The Dragon in the Cockpit:
A Chinese view about the differences between China and the West in aviation

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Contents

• Overview of the basic argument – linear and non-linear thinking
• Origin of the differences – Chinese writing + fundamental beliefs
• Operation of the differences – effects on technological development
• Differences in aviation – effects on CRM
• Differences in the future
The basic questions

How different are the two cultures in aviation?
How to comprehend the difference?
oracle scripts

origin of the Chinese characters

How do they convey information?
Western phonetic writing

meaning
sound
form

meaning carried mostly by sound

Chinese ideographic writing

meaning
sound
form

meaning carried mostly by form
The Alphabet Effect

- 2004 book by Robert K. Logan
- Contrasted thought patterns of societies with alphabetic/phonetic scripts with pictographic writing
- Alphabetic: abstract, Pictographic: concrete
- Implications for scientific development
- Technology: concrete objects, instruments
- Science: abstract laws, theorems
- The merger of science and technology in the 20th century
How do we make sense of the world?

In the West, What is it?
looking for essence through disassembly by using dialog

In China, 這是甚麼東西？
(What is this east-west?)
looking for feature through analogy by using vision

and the difference is everywhere!
Information processing of thinking pattern

- Since we have to make sense of everything, thinking is a **cycle** of information processing
- In the West, through dialogue
  - Sequential
  - Parallel
  - One-dimensional information processing
- In China, through vision
  - Networking
  - Ideographic
  - Two-dimensional information processing
differences in aviation
linear thinking

ideographic thinking

thinking along a line

thinking around a circle

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Fundamental difference in aviation

Figure 4.4  Global aviation accident rates shown as fatal accidents per million departures in different regions of the world
Figure 4.5  Worldwide percentages of accidents in which the human error includes pilots not strictly adhering to the SOP

What makes the difference?
Western theories, linearized artifacts......

Sequence

Social environment and ancestry
Fault of person
Unsafe act
Accident
Injury

Figure 4.1 Illustration of the domino theory proposed by Heinrich

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Figure 4.2 Illustration of the accident chain theory proposed by Boeing
Figure 4.3  Illustration of the basic concept of Reason’s “Swiss cheese” theory
Hofstede’s 4-dimensional Value System

• Power distance
• Individualism
• Uncertainty avoidance
• Masculinity

*These are linear values?*
Strongest differences between pilots of different countries (by Helmreich and Merritt)

1. command roles and interactions;
2. attitude toward orders, rules and routines;
3. preference for and reliance on automation.
And the correlations between them are.....

<table>
<thead>
<tr>
<th>Helmreich’s scales</th>
<th>Hofstede’s indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PD</td>
</tr>
<tr>
<td>Command roles</td>
<td>0.79</td>
</tr>
<tr>
<td>Rules and orders</td>
<td>0.67</td>
</tr>
<tr>
<td>Preference for automation</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Hence, the strongest differences in values between pilots of different countries are power distance and individualism.
In the West, power is a distance......
“Power distance” in China?

Is power a distance in China?
The throne of emperor surrounded by countless dragons
dragon: symbol of imperial power (emperor-father)
symbol of Chinese authoritarianism
evolved from six real animals (proto-dragon)
crocodile, tiger, snake
fish, pig
hynobius
Combined in Shang Dynasty....

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Results of a Survey of Flight Crews

– Conducted by NCKU, 2000
– Cooperation of all Taiwanese airlines
– Sponsored by Aviation Safety Council
– Technical Assistance from Wayne State University
### Table 6.1 Questions related to inscrutable power

<table>
<thead>
<tr>
<th>N</th>
<th>Question</th>
<th>Taiwanese CAP</th>
<th>Foreign CAP</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Q24</td>
<td>I am reluctant to express disagreement with my superiors.</td>
<td>3.10</td>
<td>0.99</td>
<td>2.37</td>
</tr>
<tr>
<td>Q59</td>
<td>When I am communicating to my superiors, I need to be careful how I approach him.</td>
<td>3.64</td>
<td>0.85</td>
<td>3.19</td>
</tr>
<tr>
<td>Q1</td>
<td>If I perceive a problem with the flight, I will speak up, regardless of who may be affected.</td>
<td>4.40</td>
<td>0.80</td>
<td>4.65</td>
</tr>
<tr>
<td>Q16</td>
<td>During an emergency I still like to ask the crewmembers’ opinion before I make a decision.</td>
<td>3.74</td>
<td>0.98</td>
<td>4.01</td>
</tr>
<tr>
<td>Q43</td>
<td>I feel comfortable going to my manager’s office to discuss problems or operational issues.</td>
<td>3.21</td>
<td>1.10</td>
<td>3.48</td>
</tr>
</tbody>
</table>
Table 6.2  Questions and data related to leadership style

Please read the following descriptions of four different leadership styles, and answer the questions that follow:

Style A Leader usually makes decisions promptly and communicates them to subordinates clearly and firmly, and expects them to carry out the decisions loyally and without raising difficulties.

Style B Leader usually makes decisions promptly, but, before going ahead, tries to explain them fully to subordinates. The leader gives the reasons for the decisions and answers whatever questions they may have.

Style C Leader usually consults with subordinates before reaching decisions, and listens to their advice, considers it, and then announces the decision. The leader expects all to work loyally to implement it whether or not it is in accordance with the advice they gave.

Style D Leader usually calls a meeting of subordinates when there is an important decision to be made. The leader puts the problem before the group and invites discussion, and accepts the majority viewpoint as the decision.

