

Cognitive Psychology

PSYC230

Lecture # 19

Today's topic...

Cognitive Development

Infant & Child Memory

Elderly Memory

Theories of Cognitive
Development

Methodology

How much do infants know?

How and what can we find out from a pre-linguistic child?

Diary studies & parental reports

Parents who have time to record child behaviour
may also be changing the developmental conditions
(Rosenthal Effects)

Naturalistic Methods:

Observation

Diary studies & parental reports

Audio- and video-tape

(good fidelity, poor
control)

Controlled Methods:

Head-turning, looking & gaze

Cardiac deceleration

High amplitude sucking

Conjugate reinforcement

(tie a ribbon from infant's foot to crib mobile)

(good control, poor fidelity)

Infant Memory

Mother's voice

2-day old babies will suck dummies (pacifiers)
to produce video of their mother's face
(but not of visually similar stranger)

3-day old babies suck dummies at different
rates to produce the voice of their mother
versus female stranger (& prefer mother)

Newborns prefer hearing stories that their
mother read aloud each day during last 3 months
of pregnancy (rather than similar passages
that had never been read aloud)

Infant Memory

Recognition Memory

2 month old infants remember stimuli for 3 days

3 month olds remember stimuli for 1 week

18 month olds remember stimuli for 13 weeks

Encoding Specificity

Conjugate reinforcement paradigm shows recognition
interference effects of different crib liner and priming
effects on implicit memories

Retroactive Interference

Switching to a new mobile interferes with
memory of how to "work" original mobile
(in conjugate reinforcement paradigm)

Infant Memory

Distributed Practice

3 month olds show distributed practice effects
better recognition after an 8-day delay when
training sessions are separated by 2 days (but not 4 days)

Imitation & Schemas

Babies taught "two step" imitation schema
(buttons in box + shake) remember schema 3 months later
(compared to one step imitation & no imitation controls)

Between ages 1 & 2 production of new "three step"
sequences, at 24 months "five step" sequences,
at 30 months "eight-step" sequences

Retention intervals are long, 13 month olds remember
three step sequences for 8 months

Child Memory

Working Memory

2-year olds' memory span is two digits

9-year olds' memory span is six digits

Cognitive speedup – increased rehearsal rate with age

Long-Term Memory

2-year olds' recognition memory is good – recall is poor

4-year olds' display good recognition & recall

2-year olds' cued recall is excellent
(recall feeding teddy bear with bottle from 12 months earlier!)

4.5 year old recalled 46 dinosaur names, and their properties
the researchers were even able to form a network representation
of the boy's semantic knowledge about dinosaurs

Child Memory

Episodic Memory

ask University students about events
from the time of younger siblings' birth

Infantile amnesia -- good recall if they were 4 or older,
poor recall if 2 years old

Implicit Memory

explicit recognition memory for verbal &
nonverbal materials (pictures) steadily improves
with age (4, 5, & 10 yrs old)

implicit recognition memory for verbal &
nonverbal materials (priming effects) shows no
age effects (good from an early age)

dissociation between implicit & explicit memory

Child Memory Baking cookies (Nelson & Gruendel, 1981)

Children learn new schemas & scripts quickly,
good at recounting the script but not the details from a
particular instance of the script (just like adults)

Age 3yrs, 1 month – *"Well, you bake them and eat them."*

Age 4 yrs, 5 months – *"My mommy puts chocolate chips inside the
cookies. Then ya put 'em in the oven... Then we take them out on
the table and eat them.."*

Age 6 yrs, 9 months – *"Add three cups of butter...Add three lumps of
butter, two cups of sugar, one cup of flour. Mix it up...knead it.
Get it in a pan, put it in the oven. Bake it... Set it up to 30. Take it
out and it'll be cookies."*

Age 8 yrs, 8 months – *"First, you need a bowl, a bowl, and you need
about two eggs and chocolate chips and an eggbeater. And then
you gotta crack the eggs open and put it in a bowl and ys gotta get
the chips and mix it together. And put it in a stove for about 5 or
10 minutes, and then you have cookies. Then ya eat them!"*

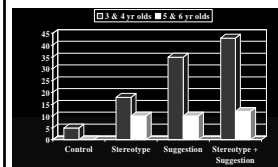
Child Memory

Source Monitoring

ask 6 year-olds to imagine what it would *feel like* to do *X*
usually report that *X* actually happened

fail to report that the action had been imagined

Constructive Processes



Leichtman & Ceci, 1995
"Sam Stone" experiment

Kids under age 5 are very suggestible
witnesses
can't inhibit irrelevant information

Elderly Memory

Stereotype of forgetful elderly

Full file cabinets?

