Overview

- 1st part:
  - What is developmental psychology
  - Some views on theory and change
- 2nd part:
  - Early memory development
Is psychology a single coherent discipline?
DP = just one of many areas

The Swedish National Committee for Psychology
(the Swedish Royal Academy of Science)
Areas of psychology:

- Biological psychology
- Clinical psychology
- Cognitive psychology
- Cultural psychology
- Developmental psychology
- Economic psychology
- Educational psychology
- Emotions
- Environmental psychology
- Forensic psychology
- Handicap psychology
- Health psychology
- Military psychology
- Motivational psychology
- Music psychology
- Neuropsychology
- Perception
- Personality
- Political psychology
- Psychophysics
- Religion
- Social psychology
- Sports psychology
- Technique
- Work/organizational psychology
The first nervous impulses which pass through the baby’s eyes, ears, finger, or mouth to the tender brain make a pathway for itself; the next time another impulse travels over the same path it deepens the impression of the first”

Attentional processes

Attention - behavioral responses

(Colombo et al., 2001)
Attention - behavioral responses

• Orienting

(Columbo et al., 2001)

Attention - behavioral responses

• Orienting
• Sustained attention

(Columbo et al., 2001)
Attention - behavioral responses

- Orienting
- Sustained attention
- Attention termination

(Colombo et al., 2001)

Attentional systems - Brain networks

- **Alerting** - readiness for reacting to new incoming stimuli.
  - Subcortical processes (thalamus)
  - Cx: right parietal and right frontal areas
  - Neurochemistry: Norepinephrine is the main modulator

- **Orienting** - some information is selected.
  - Cx: posterior parietal lobe (e.g. the superior parietal lobe) + frontal (frontal eye fields)
  - Subcortical areas (superior colliculus)
  - Neurochemistry: The main component is acetylcholine

- **Executive attention** - monitoring responses, thoughts and feelings (affect regulation).
  - Cx: frontal cortex
  - Subcortical: basal ganglia
  - Neurochemistry: Dopamine is the main modulator

(Posner & Rothbart, 2007)
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Disorders related to attentional networks

- Alerting
  - ADHD
  - Normal aging
- Orienting
  - Autism
- Executive control
  - Schizophrenia
  - BPD
  - Alzheimer
  - 22q11 deletion syndrome

(Posner & Rothbart, 2007)

View of CNS development affects our view of psychological development

- Protomap
  - Each individual subdivision are built differently from start
  - "Patched quilt"-model

- Protocortex
  - A model of gradual development
  - Gradually differentiated over time. Functions emerge.
Connectionism: Neurala networks

- Neurons integrate information
- Neurons transmit information about the level of their input
- Brain structure is layered
- The influence of one neuron on another depends on the strength of the connection between them
- Learning through changing strength of connections
If infants can successfully remember four objects they should search longer on trials when the box was expected to contain more objects than when it was expected to be empty.

The infants searched longer when more objects remained in the box than when the box was empty when presented with familiar objects, spatially grouped, familiar objects, spatially interleaved, and novel objects, spatially grouped. The infants did not search longer for objects remaining in the box when presented with novel objects, spatially interleaved.

Infants remembered a greater number of objects when arrays could be parsed into smaller units on the basis of conceptual or perceptual information.

(Feigenson & Halberda, 2008)
Fig. 2. The mean of increased searching (± SEM), average search times, and examples of the object configurations used in Exp. 2 are shown. The infants’ average search times are plotted in triads on the right y axis. The infants showed increased searching when presented with two tokens of two different object types, but not when presented with four tokens of a single object type.

(Feigenson & Halberda, 2008)

Fig. 4. The mean of increased searching (± SEM), average search times, and object configurations used in Exp. 4 are shown. The infants’ average search times are plotted in triads on the right y axis. The infants showed increased searching when presented with six objects as three sets of two, but not when presented as a single set of six.

(Feigenson & Halberda, 2008)
E.g.: Developmental psychopathology

In memory, temperament, intelligence
Development = change

- Issues:
  - Multiple or singular processes?
  - Implicit or explicit strategies?
  - Change or variation?
- What drives / affects development?
  - Biology?
  - Individual experiences?
  - Culture?

Development = change or not?

- Or how do mental concepts develop?
- Is it “there” from birth or not
It all starts at birth... or?

