT vocabulary or syntax—those typically intact). Common diagnostic error: Assuming child with large vocabulary and complex sentences has "no language problems" when significant pragmatic impairments may affect social communication	ASD: Often age-appropriate phonology, morphology, syntax, vocabulary; **BUT pragmatic deficits: miss sarcasm/irony, conversational turn-taking difficulties, fail to track listener knowledge**; Requires social cognition intervention (theory of mind training), NOT linguistic intervention	**CLINICAL DISSOCIATION** Pragmatics dissociates from structural language—can have intact phonology/vocabulary/syntax but impaired pragmatics (requires social cognition, not just linguistic knowledge)	"ASD profile: often intact phonology, vocabulary, syntax BUT pragmatic deficits (miss sarcasm, conversational norms)—pragmatics requires social cognition (theory of mind), dissociable from structural linguistic knowledge"

L23-24: Language Development II & III

STUDY/PARADIGM	AUTHORS & YEAR	AGE/POPULATION	METHOD	KEY FINDING	STATISTICAL DETAIL	THEORY LINK	MEMORIZABLE SENTENCE
Crain & Nakayama (1987): Structural Dependence in Question Formation	*Crain & Nakayama (1987)*	3-5 years	Elicited production: Complex sentences with relative clauses ("The boy who is smoking is crazy"). Elicit question formation. Linear rule would move first auxiliary ("*Is the boy who smoking is crazy?"); structure-dependent rule moves main-clause auxiliary ("Is the boy who is smoking crazy?")	**Zero structural dependence violations across 600+ questions. Children NEVER produce linear-order errors** despite: (1) Relative clauses rare in child-directed speech (minimal exposure), (2) Linear rule simpler, (3) No negative evidence (never hear island violations corrected). **Perfect performance despite impoverished input = innate structural dependence constraint** (UG prohibits structure-independent rules).	**0 errors across 600+ questions from 3-5 year-olds**; Elicitation contexts designed to maximize error likelihood (complex embeddings, time pressure); Other error types (tense, agreement) occur freely in same data (NOT rote memorization)	**UG CONSTRAINT** Syntactic operations MUST reference hierarchical phrase structure, NEVER linear word order—genetically specified, NOT learned	"Crain & Nakayama 1987: 0 structural dependence errors across 600+ questions (3-5yo)—'parade case' for innate constraint—children never move first auxiliary despite simplicity + no negative evidence"
Wh-Movement Island Constraints: Poverty of Stimulus Argument	*Chomsky; Jackendoff (2002)*	Adult speakers; children never violate	Grammaticality judgments: Legal wh-questions ("Which movie does Susan imagine that Sarah saw __ last night?") vs. illegal coordinate structure islands ("*What did Beth eat peanut butter and __ for dinner?") or complex NP islands ("*Who does Sam know a girl who is in love with __?")	**Children NEVER produce island violations** despite no negative evidence. No one produces ungrammatical sentences to teach what's prohibited. **If general learning mechanisms (reinforcement, statistical extraction) sufficient, children should overgeneralize, produce errors, then correct based on feedback—but they do NOT**. **Conclusion:** Constraints on wh-movement must be innate UG, specifying universally allowed vs. prohibited syntactic operations.	Acceptance rate of island violations: ~5-10% in non-native speakers (near-zero in native speakers); Never corrected in input (no negative evidence); **Children's production: 0% island violations** (cannot learn prohibition from absent evidence)	**POVERTY OF STIMULUS** Linguistic knowledge UNLEARNABLE from experience alone → must be innate. If language is innate, symbols are innate (refutes Piaget/Vygotsky)	"Wh-movement island constraints: children NEVER violate ('*What did Beth eat peanut butter and __ for dinner?') despite no negative evidence—innate UG specifies prohibited operations across all languages"
Senghas, Kita, & Özyürek (2004): Nicaraguan Sign Language—Children Create Linguistic Structure	*Senghas, Kita, & Özyürek (2004)*	Deaf children (Nicaragua 1980s); **Cohort 1 (1980s adults), Cohort 2 (1990s children), Cohort 3 (2000s children)**	Natural experiment: Deaf students brought together for first time in 1980s (previously isolated). Analyze motion event descriptions (ball rolling down hill). Measure simultaneous manner+path gestures (holistic) vs. sequential componential (manner THEN path—linguistic	**Spanish co-speech gesture: 65% simultaneous** (baseline). **NSL Cohort 1 (adults): 25% componential** (mostly simultaneous like Spanish). **NSL Cohort 2 (children exposed to Cohort 1 during sensitive period): 75% componential**. **Cohort 3: 73% componential** (fully systematic). **Dramatic 50 percentage-point increase from Cohort 1 to 2/3** occurred DESPITE Cohort 2 children having Cohort 1 adults as primary models—children did NOT simply learn what was modeled;	Spanish gesture: 65% simultaneous; **NSL Cohort 1: 25% componential**; **Cohort 2: 75% componential**; Cohort 3: 73% componential; **50 percentage-point gain (Cohort 1→2)** despite impoverished first-cohort input; Sensitive period: Cohort 1 adults past critical	**SENSITIVE PERIOD + UG** Children's UG imposes linguistic structure (compositionality) on deficient input, exceeding what adults provide—sensitive period constraint explains why first-cohort adults couldn't generate it	"Senghas et al. 2004 NSL: Cohort 2 children introduced 75% componential structure (manner→path sequential) vs. Cohort 1's 25%—children EXCEEDED adult input quality during sensitive period, imposed UG-driven compositionality"