Dual Task Paradigm

Task switching "costs" elderly more on early trials,
soon catch up with young adults

Working Memory

Elderly have same digit span as young adults

Long-Term Memory

Recognition – same or slightly worse than young adults

Recall – appears to suffer the most,
mostly in inactive or poorly educated elderly

depends on content, effort & demand (e.g., Native
American & Asian culture)

Elderly Memory

Implicit Memory

implicit recognition memory for verbal & nonverbal
materials (priming effects) shows no age effects (stays good)

dissociation between implicit & explicit memory

Elderly do display:

Cognitive slowing – 20% slower rehearsal speeds
& poorer computation span (mental arithmetic)

Source forgetting – difficulty recalling the circumstances
under which they acquired information

Inhibition deficits -- competition from extraneous information

Sustained activation of irrelevant information

Preference for serial & depth search strategies

Slower acquisition of new skills

Elderly Memory

Elderly do not show declines on skills they practice regularly

Elderly do develop compensatory strategies

Memory declines

free recall
cued recall
fewer flashbulb memories
names & faces
contextual information

new skill acquisition
rate of rehearsal

Slight declines

recognition
digit span

No differences

implicit memory
maintenance of skills
meta-memory

Age advantages

longer-lasting sensory memory
vocabulary scores
anticipation in skilled performance
remote (childhood) memories

Cognitive Development

The “classic” theoretical questions

What are the relative contributions of maturation and experience?

(nativist, learning, or social interaction?)

Is development a continuous or a discontinuous process?

(gradual or in stages?)

Theoretical Approaches to Cognitive Development

Maturation (Nature)

Physiological/brain maturation determines cognitive development

Cortical development after birth

Experience (Nurture)

Social and environmental influences determine development

Humans are social animals; cognitive development results from need to interact with other members of the species

The “classic” theorists



Jean Piaget (1896-1980)
Swiss developmental psychologist
Proposed a “stage” theory
Stages are maturationally determined



Lev Vygotsky (1896-1934)
Russian psychologist
Stressed role of social interaction
Development proceeds from “outside in”

Piaget’s Principles

Children’s thought processes differ from adults’ thought processes

However, children do not behave randomly

Children use coherent logical systems that differ from adult logic

Analysis of errors can uncover the child’s system

Goal is to adapt to the environment

Responses to the environment become increasingly more complex and have a greater reliance on mental representation and symbol manipulation

Piaget’s Principles

Motivation of the child is to achieve “equilibrium” between environment and current stage of cognition

Changes occur when current cognitive processes and schemata cannot handle environmental input
e.g., learning the name of a new animal

Processes to achieve equilibrium

Assimilation -- Child adds new information into existing schema

Accommodation -- Child alters existing schema to fit new information

Piaget's Stages of Cognitive Development

I. Sensorimotor

II. Pre-operational

III. Concrete Operations

IV. Formal Operations

Ages are approximate
Stages follow in sequence and include the
cognitive processes of the preceding stage

Piaget's Stages of Cognitive Development Sensorimotor

birth to 18-24 months

Earliest adaptations are reflexive
Focussed on sensory input and motor behaviours
Stage ends with beginnings of representational thought

Characterised by
lack of object permanence before 9 months
"egocentric" thought

Piaget's Stages of Cognitive Development

Preoperational age 2 to 6-7 years

Language development

Foundations for logical thought

Increasing ability to take
another's perspective

Development of internal
mental representations

Characterised by centration
tendency to focus on only one aspect
of a complex situation or problem
and inability to conserve quantity

Piaget's Stages of Cognitive Development

Concrete-Operational

7-8 to 11-12 years

Internal manipulation of mental representations

ability to perform mental operations
on representations of *concrete objects*
e.g., conservation of quantity

requires understanding of *reversibility*

not yet capable of formal inductive
and deductive reasoning

Piaget's Stages of Cognitive Development

Formal-Operational

11-12 + to adulthood

Your stage of cognitive development!

Can acquire knowledge without
direct experience

Ability to perform mental operations
on abstract symbols and thoughts

Greater use of mathematical reasoning
and formal logic

Fully able to adopt other's perspectives

Systematic approach to problem solving

Increased linguistic sophistication

Criticisms of Piaget's theory

Environment (e.g., culture) can affect development of stages

e.g., infants in some cultures develop psychomotor skills earlier

Ages are too high an estimate for stages
children can perform many tasks at much earlier age than Piaget claimed

Experiments are hard for children to understand
if instructions are not phrased in a "tricky" way,
they may be able to do the task

An additional, fifth, "stage" is needed

"problem-finding"-- determining which problems are most important
"dialectical thinking" -- recognise one correct answer may not exist
"postformal thinking"-- recognition that thought evolves & ambiguity
must be dealt with

Vygotsky's Theory of Cognitive Development

Development is determined by social influences

Development is continuous, rather than in stages

Knowledge is acquired from the environment
through internalisation

*internal re-creation of external events,
experiences and conversations*

Thought is "language gone underground"
private speech

Vygotsky's Principles

It is through others that we
become ourselves

What a child can do in cooperation today he can do alone
tomorrow. Therefore the only good kind of instruction is
that which marches ahead of development, and leads it
("scaffolding").

A child's greatest achievements are possible in play,
achievements that will tomorrow become his basic
level of real action and morality. It is the essence of
play that a new relation is created... between situations
in thought and real situations.

Vygotsky's Theory of Cognitive Development

Vygotsky argued that we should go beyond
a child's (overt) performance on a task and try
to assess their (tacit) competence

Zone of Proximal Development

ZPD reflects beginning skills that can be
performed "with help"

A child has a greater range of ability
(ZPD)

than can be shown through static
Ability should be assessed "dynamically"
--i.e., with hints

Evaluation of Theoretical Approaches

Discontinuity or Continuity?

Discontinuity theorist: Piaget

Continuity theorist: Vygotsky

Nature or Nurture?

Nature: Piaget

Nurture: Vygotsky