- Interpret
- Establish meaning
- Develop relationships
- Understand relationships
- Mental world?

Qualitative changes in development
(Kagan 2008)

- Argues against core competencies.
- Does the current contain the feature?
- Transformation vs. preservation
  - How much (or how little) transformation of the infant’s psychological structures occurs as the child grows?
Mental representations are

ex: IB&D 1998

INVITED ARTICLE

WHO PUT THE COG IN INFANT COGNITION?
Is Rich Interpretation Too Costly?

Marshall W. Guth
University of Oregon

The basic insight of my additional theory concerns the role of experience in the development of language use. The guiding idea is that we are being invited to be interpreters of the intentional stance. The intentional stance is a useful tool for understanding mental representations.

INVITED ARTICLE

NATIVISM, EMPIRICISM, AND THE ORIGINS OF KNOWLEDGE

Elizabeth S. Spelke

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Mental representations (ex: IB&D 1998)

OBJECT REPRESENTATION, IDENTITY, AND THE PARADOX OF EARLY PERMANENCE: Steps Toward a New Framework

Andrew N. Meltzoff
M. Keith Moore
University of Washington

The predominant theory of infancy has been overthrown, but there is little consensus on a replacement. We hypothesize that identity for representation is the starting point for infant development, not its culmination. Logical similarities are drawn between object representations, identity, and permanence. Evenly spaced events on early object permanence and deferred imitation suggest bit even for young infants, representations parallel their forms in sensory context. By numerical identity of object (Oi) is initially specified by spatiotemporal similarity (match and trajectory). t) Personal and functional identity (inner) develop about events are analyzed by categorizing experiences to current perceptions, and Oi representation opens this perspective, anticipating future contexts with Oi and, reciprocally, modifying Oi as the "same" one again. A model of the architecture and functioning of the early representational world is proposed. It accounts for young infants’ behavior toward objects and things in terms of their efforts to determine the identity of objects. Our proposal is developmental without denying innate structure and extends the power of perception and representation and for being curious about attributing common concepts to young infants.

Mental representations: Meltzoff & Moore’s model
Mental representations

Three examples

- How to understand early competencies
- Are we making the baby too competent?
Example 1: Imitation

No consensus

• Is it imitation?
• Innate releasing mechanism?
• Matching w/o being imitation?
• If yes:
  – What mechanism?
NI: Different response patterns for TP and MO (2 days)

Heimann, in prep

PERIODS:
P = Presentation
R = Response

* p < .05
To imitate is a difficult task for the newborn child.

...... it might take between 30 and 60 seconds before clear imitation is displayed
...... it is also a task carried out by a nervous system that has yet to develop most of its detailed architecture.
...... Thus, a newborn child achieving reasonable matching does so in spite of the fact that many systems are immature.

Two visual pathways
Normal intersubjectivity in infancy

- Infant is born with awareness specifically receptive to subjective states of other persons
  - Protoconversation
  - Timing
  - Intrinsically motivated companionship
  - Communicative motivation
  - Self-other awareness (cf. virtual other; Bråten)

Communicate motives and intersubjectivity

“In the gentle, intimate, affectionate, and rhythmically regulated playful exchanges of protoconversation, 2-month-old infants look at the eyes and mouth of the person addressing them while listening to the voice.”

Trevathan & Aitken, 2001, p6
Exemple 2: core knowledge of objects

Baillargeon’s experiment
3 months
Exemple 3: core knowledge of faces
Faces 1

Figure 5. Infant's visual attention to different face patterns (from "The Origin of Form Perception," by R. L. Fantz, 1961, Science, 133, 860. Copyright 1961 by the AAAS. Reprinted with permission.)

(Fantz, 1961)

Faces 2

Figure 1. The schematic configurations drawn on the left, with their inverse on the right, were used to study the infant's face preferences (Johnson & Morton, 1991; Volterra,薅 tumor, & Morton, 1994).