<table>
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<th>N</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>Q66</td>
<td>Which one of the above styles of leadership would you most prefer to work under?</td>
<td>1.85</td>
<td>0.77</td>
</tr>
<tr>
<td>Q67</td>
<td>In your organization, which style do you find yourself most often working under?</td>
<td>3.48</td>
<td>0.84</td>
</tr>
</tbody>
</table>

$t_{crit} = 1.645, \alpha = 0.05$
Table 6.3   The higher expectation about superiors frequently resulted in lower satisfaction

<table>
<thead>
<tr>
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<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Q61</td>
<td>My superiors are courteous and polite when they are talking to me.</td>
<td>3.54</td>
<td>0.88</td>
<td>4.07</td>
</tr>
<tr>
<td></td>
<td>The resources that my company devotes to employees’ training are adequate.</td>
<td>3.26</td>
<td>1.09</td>
<td>3.81</td>
</tr>
<tr>
<td>Q82</td>
<td>How does your company support you in your job?</td>
<td>2.96</td>
<td>0.74</td>
<td>3.22</td>
</tr>
<tr>
<td>Q49</td>
<td>My immediate superior participates in CRM.</td>
<td>3.49</td>
<td>1.03</td>
<td>3.77</td>
</tr>
<tr>
<td>Q32</td>
<td>I think my company has a long-term flight safety plan.</td>
<td>3.16</td>
<td>1.10</td>
<td>3.43</td>
</tr>
<tr>
<td>Q28</td>
<td>Management will compromise safety concerns for profitability or any other reason.</td>
<td>3.26</td>
<td>1.26</td>
<td>3.00</td>
</tr>
</tbody>
</table>
Features of Chinese Authoritarianism

• Frightening inscrutable power
  – Obedience
  – Respect
  – Fear of punishment

• Benevolent auspicious expectation
  – Kindness
  – Taking care
  – Superb superiority

• Family clan
Table 8.1 Survey questions relating to interpersonal relations

<table>
<thead>
<tr>
<th>N</th>
<th>Questions</th>
<th>Local Captain</th>
<th>Foreign Captain</th>
<th>t-test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>Q34</td>
<td>The pilots I fly with in my company are good communicators.</td>
<td>3.83</td>
<td>0.59</td>
<td>3.34</td>
<td>0.82</td>
</tr>
<tr>
<td>Q35</td>
<td>The pilots I fly with in my company maintain good situation awareness.</td>
<td>3.87</td>
<td>0.55</td>
<td>3.52</td>
<td>0.95</td>
</tr>
<tr>
<td>Q38</td>
<td>The pilots I fly with in my company manage the workload effectively.</td>
<td>3.96</td>
<td>0.57</td>
<td>3.71</td>
<td>0.82</td>
</tr>
<tr>
<td>Q40</td>
<td>The pilots I fly with make appropriate decisions in a timely manner.</td>
<td>3.86</td>
<td>0.58</td>
<td>3.69</td>
<td>0.77</td>
</tr>
<tr>
<td>Q36</td>
<td>The pilots I fly with in my company are good team players.</td>
<td>3.84</td>
<td>0.61</td>
<td>3.69</td>
<td>0.80</td>
</tr>
<tr>
<td>Q65</td>
<td>Whenever there is conflict, people in my company are more concerned with what is right instead of who is right.</td>
<td>3.45</td>
<td>0.94</td>
<td>3.18</td>
<td>1.11</td>
</tr>
<tr>
<td>Q55</td>
<td>The people I work with faithfully follow the company’s standard operating procedures.</td>
<td>4.11</td>
<td>0.62</td>
<td>3.97</td>
<td>0.86</td>
</tr>
<tr>
<td>Q18</td>
<td>I will make a special effort to understand crewmembers from other nationalities.</td>
<td>3.52</td>
<td>0.86</td>
<td>4.33</td>
<td>0.74</td>
</tr>
<tr>
<td>Q19</td>
<td>I like to work with pilots from different nationalities.</td>
<td>3.08</td>
<td>1.04</td>
<td>3.84</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Notes: * p<0.05; ** p<0.01; *** p<0.001 (5 = “strongly agree,” 4 = “agree,” … 1 = “strongly disagree”).
Interpersonal relations in China are many flexible circles changing with situations

Figure 8.1  The four-level differentiated order together with the moving scale of family–outsider to portray the Chinese concept of interpersonal relations
Guanxi

- A central concept in Chinese culture
- Can mean relation and connection … but much more!
- Emphasizes relationships – contrast to individualism
- Guanxi gradient – the slope of guanxi effects from interpersonal distance
Guanxi gradient: a continuous spectrum

Figure 8.3 The international “guanxi gradients,” the decay of the attitude according to the changing degree of intimacy, for pilots from different regions.
Figure 8.4 Global aircraft accident rates and guanxi gradients
Figure 8.6
The role of guanxi gradient and its influence on CRM activities
differences in the future
results of adaptation

Figure 11.1  Ten-year moving average accident rates of commercial jet aircraft in Taiwan

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normalized difference

<table>
<thead>
<tr>
<th>Year</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>-0.184</td>
</tr>
<tr>
<td>2008</td>
<td>-0.165</td>
</tr>
</tbody>
</table>

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estimated: 0.003/yr
actual: 0.002+/yr

Figure 11.3 The difference of the measured guanxi gradients in 2000 and 2008 surveys
The problem is that it is much more faster for the last thirty years.....

The Chinese COMAC C-919.....
The Chinese space program.....
Zheng He’s treasure ship (four hundred feet) and Columbus’s St. Maria (eighty-five feet). (Illustration by Jan Adkins, 1993.)
Einstein: Peace cannot be kept by force, it can only be achieved by understanding.

Mutual understanding → harmonious sky