Two Systems of Thinking Across Cultures

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Assumption in Cognitive Science

- Cultural variability in content of thinking
- But universality in process
- This assumption was rarely tested empirically
- Estimated 90-95% of all samples in psychology are Western people
- Recent cross cultural evidence
Two Systems of Reasoning

Formal (e.g., Bruner, Goodnow, & Austin, 1956)
  – symbolic
  – rule-application
  – e.g., deductive reasoning

Intuitive (e.g., Smith & Medin, 1981)
  – experience
  – similarity relations
  – e.g., exemplar-categorization
Modes of Thought in Two Cultural Areas

    e.g., Nisbett, Peng, Choi, & Norenzayan, 2001

Western independent cultures:
    Analytic predominates

East Asian interdependent cultures:
    Holistic/ intuitive predominates
Questions

• Are there cultural differences in process? YES

• Both conceptual and perceptual tasks? YES

• Are these differences result of artefacts NO

• Proximate explanation for the diffs? MAYBE
Cultural Differences in Modes of Thought

• Conceptual tasks
• Attention/perceptual tasks
• Evidence from additional cultures
• Explanations for the cognitive differences
Examples of Deductive Arguments

Typical:

All birds have an ulnar artery
Therefore all EAGLES have an ulnar artery

Atypical:

All birds have an ulnar artery
Therefore all PENGUINS have an ulnar artery

0-----2-----3-----4-----5-----6-----7-----8-----9-----10
Very Unconvincing                         Very Convincing
Conceptual Structure
<table>
<thead>
<tr>
<th>Belief</th>
<th>Logic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid/ Believable</td>
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</tr>
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<td>Valid/ Nonbelievable</td>
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</tr>
</tbody>
</table>
Examples of Arguments

Valid/believable conclusion:

- All living things grow
- Computers do not grow
- Computers are not living things

Does conclusion follow logically from premises?

YES or NO
Examples of Arguments

Valid/nonbelievable conclusion:

All things made of plants are good for the health
Cigarettes are things made of plants
Cigarettes are good for the health

Does conclusion follow logically from premises?

YES or NO
Concrete VALID Arguments

![Bar chart showing percent “Valid” responses for Believable and Unbelievable arguments for European American and Korean participants.](chart.png)
Concrete Invalid Arguments


Believable
Unbelievable

Percent “Valid” Responses

- European American
- Korean
Abstract Arguments

- European American
- Korean

Percent "Valid" Responses

<table>
<thead>
<tr>
<th></th>
<th>Valid</th>
<th>Invalid</th>
</tr>
</thead>
<tbody>
<tr>
<td>European</td>
<td></td>
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<tr>
<td>American</td>
<td></td>
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<tr>
<td>Korean</td>
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Choice Set
Choi et al, 2003, *JPSP*

- Koreans and Americans read murder case
- Then evaluated a list of clues
- Asked to include relevant info or exclude irrelevant info
- Info was equally familiar to both cultures
Koreans kept a lot more info. relevant to a murder case than Americans when asked to exclude than include.
Differences in Attention/Perception

• Perceptual memory
• Similarity ratings
• Categorization
• Eye movements
Seeing the Object and the Field (Masuda & Nisbett, 2001) Phase 1: Recall Task

41 American participants at the University of Michigan and 44 Japanese participants at Kyoto University, Japan.
Phase 2: Recognition Task

Fish with Original Background

Fish with No Background

Fish with Novel Background
Seeing the Object and the Field (Masuda & Nisbett, 2001) Phase 1: Recall Task

Japanese and Americans recalled equal amounts of detail about focal fish, but Japanese recalled 70% more background information.
Previously Seen Objects (USA)
Previously Seen Objects (Japan)
Procedure: Trial Example

Group 1

Group 2

Target Object
Procedure: Trial Example

Group 1

Group 2

Target Object
Similarity Judgments

Norenzayan et al, Cog Sci, 2002, Study 2

- European American
- Asian American
- East Asian

Percent Similarity Judgment

Rule
Family Resemblance
Classification Responses


- **Percent Classification**
  - European American
  - Asian American
  - East Asian

Legend:
- Red: Rule
- Blue: Family Resemblance
Framed Line Task:

Target Stimulus

Relative Task

Absolute Task
Framed Line Task:  

- Subjects see line in square frame
- Frame is removed and Ss are shown a different frame that is either larger, smaller or equal in size to the first frame
- Two within-subjects conditions
  - **Relative task**: Participants draw a line in the new frame that has the same proportion as the original
  - **Absolute task**: Participants draw a line in the new frame that has the same absolute length as the original
Results: Experiment 1