Johnson & Morton, 1991
Inborn schema

Snapshots of the babies mental world
• Schema and sensorimotor knowledge vs. semantic knowledge
  – Schema = patterned perceptual features of an event (good for recognizing events, places and things)
  – Semantic knowledge can not be explained by adding perceptual/schematic information (good for classification, understanding causal sequences, comprehension of communication)
Qualitative changes in development 3  
(Kagan 2008)

• Argues against the use of a single measure (looking time)  
  – Need convergent measures

• Also:  
  – There might be curvilinear functions  
  – Brain maturation  
  – Stimulus characteristics

Continuous quantitative changes do exist  
(Quinn, 2008)

• Perceptually based category representations can be used for generalization (to go beyond the information given)
• Convergent measures exist, e.g.: ERP
• Perceptual representations = placeholders  
  – It is the content that changes, not the underlying developmental process.
• Early biases (constraints) helps the rapid development
• Single network connectionist learning system has been proven powerful in capturing “complex” processes
Rediscovering development
according to Campos et al. (2008)

• Longitudinal studies are needed (single studies and single ages = incomplete data)
• Don’t overlook intermediate functions. Early behavior ≠ link to later competency.
• Emergent forms depend on prior forms but does not ‘contain’ them

(Campos et al., 2008, pp 1626-1627)

Guidelines for studying development
according to Campos et al. (2008)

1. Developmental phenomena = embedded in time
2. Context affects early competencies
3. There are “regressive” phenomena in development
4. Early and late competencies might serve different functions
Periods of rapid change or Regression periods
Fact or fantasy?

Different or similar concepts?

- **Regression**
  - = the return to a high frequency of M-I contact, characteristic of the earliest period (Horwich, 1974)

- **Transition**

- **Discontinuity**
Van de Rijt-Plooij & Plooij:

- Chimpanzees
  - Free-ranging
  - "leaps" of independence
- Infants
  - Q-naires + interviews
  - 10 periods at ages:
    - 4-5, 7-9, 11-12, 14-19, 22-26, 32-37, 40-46, 49-52, 61-64, 72-73


Dutch studies 1

- Chimpanzees
  - Free-ranging
  - "leaps" of independence
- Infants
  - Q-naires + interviews
  - 10 periods at ages:
    - 4-5, 7-9, 11-12, 14 (15)-19, 22 (23)-26, 32 (34)-37, 40 (42-45) - 46, 49-52, 61-64, 72-73

Hypotheses:
*Regression periods…*

- = localised specific periods
- = the emotional demonstration of cerebral reorganisations
- = may be related to stress and conflicts with the mother
- = indicators of a transition period


Dutch studies 2

- Peaks in *illnesses*
  - N = 26
  - Data = Q
  - 183 illnesses reported
  - Peaks: 6, 15, 21, 31, 40, 51, 65, 85 95 and 99 weeks
- Age linked changes affect behavior and immune system?

Dutch studies 3

• SIDS
  – N = all children in NL who died during first year of life from SIDS
  – 1322 boys, 892 girls
  – Years 79-93
  – Results girls only (7, 10-12, 17, 25, 29-35, 38-42 plus 51)

(Plooij, 2003)

Replication Spain

• N= 20 pairs (5 cohorts) 3w-14m
• Q + int
• Peaks: 5, 8, 12-13, 18, 26-27,35, 43 and 52

(Sadurni & Rostan, 2003)
Replication: UK

- 30 dyads from 10-26 w
- Telephone interview
- Regression algorithm
- Peaks 12, 17, 26 confirming
- but also peak 20 w

(Woolmore & Richer, 2003)

Replication SE

- N = 17 (8 boys)
- OG (n=9); QG (n=8)
- Incl criteria
  - Married
  - No planned child care < 15 mos
- Measures
  - Maternal reports
  - Observations

(Lindblad, Heimann & Ullstadius, 2003)
Replication SE 1
(compared with Dutch findings)

• > 60 %: 14-19, 32-37, 40-46
• > 50 %: 4-5, 11-12, 22-26
• < 50 %: 7-9, 49-52, 61-64
• 61-64 maybe masked by illness
• # of peaks/weeks: $r = .9$ between observed and expected

(Lindblad, Heimann & Ullstadius, 2003)
Replication SE 2
(Peaks found)

• > 60: 5-6, 10-11, 31-34, 40-46, 60-62
• > 50%: 14-17, 20-21, 36-38, 55-57
• Concl
  – Cyclic pattern exist
  – No support 7-9, 22-26 or 49-52
  – Expl? culture? Individual?

Comparing four countries

(Heimann, 2010)
Imp for understanding...

- Individual development?
- Dvl of M-I relationship?
- M-I conflicts
- Psychopathology?
- Rel brain - behavior?
- Gender differences?