Privacy and Composition
(Part 2)

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High inputs	

Program 1

High outputs	

Low outputs

Low inputs
Low inputs

Program 2

Low outputs
Failure of Composition

Composite System

Program 1
- High inputs
- Low outputs
- High outputs
- Low inputs

Program 2
- Low inputs
- Low outputs

High inputs
Low outputs
High inputs

Program 2

High outputs

High inputs
Failure of Composition

Composite System

Program 1
High outputs
High inputs
Low outputs

Program 2
High inputs
High outputs

High inputs
High outputs
## Noninterference Compositional and Not

<table>
<thead>
<tr>
<th>Feedback</th>
<th>Not in general</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cascade (sequential)</td>
<td>Yes</td>
</tr>
<tr>
<td>Product (parallel)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

[McLean, 1996]
Purpose Restrictions in Privacy Policies

• Yahoo!'s practice is not to use the content of messages [...] for marketing purposes.

• By providing your personal information, you give [Social Security Administration] consent to use the information only for the purpose for which it was collected.
Auditing

- Purpose restriction
- Auditee’s behavior
- Environment Model

- Obeyed
- Inconclusive
- Violated
Record for treatment

Behavior log

Consistent with treatment

Consistent with observed behavior
Behavior log

Record for cost reduction

Consistent with cost reduction

Consistent with observed behavior

Solver
Record for treatment

Solver

Record for cost reduction

Solver

Consistent with treatment

Consistent with observed behavior

Consistent with cost reduction

Behavior log
<table>
<thead>
<tr>
<th>Purpose</th>
<th>Compositional and Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simultaneous</td>
<td>No</td>
</tr>
<tr>
<td>Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>Sequential</td>
<td>Yes</td>
</tr>
</tbody>
</table>
'We'll be back': Hong Kong protesters chant as camp site dismantled

Reuters | Dec 12, 2014, 08:39 AM IST

HONG KONG: Hong Kong police arrested pro-democracy activists and cleared most of the main protest site on Thursday, marking an end to more than two months of street demonstrations in the Chinese-controlled city, but many chanted: "We will be back".

Most activists chose to leave the Admiralty site, next to the Central business area, peacefully, despite their demands for a free vote not being met. But the overall mood remained defiant.

Hong Kong Federation of Students leader Alex Chow said: "You might have the clearance today but people will come back on to the streets another day."
## Settings for Google ads

Ads enable free web services and content. These settings help control the types of Google ads you see.

<table>
<thead>
<tr>
<th>Ads on Google</th>
<th>Google ads across the web</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Search" /></td>
<td><img src="image" alt="Google ads across the web" /> <img src="image" alt="YouTube" /></td>
</tr>
<tr>
<td><img src="image" alt="Gender" /> N/A</td>
<td><img src="image" alt="Female" /> <img src="image" alt="Edit" /> <img src="image" alt="Based on the websites you've visited" /></td>
</tr>
<tr>
<td><img src="image" alt="Age" /> N/A</td>
<td><img src="image" alt="25-34" /> <img src="image" alt="Edit" /> <img src="image" alt="Based on the websites you've visited" /></td>
</tr>
<tr>
<td><img src="image" alt="Languages" /> N/A</td>
<td><img src="image" alt="English" /> <img src="image" alt="Edit" /> <img src="image" alt="Based on the websites you've visited" /></td>
</tr>
<tr>
<td><img src="image" alt="Interests" /> N/A</td>
<td><img src="image" alt="Air Travel, and 30 more" /> <img src="image" alt="Edit" /> <img src="image" alt="Based on the websites you've visited" /></td>
</tr>
<tr>
<td><img src="image" alt="Opt-out settings" /></td>
<td><img src="image" alt="Opt out" /> of interest-based Google ads across the web</td>
</tr>
</tbody>
</table>

You've opted out of *interest-based* ads on Google. **Opt in** to *interest-based* ads on Google.
Discrimination

Web browsing

Ad ecosystem

Ad settings

Advertisements

Browse websites related finding a new job

Set the gender bit to female or male

Significant difference ads on news website ($p < 0.000006$)

[Datta, Tschantz & Datta 2015]
Discrimination Explanation

Female Group

Jobs (Hiring Now)
www.jobsinyourarea.co
45 vs. 8

4Runner Parts Service
www.westernpatoyotaservice.com
36 vs. 5

Male Group

$200k+ Jobs - Execs Only
careerchange.com
311 vs. 1816

Find Next $200k+ Job
careerchange.com
7 vs. 36

Criminal Justice Program
www3.mc3.edu/Criminal+Justice
29 vs. 1

Become a Youth Counselor
www.youthcounseling.degreeleap.com
0 vs. 310
Out Bided on Women but Not Men

<table>
<thead>
<tr>
<th>Bids for Females</th>
<th>Bids for Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7 Makeup</td>
<td>$4 Job</td>
</tr>
<tr>
<td>$5 Dress</td>
<td></td>
</tr>
<tr>
<td>$4 Job</td>
<td>$4 Job</td>
</tr>
<tr>
<td>$2 Hair Salon</td>
<td></td>
</tr>
<tr>
<td>$1 Car</td>
<td>$1 Car</td>
</tr>
</tbody>
</table>
Who’s to Blame?

- Career coaching service: place same bids for females and males
- Other advertisers: place bids on females for products that cater only to women
- Google: show the highest bid
References