![Graph showing mean absolute error for Japanese and Americans in absolute and relative task. The graph indicates that Japanese Americans have a lower mean absolute error compared to Americans in the absolute task.](image-url)
Eyetracking (Chua and Nisbett, 2005)
Study Phase
Chinese have poorer memory for old objects in new backgrounds $p = .03$)
Chinese made more saccades to each picture presentation than Americans ($p < .05$).
Chinese made more saccades to background than Americans (p = .003). No diff. in number of saccades to the object.
Americans look at the object sooner than Chinese \((p = .02)\).
Americans have longer fixations than Chinese ($p = .01$). Compared to Chinese, Americans also have substantially longer fixations on objects than on backgrounds ($p = .02$).
Meta-Analysis
(Miyamoto et al, 2006)

• Cognitive differences between East Asians and Westerners
• Average $d = .60$
• Differences as large for perceptual tasks as for conceptual tasks
• As expected differences larger for EA living in EA than those tested in North America
Some Alternatives

• Task Demands
  – No diffs in control conditions with same demands
  – Consistent across different degrees of task demands

• Sampling biases
  – Diffs controlling for demographic variables
  – Diffs whether or not students are sampled

• Language
  – Differences even when tested in English (but often reduced)
  – Differences even in minimally-linguistic tasks
Evidence from Other Cultures

- Arabs
- Mapuche farmers in Chile
- Eastern vs. Western Europeans
- Southern vs. Northern Italians
- Southern vs. Northern Japanese
Group Embedded Figures Test

Here is a simple form which we have labeled "X":

![Simple Form](image)

This simple form, named "X", is hidden within the more complex figure below:

![Complex Figure](image)
Belief Bias: Design

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Group Embedded Figures Test

Field Independence

CULTURE

$F(2, 102)=10.41, \ p=.001$

Controlling for religiosity didn’t alter results
Belief Bias Valid & Invalid

Mean Degree of Belief Bias

Arabic

Chinese

Euro

CULTURE

$F(2, 113)=4.47, p=.01$

Controlling for religiosity didn’t alter results
Mapucheland
Mapuche Study (Henrich)

- N = 23, 18 men, 5 women
- Mean age = 50, range 26-80
- Mean education in years = 5.7, range 0-12
- Classification task: relational vs. categorical (feature based)
- Westerners reliably biased towards category-based classification
Ji, Zhang & Nisbett, *JPSP* 2004
83%
91%
Ji, Zhang & Nisbett, *JPSP* 2004

![Graph showing the number of groupings (relational minus categorical) for different groups: Mainland Chinese in China, Mainland and Taiwan Chinese in the United States, Hong Kong and Singapore Chinese in the United States, and European Americans. The graph compares data for Chinese Language and English Language.]
Overall Mapuche Results

- Mean of relational = 81%, SD = 16%

Years of education only predictor of classification, r=.40, p=.05
Other Cultures

• Eastern Europeans more relational than Western Europeans (Knight et al)
• Southern Italian HS students (Naples) more relational than Northern Italians (Milan) (Knight et al)
• Russians and Malaysians more field dependent than Americans and Germans (Kuhnen et al, 2001)
• Southern Japanese (Hokkaido) more holistic in causal explanation than Northern Japanese (Kyoto) (Kitayama et al 2006)
Cultural Distribution of Analytic Reasoning

• East-West or West vs. the Rest?
• Or uniqueness of Post-Enlightenment Modern West?
Mechanisms

What mechanisms mediate the cultural difference?

– Independence-interdependence
– Education: oriental medicine, western formal education
– Visual affordances of environment
Priming Self-Construal
Kuhnen & Oyserman, 2002, JESP

Independent:
I, ME, MINE

Interdependent:
US, OUR, WE
Perceptual Affordances
(Miyamoto, Nisbett, & Masuda, 2006, *Psych Science*)

- Japanese scenes, compared to American ones, are more complex
  - Have more objects
  - Have more interpenetrating objects
- Americans incidentally primed with Japanese scenes become more holistic in unrelated task
Educational Practices

• Western style formal education best predictor of analytical solutions (Scribner, 1977)

• Training in Oriental Medicine increases holistic responses among Korean students (Koo & Choi, 2005)
Conclusions

- Dual process models critical for cross-cultural comparisons
- Two reasoning systems exist in principle in the cognitive repertoire of all cultures (*Existential Universal*)
- But cultures differ in reliance and accessibility (*Variability in accessibility and function*)
Cross Cultural Status of Mental Process

Same Cognitive Availability

YES

Same Use

NO

YES

Same Accessibility

NO

YES

Resultant Level of Universal

Non-Universal
(Cultural Invention)

Existential Universal
(Variation in Function)

Functional Universal
(Variation in Accessibility)

Accessibility Universal
(No Cultural Variation)

Norenzayan & Heine, 2005, *PsyBull*